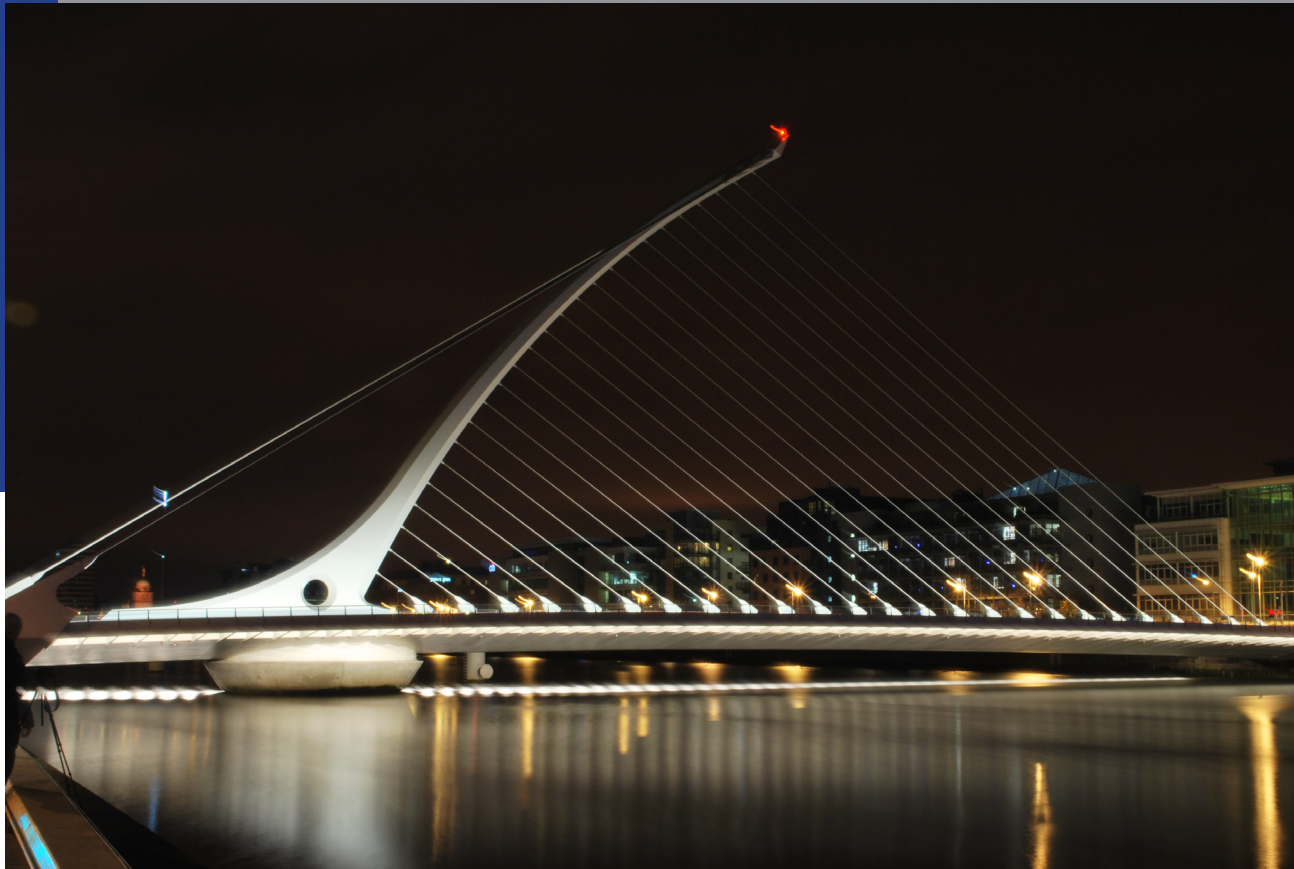


Liffey Cycle Route Options Assessment Report



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Liffey Cycle Route Options Assessment Report

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Note: The Authors acknowledge the use of imagery from Google Maps and Google Earth in the preparation of this report.

EXECUTIVE SUMMARY

The Liffey Cycle Route has been an important objective of Dublin City Council [DCC] and the National Transport Authority [NTA] and since 2013. Various studies have been undertaken to determine how best to advance Primary Route 5 of the Cycle Network Plan for the Greater Dublin Area. In 2017, DCC and the NTA agreed that an independent assessment of all options previously considered as well as any new options that hadn't been identified to date should be commissioned. The NTA appointed a consultant to undertake this assessment. This report presents the outcome of that detailed assessment.

The detailed route options assessment for the proposed River Liffey Cycle Route covered an area between the Phoenix Park to the west and Tom Clarke Bridge (East-Link) to the east, a length of almost 5km. The study considered route options across an area spanning from Parnell Street in the north of the city, to Thomas Street / Dame Street in the south. The study considered a variety of cycle facility types, including one-way and two-way options. Each option was considered in the context of its feasibility, its capacity to deliver the scheme objectives, the associated traffic management issues, and its effects on the environment.

The objectives of the project were:

1. To provide safe, continuous cycle facilities in both directions between the Phoenix Park / Heuston Station and the Tom Clarke East Link Bridge, with a Quality of Service of A or A+, where practicable;
2. To comply with the National Cycle Manual; to be cognisant of the Principles of Sustainable Safety; and to meet the five needs of cyclists; and
3. To be consistent with the National Cycle Policy Framework and the Transport Strategy for the Greater Dublin Area 2016 – 2035.

The scheme was considered in four sections along the course of the Lower River Liffey between the Phoenix Park and the Tom Clarke East link Bridge. A detailed optioneering assessment was undertaken for the western three sections:

- Section 1: Phoenix Park to Father Matthew Bridge (Church St / Bridge St);
- Section 2: Father Matthew Bridge to O'Connell Bridge; and
- Section 3: O'Connell Bridge to Matt Talbot Memorial Bridge.

Previous plans for Section 4 from Matt Talbot Memorial Bridge to Tom Clarke East Link Bridge were reviewed and found to already address the requirements of the Liffey Cycle Route project.

The conclusion of the assessment is that a 5km long Liffey Cycle Route from the Phoenix Park to the East Link is feasible.

- In the western section of the route, over a length of 2km the cycle tracks will be located on the buildings side of the traffic lanes.
- In the busiest central section over a length of 1.2km, the cycle tracks will be located on the river side of the traffic lanes so as to avoid very busy bus stops on the buildings side of the road.
- The final eastern section over a distance of 1.8km through the Docklands will consist of two-

way cycle tracks alongside the river on both sides.

The scheme will provide full segregation of cyclists from other traffic along its length.

The Liffey Cycle Route will be generally 2.0m wide for the one-way sections (except at unavoidable pinch-points), and 3.5m wide for the two-way sections. The scheme can be delivered with limited impacts on other road users and will benefit the busy bus corridor along this route where cyclists and buses currently mix. The scheme can be delivered with limited impacts on other road users in line with the Dublin City Development Plan (2016-2022).

Previous studies of the Liffey Cycle Route project highlighted a number of specific pinch points along the River Liffey Quays, notably at Liam Mellows and James Joyce Bridges, at Parliament St and Essex Quay and at the Merchants Arch. The recommended scheme includes proposals to overcome these constraints through sensitive interventions which are cognisant of the historic and protected nature of city's Quay Walls and Bridges.

The scheme includes new boardwalks to improve capacity for pedestrians and the quality of the walking environment along the corridor, while also enhancing the river environment as a public realm. Sections of new and extended boardwalk will be necessary at a number of locations along the River Liffey corridor to provide sufficient width for all road users, in particular pedestrians. Some trees will have to be removed along the corridor to accommodate the scheme, but compensatory landscaping will be provided to mitigate the loss of existing trees along the corridor.

1. INTRODUCTION

Roughan & O'Donovan was engaged by the National Transport Authority to carry out a review of the proposed Liffey Cycle Route and to prepare an Options Assessment Report, which should consider all possible options, including but not limited to those considered in earlier studies. Options considered must in all instances be respectful of the sensitive receiving environment and changing urban landscape. This report presents a summary of the earlier work, additional options considered, and a route options appraisal leading to the Recommended Option.

The River Liffey corridor is:

- Is a critical public transport corridor through the city centre, and also facilities access for deliveries and car parking;
- Is an important route for cycling which has seen significant growth along this corridor while also seeing a continuing decline in private car use;
- Is an important ecological corridor through Dublin City Centre's built environment;
- Has significant commercial and retail activity;
- Is a valuable amenity for its residential communities, sporting interest groups, and tourists alike;
- Is an important heritage corridor, housing many of the city's most iconic and important landmark buildings and bridges, and its historic quay walls; and
- Is a primary utilities corridor carrying underground trunk services.

The proposed Liffey Cycle Route aims to serve the significant¹ and increasing cycling demand that exists through Dublin City Centre and will connect the other principal radial cycling routes into the city centre and will improve the cycling and pedestrian environment. This will have significant benefits both for citizens and tourist alike and will make the city centre and the Phoenix Park more accessible for all.

The following information was available to the Project Team to inform the Options Assessment process:

- Topographical Surveys;
- Extensive, multi-annual traffic count data;
- Collision Data²;
- Geotechnical Information for recent projects;
- Planning Records;
- Utility and Service Records; and
- Desktop Heritage Studies prepared for earlier Study.

¹ Refer to 2018 May and November City Centre Count Data published by Dublin City Council

² Road Safety Authority Collision Data - RSA

2. CONTEXT

2.1 Need for the Scheme

The need for the Liffey Cycle Route was identified in the Greater Dublin Area [GDA] Cycle Network Plan (2013)³, and is incorporated into the approved National Transport Authority Greater Dublin Area Transport Strategy (2016 – 2035). The route is designated as Primary Corridor No.5, a west – east route between Parkgate Street and the Point Roundabout, along the Liffey Quays. The proposed Liffey Cycle Route will intersect several other Primary and Secondary cycle routes identified in the GDA Cycle Network Plan.

The objectives of the project are as follows:

1. To provide safe, continuous cycle facilities in both directions between the Phoenix Park / Heuston Station and the Tom Clarke East Link Bridge, with a Quality of Service of A or A+, where practicable;
2. To comply with the National Cycle Manual; to be cognisant of the Principles of Sustainable Safety; and to meet the five needs of cyclists; and
3. To be consistent with the National Cycle Policy Framework and the Transport Strategy for the Greater Dublin Area 2016 – 2035.

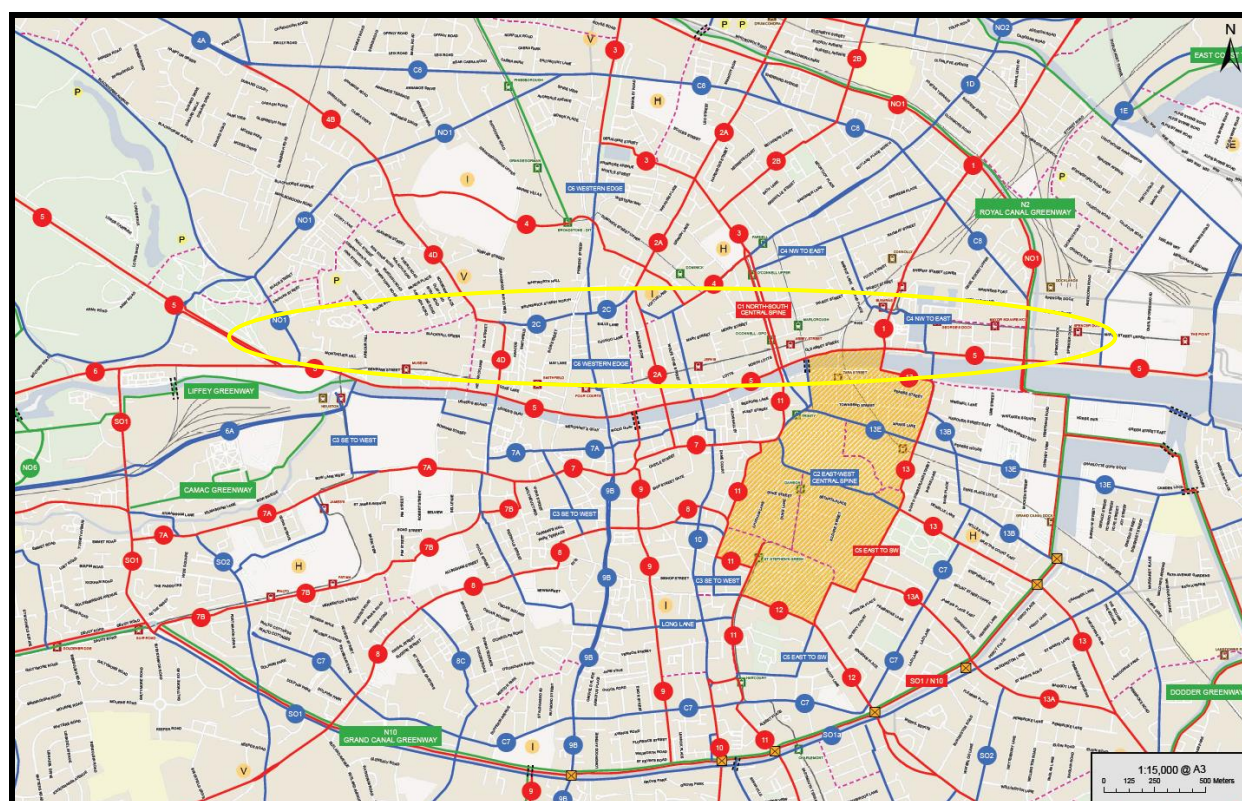


Figure 2.1 Dublin City Centre Cycle Network Plan [Extract from GDA Cycle Network Plan] with Liffey Cycle Route highlighted]

Dublin City Council's Development Plan (2016 – 2022)⁴ incorporates the roll-out of the GDA Cycle Network Plan, including the proposed Liffey Cycle Route. It further identifies the need for public realm enhancements along the river corridor.

2.2 Existing Facilities

2.2.1 North Quays

Existing cycle facilities along the Liffey Quays are inconsistent and discontinuous. There are sections of on-road cycle lane on the north quays between Heuston Station and O'Connell Bridge. Cycle lane facilities exist along the building side only and varies between one-way on-road cycle lane and shared bus lane in the west to east direction only. Where a cycle lane is marked, it varies between mandatory (solid line) and advisory (dashed line). There are numerous interactions with bus stops, parking bays, and left turning vehicles, which present frequent hazards for cyclists. Furthermore, it is difficult for cyclists on the Quays to access the opposite side of the river, as a result of the current traffic regime, banned turns and one-way streets and bridges. This results in illegal manoeuvres being made at various locations, as evidenced by the traffic count data⁵.

Similarly, between O'Connell Bridge and Butt Bridge, the cycle lane is only present in the west to east direction along the buildings side and is demarcated as advisory, with significant interaction with bus stops, parking bays and a heavy two-lane left turn to Beresford Place and Gardiner Street Lower. Between Butt Bridge and Memorial Bridge, the cycle lane is mandatory and is interrupted by one bus stop at the Custom House. Some cyclists also use the very wide footpath along the river side of the north quays between Butt Bridge and Matt Talbot Memorial Bridge to gain access to and from the Dublinbikes station, in the absence of a formal cycle facility.

Between Matt Talbot Memorial Bridge and the Point Roundabout, the on-road cycle facility along the building side of the north quays varies between predominately advisory and shared with the bus lane. There are no cycle or bus lane facilities through the pinch-points at the two Scherzer Bridges, located at Spencer Dock and George's Dock. Along the river side of this section of the North Quays, there is an additional cycle facility which varies between two-way off-road (between Samuel Beckett Bridge and the Point Roundabout), one-way off-road in the east-west direction (between Matt Talbot Memorial Bridge and Samuel Beckett Bridge) and on road shared with buses in the east-west direction where pinch points exist. Three particular pinch-points exist along this facility, at the Dublin City Council Docklands office, at the commercial pods opposite Excise Walk and at the Spencer Dock Scherzer Bridge. The alignment of the cycle track is poor, and usage is restricted by the discontinuities and poor access to and from the route.

The means of assessing the Quality of Service of cycling facilities is outlined in the National Cycle Manual⁶. Using these criteria, the Quality of Service of the existing facilities is D – the lowest level.

⁴ www.dublincity.ie/main-menu-services

⁵ Traffic Count Data – June 2018 published by Dublin City Council

⁶ <https://www.cyclemanual.ie/manual/thebasics/quality/>

³ www.nationaltransport.ie/wp-content

2.2.2 South Quays

Along the south quays, there are no dedicated cycle facilities available between Heuston Station and O'Connell Bridge and cyclists share the bus lanes, which have some gaps in continuity. Victoria Quay is noted for its particular hostile environment, with multiple lanes, high speeds and significant weaving and lane indiscipline. Cyclists wishing to access Heuston Station and those wishing to travel north towards Parkgate Street and the Phoenix Park have to negotiate these hostile conditions. The intersection of Parliament St and Essex Quay is an area where improvement is required, as two general traffic lanes offer no protection to cyclists through this section. The limited available width and weaving manoeuvres between vehicles, particularly at bus stops, taxi ranks, and loading bays makes the environment unattractive for cycling - especially for inexperienced and slow moving cyclists.

Further east from O'Connell Bridge to Matt Talbot Memorial Bridge, the cycle facilities are generally advisory, which allows other vehicles to weave across the cycle route to bus stops, parking/loading facilities, and left turns.

From Matt Talbot Memorial Bridge to Samuel Beckett Bridge a two-way segregated cycle track has been implemented by Dublin City Council, following adjacent to the river side footpath on the south side of the river.

Given the inconsistencies and discontinuities in cycle facility provision along the south quays, the Quality of Service of the existing facilities is D – the lowest level.

2.3 Demand

2.3.1 Cycling Flows

The Cycle Network Plan for the Greater Dublin Area published in 2013 included an extensive assessment of the [then] current cycling flows across the Greater Dublin Area, and the projected 2021 flows⁷. More recent survey data⁸ indicates that the projected 2021 bicycle traffic flows along the River Liffey corridor have been exceeded already [2018] and that demand continues to grow, even with the current limited dedicated infrastructure provision. This could be due to factors such as the continuing success of the Dublinbikes scheme, the Bike to Work tax saver scheme, the HGV canal cordon ban, and increased public awareness of the societal benefits associated with cycling.

In demand terms, the GDA Cycle Network plan expected AM peak (7am – 10am along Bachelors' Walk) to exceed 900 cyclist by 2021. Traffic counts from June 2018 shows, cycling numbers in excess of 1080 (compared to 950 private cars). Even the absence of any infrastructure improvement (which the GDA Cycle Network Plan assumed), it is reasonable to assume that cycle trips will continue to increase further.

2.3.2 Movement Patterns

In broad terms, movement patterns along the River Liffey corridor can be broken into four distinct sections:

- Section 1: Phoenix Park to Father Matthew Bridge (Church Street);

- Section 2: Father Matthew Bridge to O'Connell Bridge;
- Section 3: O'Connell Bridge to Matt Talbot Memorial Bridge;
- Section 4: Matt Talbot Memorial Bridge to Tom Clarke East Link Bridge (the Point).

Current data shows demand through Section 1 is generally linear from the western suburbs towards the city centre. The new Technical University of Dublin [formerly DIT] campus at Grangegorman will also be accessed from this section.

Through Section 2 – the historic city centre, turning demand increases with the increasing number of trip attractors and other routes on each side of the river.

In Section 3 – the core city centre, all of the city's transit modes come together, and light rail, buses, bicycles, pedestrians, deliveries, taxis and private cars all compete for limited road space and priority. The amount of time that can be apportioned to any given mode or direction is constrained by these competing demands through this congested section. Through cycling demand flows along the river corridor are marginally lower through this section, however north-south cycling flows are significantly higher resulting in a greater overall number of cyclists.

Section 4, the Docklands, is the area of the city experiencing the greatest quantum of development and, consequently, cycling demand. Many of the new developments in this area include little or no provision for private cars, and this will necessitate a large proportion of their occupants travelling to and from the area by bicycle.

2.4 Collision Data

A review of historic accident data along the River Liffey Corridor was undertaken to inform this study. The Road Safety Authority Collision Database⁹ was interrogated. Data from 2005 – 2015 was analysed for incidents involving cyclists and for other modes.

Location	Mode	No. Incidents	No. Fatal	No. Serious Injuries	No. Minor Injuries
Liffey Quays	Cyclist Only	58	3	5	50
	All Modes	330	10	42	278

The incident data showed that 18% of all incidents on the Liffey Quays involved cyclists despite cyclist demand historically representing a lower percentage of total demand.

⁷ https://www.nationaltransport.ie/wp-content/uploads/2014/04/Cycling_Demand_Maps11.pdf

⁸ Refer to 2018 May and November City Centre Count Data published by Dublin City Council

⁹ <http://www.rsa.ie/en/RSA/Road-Safety/Our-Research/Collision-Statistics/Ireland-Road-Collisions/>

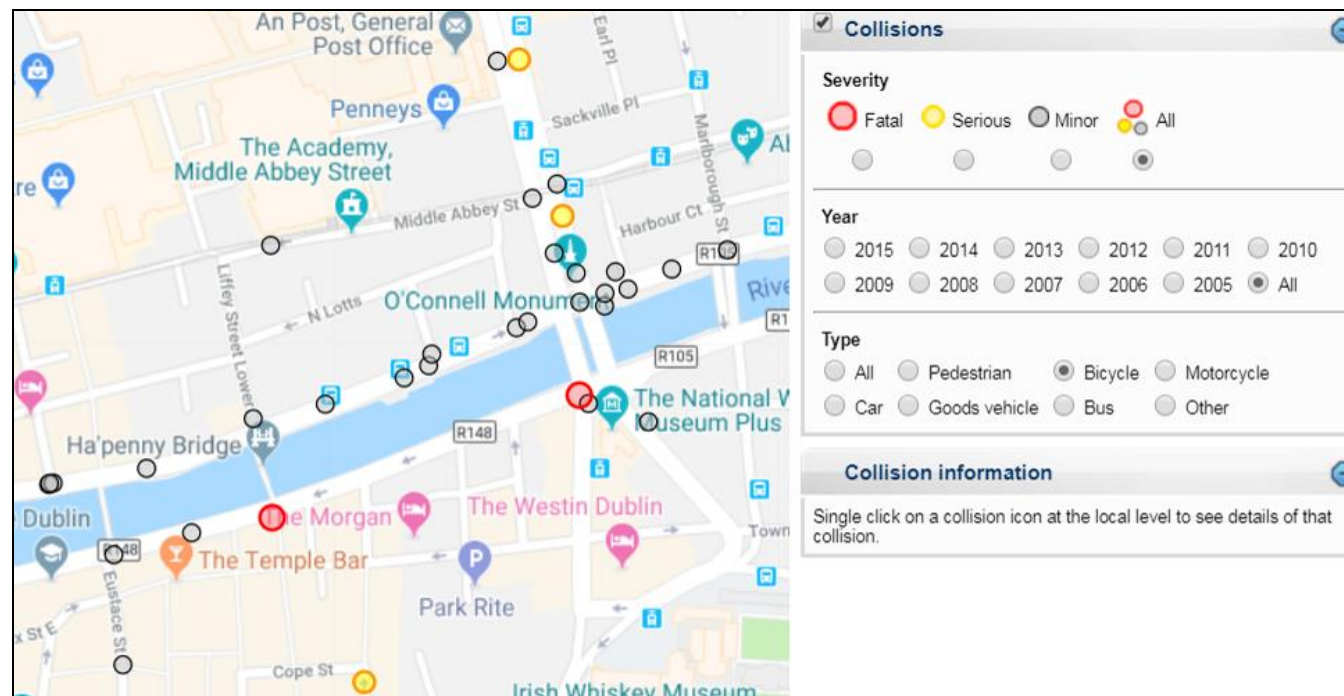


Figure 2.2 Sample of Collision Data Statistics from RSA Website

3. EARLIER STUDY

A previous commission for Dublin City Council [DCC] looked at various options for the Liffey Cycle Route [Liffey Cycle Route].

3.1 Initial List of Options Considered

The following options were initially considered:

- 1) Do Nothing;
- 2) Two-way riverside North Quays;
- 2a) Two-Way riverside North Quays with Bus Re-routing;
- 3) Two-way riverside South Quays;
- 4) One-way riverside Both Quays;
- 5) Two-way riverside North Quays with boardwalks;
- 6) Two-way riverside South Quays with boardwalks;
- 7) Two-way North Side Parallel Route;
- 8) Two-way South Side Parallel Route;
- 9) Two-way riverside South Quays from Heuston Station to Father Mathew Bridge, Two-way riverside North Quays from Fr Matthew Bridge to the Campshires;
- 10) Two-way riverside North Quays with limited boardwalk (Arran Quay & Ellis Quay);
- 11) Two-way riverside South Quays with limited boardwalk (Essex Quay & Wellington Quay);
- 12) One-way riverside North and South Quays with limited boardwalk (Arran Quay, Ellis Quay, Essex Quay & Wellington Quay); and
- 13) One-way Both Quays on Building Side of Quays.

The analysis of these options resulted in a shortlist being prepared for further presentation and consultation. The criteria used in that shortlisting exercise were:

- i) Quality of Service for Cyclists;
- ii) Network Efficiency;
- iii) Environmental Quality;
- iv) Cost;
- v) Technical Risk; and
- vi) Operation and Maintenance Issues

3.2 Options Shortlisted for Public Consultation

Following initial assessment, four options were shortlisted for public consultation in March 2015, and renumbered as:

Option 1: Two-way riverside facility on the north quays with a limited section of boardwalk along Ellis Quay and Arran Quay – i.e. between James Joyce and Father Matthew Bridges, and upgrade of the existing one-way on-road facility on the south quays;

Option 2: Two-way riverside facility on the north quays with buses rerouted via Benburb Street between Liffey Street West and Church Street, and upgrade of the existing one-way on-road facility on the south quays;

Option 3: As Option 2, but with Croppy's Acre Park moved to riverside, with cycleway and traffic lanes diverted between it and the Luas line, and upgrade of the existing one-way on-road facility on the south quays; and

Option 4: One-way on-road building – side cycling facilities on each quay.

This option raised concerns primarily due to the significant interactions between buses and cyclists that would arise along the corridor.

The feedback from the public consultation was generally positive towards the proposed Liffey Cycle Route in principle, but comments were received from various stakeholders and interest groups raising concerns about each of the options presented. Further studies were undertaken on foot of the feedback to the public consultation process.

Option 5: Two-way cycle route north of Croppy's Acre and along Benburb Street and Hammond Lane to Church Street, continuing east on the north quays from there, and upgrade of the existing one-way on-road facility on the south quays;

Option 6: Combination of Option 1 and Option 3, with buses returning to the quays at Queen Street, and a boardwalk along Arran Quay only, and upgrade of the existing one-way on-road facility on the south quays; and

3.3 Shortlisted Options

Following feedback from the public consultation and stakeholder engagement processes, two further options were developed and these were shortlisted for the Recommended Option:

Option 7: Two-way riverside cycle route along the north quays with no private vehicular traffic along Ellis and Arran Quays. Traffic rerouted via Blackhall Place, North King St, Brunswick St and Church St, and upgrade of the existing one-way on-road facility on the south Quays.

A two-way segregated cycling facility along the north Quays was examined in detail, with various proposals emerging to overcome a significant pinch-point at Ellis and Arran Quays. In all the options, the solutions presented to the pinch-point at Ellis and Arran Quays remained a concern, and a further variant option was added for assessment purposes:

Option 8: Two-way facility on the north Quays with a limited section of boardwalk along Ellis Quay and Arran Quay – i.e. between James Joyce and Father Matthew Bridges, and upgrade of the existing one-way on-road facility on the south Quays. A bus gate was proposed upstream of Liam Mellows Bridge.

3.4 Concerns Regarding the Shortlisted Options

Concerns remained associated with the following:

- The diversion of bus lanes from the quays;
- Proposals to divert traffic from the quays;
- Proposals to divert cyclists from the riverside; and

- Finding feasible solutions at constrained junctions, where bridge parapets and higher road levels prevent the increased cross-sectional area (provided by the boardwalk being extended through the junctions).

On foot of these concerns, a preferred option did not emerge from the earlier study.

4. TERMS OF REFERENCE FOR CURRENT COMMISSION

The National Transport Authority [NTA], following a public procurement process, appointed a team of consultants led by Roughan & O'Donovan to undertake an independent assessment of the Liffey Cycle Route.

4.1 The Brief

The key requirements for the current study are:

- 1) Review all previous options considered;
- 2) Review all baseline information, and reappraise constraints and design assumptions;
- 3) Set and define clear project objectives;
- 4) Identify and prepare outline designs for any options not considered to date;
- 5) Undertake a comprehensive Options Assessment, and prepare an Options Assessment Report (this report); and
- 6) Prepare a conceptual design for the Recommended Option.

The commission also includes stakeholder consultation and the role of Project Supervisor Design Process¹⁰.

4.2 Proposed Study Area

The Study Area for the project encompassed the area between the green and blue lines on Figure 4.1 between the Phoenix Park and the Tom Clarke East Link Bridge:

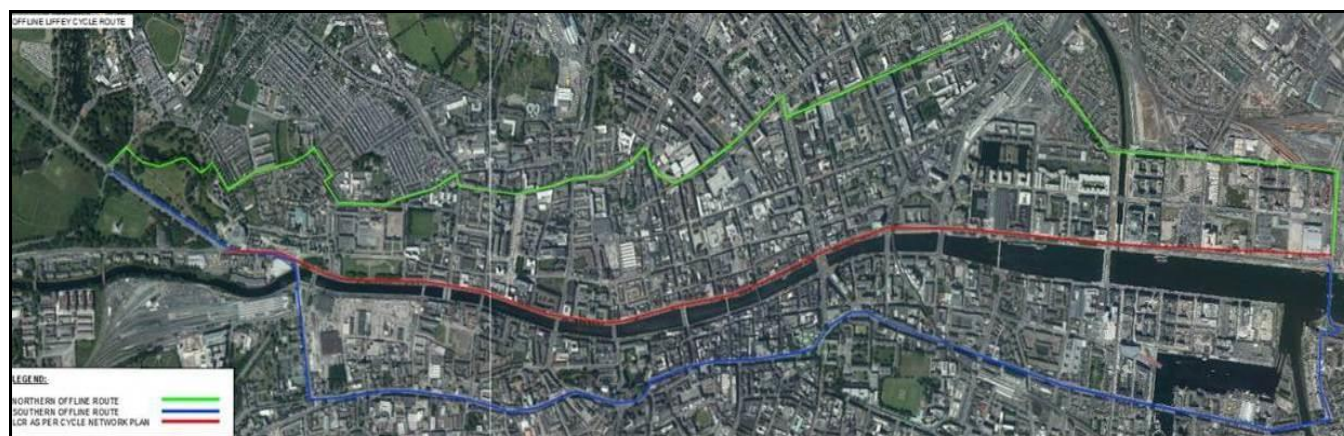


Figure 4.1 Study Area

The study area is sufficiently wide to allow the consideration of parallel routes as far north as North King Street / Parnell Street and as far south as Thomas Street / Dame Street. The Study Area did not extend further to avoid overlapping with other separate cycling routes proposed under the GDA Cycle Network Plan.

4.3 Additional Developments since Earlier Study

The baseline environment for the current study has changed since the earlier studies were undertaken, and the following changes in the intervening period were considered by the current commission:

- 1) Enhancements to bus lanes implemented by Dublin City Council on the north and south quays between Grattan Bridge and O'Connell Bridge (introduced in 2017);
- 2) The introduction of Luas Cross City across O'Connell and Rosie Hackett Bridges; and
- 3) *BusConnects* proposals, which, if implemented, would result in significant changes to bus routes and facilities throughout Dublin.

Other considerations included:

- 4) Proposed construction of pedestrian and cycle bridges on campshires at Spencer Dock (Royal Canal);
- 5) Proposed Pedestrian / Cycle bridge(s) in the docklands between Samuel Beckett Bridge and the Tom Clarke East Link Bridge; and
- 6) The advancement of the Dodder Gut Bridge; and
- 7) The implementation of flood defences and associated cycling facilities in the docklands.

4.4 Methodology for Options Assessment

This report presents a four-stage Options Assessment, comprising the following steps:

Stage 1: Feasibility Screening

Consider high-level options, including do-nothing, reversal of traffic on the quays, etc. The purpose of this step was to eliminate options that cannot meet the scheme objectives.

Stage 2: High Level Impact Assessment

This stage assessed each individual section of the corridor to determine whether scheme options could be geometrically accommodated in the context of the nature and scale of the likely associated environmental impacts.

Stage 3: Common Appraisal Framework Assessment

Link the various possible options for each section of the corridor and carry out a multi-criteria analysis using the Common Appraisal Framework (CAF) for Transport Project, published by DTTAS.

This stage compares the options that emerge from Stage 2 under the CAF headings:

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

¹⁰ www.hsa.ie

Stage 4: Link the sections together to complete the end-to-end route. Review the individual section outcomes to ensure the best overall route emerges.

It was assumed for the purposes of this assessment that, subject to space for the facility itself being available, engineering solutions could be achieved to turning manoeuvres at junctions for each type of facility, and these issues would be dealt with at the latter stages of the assessment process.

5. DESIGN PRINCIPLES AND ASSUMPTIONS

The proposed Liffey Cycle Route will provide a high quality central spine cycleway through Dublin City Centre and is needed in response to the growing volumes of cyclists to and through the city. Demand along the corridor is already high¹¹, and likely suppressed by the poor existing cycling environment. Demand will increase in the coming years, as significant new developments come onstream, particularly in the docklands and the Grangegorman Technological University Dublin [formerly DIT] campus.

The following design criteria have been assumed for the option assessment process:

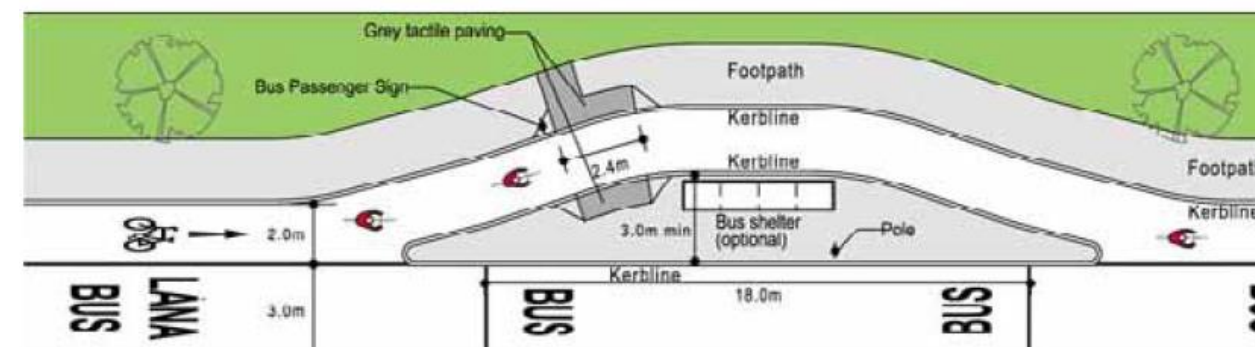
5.1 Quality of Service

The Liffey Cycle Route shall generally have a Quality of Service A or A+¹². The Quality of Service of any given section shall not be lower than B. This will facilitate the usage of the route by cyclists of all ages and abilities.

5.2 Segregation

Cyclists, insofar as possible, shall be segregated from all other modes of traffic including, in particular larger vehicles such as HGVs, buses and trams¹³. At bus stops with high-frequency services it is highly desirable to separate cyclists from bus boarding and alighting by passengers as advised in the *National Cycle Manual*.

Island Bus Stop Option 1



Detail from NCM Page 160

Along the River Liffey in the busiest city centre section where space is restricted, it is unlikely that segregation can be achieved at bus stops. This will reduce the feasibility of locating segregated cycle tracks along the buildings side of the street where direct conflicts would arise at some of the busiest bus stops in the city,

5.3 Integration and Access

The conventional arrangement for cycle lanes / tracks is to follow the left edge of the traffic carriageway alongside the footpath or verge. This allows direct access to and from the cycle

route from the frontage buildings and adjoining areas along the side streets. This situation enables ease of access and integration with the surrounding area.

Where a cycle track is positioned on the right-hand side of the traffic carriageway, this can make it difficult for cyclists to join and leave the route from the surrounding area, other than at main junctions with traffic signals or dedicated signal crossings. Such an arrangement is less than optimal in terms of access and integration for cyclists.

The default preference arrangement should therefore be to locate the cycle track along the left side of the traffic route, especially where the traffic flows, including buses and taxis, are high and there is more than one lane to cross.

5.4 Transitions

Over the 5km length of the Liffey Cycle Route between the Phoenix Park and the Tom Clarke East Link Bridge, there are variable conditions that may require different configurations for the proposed cycle facilities. Different layouts may be preferred in different sections of the route. In that case it will be necessary to arrange suitable transitions so that the overall route can be fully integrated for optimal operation for cyclists. Any necessary transition arrangements will be dealt with at the latter stages of the assessment process as the preferred layouts in each section of the route emerge.

5.5 Width

The Liffey Cycle Route will experience very heavy usage at peak times, as is currently the case. Sections of the route will see heavy tidal eastbound demand in the morning towards the city centre and docklands which is a major new and rapidly growing employment zone, with a similar return movement westward in the evening. As such, the guidance of the National Cycle Manual should be taken as a minimum provision, and the general objective is to provide a 2.0m minimum width for one-way facilities, and a 3.5m minimum width for two-way facilities¹⁴. Relaxations below this should only be considered locally, and avoided in the busier central and eastern sections, if at all practicable.

Further detailed analysis of provisions at junctions will be required at a later stage of the design process, particularly in the case of any proposed two-way facilities, which require a greater number of movements to be accommodated. The National Cycle Manual suggests that all cycle facilities should be widened by 0.5m at junctions to account for cyclist wobble on take-off. This will be accommodated where practicable. However, along the river corridor, space is most constrained at junctions, where historic bridge parapets present an additional impediment and a detail assessment will be required at the preliminary design stage.

5.6 Impact on other Modes of Transport

The impact of each option for the Liffey Cycle Route on other modes of transport in terms of diversion effects, capacity, etc. will need to be assessed and minimised where possible. Access to premises will have to be maintained in line with Dublin City Council's obligations. In particular, the needs of pedestrians need to be considered carefully.

¹¹ 2018 Traffic Data – Dublin City Council

¹² www.cyclemanual.ie – Pg 10

¹³ <https://www.cyclemanual.ie/manual/thebasics/mixed/>

¹⁴ <https://www.cyclemanual.ie/manual/thebasics/width/>

5.7 Existing Facilities and Street Furniture

It is assumed that all existing street furniture and facilities, including Dublin-Bikes stands, bus stops, loading bays, trees, and taxi ranks, can be reorganised to accommodate the Liffey Cycle Route. It is assumed that existing on-street parking may be curtailed or removed completely, where the available street space would be more appropriately used for the benefit of pedestrians, cyclists, landscaping, or public transport.

5.8 Availability

The route should generally be accessible and usable 24 hours a day, 365 days a year, in all normal weather conditions.

5.9 Junction Controls

The Liffey Cycle Route will interact with traffic at junctions and accesses. In keeping with the National Cycle Manual, the Recommended Option will seek to minimise the frequency of these conflicts, and the extents of possible delays, in order to optimise the Quality of Service for cyclists.

6. CONSTRAINTS

The following is a summary of the principal constraints to be considered in identifying and assessing options for the proposed Liffey Cycle Route.

6.1 Ecology

Dublin Bay is located 2.5km east of the eastern end of the scheme, and is designated as a Special Protection Area, Special Area of Conservation, Natural Heritage Area and UNESCO Biosphere. Any in-stream works within the River Liffey for the construction of boardwalk structures will require avoidance and/or mitigation measures to prevent any spillages into the river that could affect the downstream sensitivities. Similar works have been successfully managed for several modern bridges over the river and the current pedestrian boardwalks. Therefore, the assessment assumes boardwalks can be provided where necessary.

6.2 Architecture

The River Liffey bisects the heart of Dublin City, and the buildings and bridges along her provide an essential aspect of the City's character. The buildings along the route of the proposed scheme vary from Georgian terraces in the central section to modern icons such as the National Conference Centre at the eastern end. Various landmark buildings perforate the route, including the Customs House and the Four Courts. Any impacts on the built heritage of the city has to be carefully assessed, and extensive demolition of buildings must be avoided in any Liffey Cycle Route proposal. Isolated impacts on unremarkable, non-listed buildings may be required, subject to not affecting the overall character of the area, and in the absence of better alternatives.

There are 18 bridges along this section of the River Liffey, including historical bridges, ordinary modern types and some iconic Dublin landmark structures. These are:

1. Sean Heuston Bridge (Luas): Historic & Protected Structure;
2. Frank Sherwin Bridge: Modern;
3. Rory O'More Bridge (Watling Street): Historic & Protected Structure;
4. James Joyce Bridge (Blackhall Place): Modern;
5. Liam Mellowes Bridge (Queen Street): Historic & Protected Structure;
6. Father Matthew Bridge (Church Street): Historic & Protected Structure;
7. O Donovan Rossa Bridge (Winetavern Street): Historic & Protected Structure;
8. Grattan Bridge (Capel Street): Historic & Protected Structure;
9. Millennium Bridge (Pedestrian): Modern;
10. Ha'penny Bridge (Pedestrian): Historic & Protected Structure;
11. O'Connell Bridge: Historic & Protected Structure;
12. Rosie Hackett Bridge (Marlborough Street): Modern;
13. Butt Bridge (Tara Street): Historic;
14. Beresford Place (Loop Line) Bridge (Elevated Railway): Historic & Protected Structure;
15. Matt Talbot Memorial Bridge: Modern;

16. Sean O'Casey Bridge (Pedestrian): Modern;
17. Samuel Beckett Bridge (Guild Street): Modern; and
18. Tom Clarke / East Link Bridge: Modern.

Impacts on historic bridges that are protected structures and modern iconic bridges should generally be avoided. Sensitive minor alterations may be feasible in certain instances, similar to the earlier intervention at Grattan Bridge, where the Liffey Boardwalk was tied into the bridge by removing a section of the parapet.

The Liffey Quay Walls are noted for their granite block construction and are protected structures. Any works proposed to these will require careful consideration. The existing quay walls may be in need of rehabilitation in places, and proposals for new boardwalks or bridges may necessitate additional remedial works. Any such works would need to take account of the downstream ecological sensitivities.

6.3 Archaeology

There has been human activity along the River Liffey in Dublin City for over 1,000 years. As such, there is considerable archaeological potential where any significant invasive works are proposed – such as the realignment of quay walls, or the construction of new bridges. Minor surface interventions, such as the realignment of kerb lines, are unlikely to cause any archaeological disturbance, since historic fabric has already been removed for roadworks, services and the like.

6.4 Landscape and Visual

The River Liffey and associated buildings and bridges are an iconic feature of Dublin. The views along the river feature are sensitive to change. However, there have been significant interventions over the years, including boardwalks, additional bridges, and most recently the Rosie Hackett Bridge. New bridges, boardwalks or quay wall realignments would have to be carefully detailed to complement rather than detract from their surroundings.

Existing trees along the river provide an element of greening in an otherwise hard landscape, notwithstanding their potential negative impact on footpath accessibility. It is desirable that the existing trees should be retained, where practicable. Where this is not possible, replacement appropriate planting should be integrated in the design proposals. Proposals for the docklands area [i.e. east of Memorial Bridge] should have regard to the Public Realm Masterplan for the area.

Where significant interventions are proposed, and major roadworks are required, the public realm should be enhanced in keeping with Dublin City Council's Public Realm Strategy¹⁵.

6.5 Physical Infrastructure

Existing physical infrastructure, including roadways, quay walls, street lighting, and services, will be constraints to the delivery of the proposed scheme. The River Liffey corridor is a major conduit for transmission gas, collector sewers, and major water mains, etc. Impacts on major services should be minimised where practicable, since realignment works may be costly and

¹⁵ <http://www.dublincity.ie/sites/default/files/content/Planning/Documents/YDYVPublicRealmFinal.pdf>

disruptive. There are also a number of services crossing beneath the river, including two services tunnels in the vicinity of the Tom Clarke East Link Bridge, and a sewerage siphon at Rosie Hackett Bridge. Impacts on these should be avoided.

6.6 Traffic

The maintenance of access and circulation, both during and after construction, are significant constraints to the delivery of the proposed Liffey Cycle Route. The Liffey quays are a critical artery for transport into and out of the city, particularly public transport. In recent years, the priority afforded to private cars along the Liffey quays has diminished. However, the quays remain a critical element in Dublin's access, servicing, and circulation network.

6.7 People

The assessment of options will have to consider the impact on people. Access to residences, businesses and services will have to be maintained in the Recommended Option.

6.8 Other Plans and Policies

The Liffey Cycle Route scheme proposals will have regard to other plans and policies for the city, including, inter alia:

- 1) Dublin City Development Plan;
- 2) Dublin City Council Public Realm Strategy;
- 3) Dublin City Council City Centre Transport Study;
- 4) Grand Canal and North Lotts SDZ;
- 5) Docklands Public Realm Masterplan; and
- 6) Poolbeg SDZ.

6.9 Other Projects

The Liffey Cycle Route scheme proposals will have regard to other projects along and adjacent to the corridor, including:

- 1) Proposed Dodder Public Transport Bridge;
- 2) BusConnects proposals for bus lane enhancements;
- 3) Various bridge proposals in the docklands;
- 4) Proposed and ongoing flood defence works;
- 5) Proposed upgrade of Point Roundabout; and
- 6) Major planning applications along the route.

7. OPTIONS ASSESSMENT STAGE 1 – FEASIBILITY SCREENING

An initial assessment of the possible macro-level options for the proposed Liffey Cycle Route was carried out to determine whether there may be a more appropriate network level solution for the Liffey Cycle Route than the assumed provision of (a) cycle way(s) along the River Liffey corridor with the substantial retention of existing traffic and public transport arrangements.

The Stage 1 Assessment constitutes an exercise to eliminate options that have fundamental and irreconcilable issues with the objectives of the project that are set out in Section 2.1 of this report.

7.1 Network Option 1: Do-Nothing Scenario

This option proposes to maintain the existing facilities as described in Section 2.2. The existing facilities have Quality of Service of D, the lowest level. The Do Nothing option would therefore not achieve the objectives of the scheme.

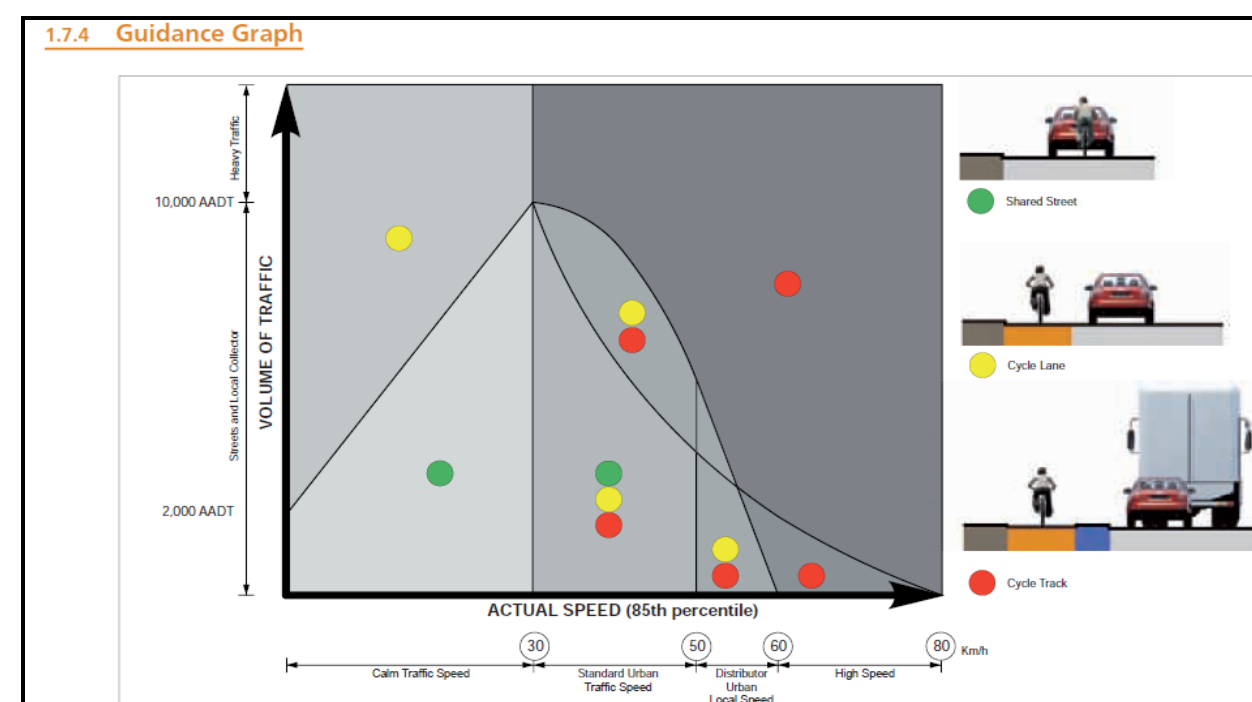
This option is not considered further.

7.2 Network Option 2: One-way Building Side cycle facility on North and South Quays

2A On-Road Cycle Lanes

This option proposes new or improved conventional one-way on road cycle lanes on the left-hand side of the road carriageway on both quays. In accordance with the Guidance Graph from the *National Cycle Manual* (as shown below) on a street with AADT greater than 10,000, segregation is required. The AADT at Arran Quay is in excess of 14,000.

The option for cycle lanes is therefore not considered further.



2B Segregated Cycle Tracks

Segregation of cyclists from general traffic and buses would be provided in this option. However, interactions at bus stops would have to be considered and addressed. Many recent schemes including Braemor Road, Old Blessington Road, and Frascati Road schemes have demonstrated that segregated left hand side cycle tracks can be engineered to provide an appropriate Quality of Service, while addressing the conflicts at bus stops.

This option is considered to be potentially feasible, subject to design.

7.3 Network Option 3: One Way Riverside Cycle Tracks on North and South Quays

This option would provide a one-way segregated riverside cycleway on both sides, avoiding the interactions at bus stops involved with Option 2. It also will have fewer traffic interactions (and fewer direct connections) at side-streets between the main junctions. It is assumed that the cycle tracks would follow the existing direction of traffic on the quays, but the facility could be operated in either direction subject to design. It would also position the cyclists next to the less busy riverside footpath, with less possibility of interference from pedestrians. However, this option would be more difficult to access from minor side streets between bridge crossings.

This option is considered to be potentially feasible, subject to design.

7.4 Network Option 4: Two-way Cycle Track on North Quays – Building Side

This option would increase the complexity of interactions at junctions and accesses - it would be difficult for other vehicles to turn left across such a facility in an uncontrolled manner. Further, it would give rise to particular safety concerns at bus stops, the third of the five Principles of Sustainable Safety¹⁷ is legibility, particularly requiring that all potential conflicts are obvious and the resolution of the conflict is mutually understood by all road users. It also requires that all road users are instinctively aware of the expected position and likely behaviour of all other road users. This would not be the case with this option for the proposed Liffey Cycle Route.

This option would therefore not achieve the objectives of the scheme and, on that basis, it is not considered further.

7.5 Network Option 5: Two-way Riverside Cycle Track on North Quays

This option would provide a two-way segregated cycleway alongside the river on the north side. This arrangement would avoid interactions between cyclists and bus passengers at bus stops. It would also leave the cyclists next to the less busy riverside footpath, with less possibility of interference from pedestrians. However, this option would be more difficult to access from minor side streets between bridge crossings.

This option is considered to be potentially feasible, subject to design.

7.6 Network Option 6: Two-way Cycle Track on South Quays – Building Side

This option was sifted out for the same reasons as Network Option 4 (Two-way Cycle Track on North Quays – Building Side) – see Section 7.4 above and is not considered feasible.

This option is not considered further.

¹⁶ <https://www.cyclemanual.ie/manual/thebasics/mixed/>

¹⁷ https://www.cyclemanual.ie/manual/thebasics/sustainable_safety/

7.7 Network Option 7: Two-way Riverside Cycle Track on South Quays

This option is considered to be potentially feasible for the same reasons as Network Option 5, subject to design.

This option is considered to be potentially feasible, subject to design.

7.8 Network Option 8: Two-way Riverside Facilities on North and South Quays

This option would comprise a combination of Option 5 and Option 7. Since both of these options are considered to be potentially feasible, a combination of the two is also considered to be potentially feasible.

This option is considered to be potentially feasible.

7.9 Network Option 9: Two-way Facility Parallel to North Quays

This route would generally follow adjacent to the Red Luas Line along Benburb Street adjacent to the Luas Line, with a short pinch-point at the western entrance to Smithfield. There is another pinch-point at Chancery Street beside the Four Courts.

Where the Luas corridor is particularly narrow for 300m along Upper Abbey Street (between Capel Street and Liffey Street), the cycle route would divert southward to either Great Strand Street or the North Quays.

Further east in the docklands, Mayor Street is unsuitable in places due to the cross-sectional arrangements for Luas, but Sheriff Street may provide an appropriate alternative route. As such, this option is considered to be potentially feasible, subject to more detailed investigation and is brought forward to Stage 2.

This option is considered to be potentially feasible.

7.10 Network Option 10: Two-way Facility Parallel to South Quays

This route proposes to generally follow streets parallel to the South Quays, through either Temple Bar or Dame Street, via Townsend Street and Hanover Street East and Hanover Quay. This option is considered to be potentially feasible, subject to more detailed investigation.

This option is considered to be potentially feasible.

7.11 Network Option 11: Off-line Routes

This option considers avoiding the Liffey Corridor completely and developing cycle routes on the next available route corridor on each side of the river. It would be necessary to provide alternative attractive routes on both sides of the river, since one side in isolation would be too remote to serve demand along the opposite side of the river corridor.



Figure 7.1 Network Option 11: Remote Routes

A schematic of the potential offline routes is indicated above. The green line represents the northern offline route, the red line represents the proposed Liffey Cycle Network as per the Cycle Network Plan and the blue line represents the southern offline route.

Both offline routes are approximately 1km longer than the direct Liffey Cycle Route and duplicate extensive sections of other routes to be provided under the Cycle Network Plan. Even if both were constructed and available to Liffey cyclists, they would likely only draw a limited number of cyclists from the more direct river corridor. Taking all of the above in to consideration, an Offline route is neither direct nor attractive, and therefore does not provide for the five needs of cyclists. This option does not meet the scheme objectives and is therefore not considered further.

This option is not considered further.

7.12 Network Option 12: Two-Way Public Transport on South Quays

This option would entail significant traffic management change to the Liffey quays, by making both quays two-way, displacing all public transport to the south quays and all general traffic to the north quays. A two-way cycle track would be provided along the north quays to avoid interaction with boarding and alighting activities at bus stops, which would take place along both sides of the south quays. Issues with this option include the following:

- An increased number of pedestrian crossings along the south quays to ensure adequate access to bus stops on the river side;
- Pedestrian congestion on the narrow footpaths along the river side;
- Significant additionally complex junction controls with larger number of different traffic movements, which would severely constrain capacity for all modes.

While this scheme can potentially meet the headline objectives of the Liffey Cycle Route, it cannot be achieved without drastic impacts on other modes of transport [Design Principle No. 4 – see Section 6.4]¹⁸, in particular:

- 1) Dublin City Council's obligations to maintain access and loading to premises along the south quays;
- 2) The emerging BusConnects proposals, if implemented, would require enhanced public transport priority including dedicated road space in each direction through the central part

¹⁸ Section 6.4

of Dublin City to facilitate extensive boarding and alighting activity combined with increased bus service frequency. This would not be achievable with all public transport concentrated on one side of the river only; and

- 3) Taxis are not permitted to use contra-flow bus lanes, and would therefore be required to share with general traffic along the north quays, losing the benefit of bus lane priority enjoyed at present;

The scheme therefore fails to adequately cater for Constraints 6 (Traffic), 7 (People), 8 (Other Plans and Policies) and 9 (Other Projects) [see Sections 6.6 – 6.9]¹⁹. Based on the foregoing, this option is incompatible and cannot be reconciled with Dublin City's other movement requirements and is therefore not considered further.

This option is not considered further.

7.13 Network Option 13: Two-way Public Transport on North Quays

This option is the opposite arrangement to Option 12 and faces all of the same issues. It has a significant additional complication, in that traffic access cannot be maintained to the Jervis Street area except via O'Connell Street and Parnell Street. Given the number of large shopping centres and private car parks in that part of the city, and capacity limitations on O'Connell Street due to Luas Cross City, this option is not considered further.

This option is not considered further.

7.14 Network Option 14: One-way Cycle Lanes with Contra Flow Bus Lanes on Both Quays

This option is the same as Network Option 2, but with the bus lanes on the quays reversed and moved to the riverside. Cyclists and general traffic would occupy the left-hand side of the carriageway, with buses running contra-flow along the riverside – as is currently the case on Custom House Quay and part of Eden Quay.

There are no current proposals to reverse the bus lanes along the River Liffey, and to do so would require extensive traffic management changes and works to the riverside footpaths. In addition, this proposal would require the removal of a considerable number of riverside trees to accommodate the increased pedestrian demand associated with bus activity.

The reversal of the current bus circulation regime while retaining the existing traffic circulation regime would pose particular difficulties for emergency service vehicles. At present, emergency service vehicles may use the bus lanes, weaving into the adjacent traffic lanes to pass buses as required. This would not be possible if the traffic lanes were running in the opposite direction to the bus lanes. It is very difficult to see how this option might be implemented without compromising the ability of emergency service personnel to safely access emergency situations in Dublin City Centre. As such, it is not considered further for the Liffey Cycle Route.

This option is not considered further.

7.15 Network Option 15: Reversal of Traffic Flow Direction on Quays

Consideration was given to reversing the traffic flow direction on the quays to bring eastbound traffic on the south quays and westbound traffic on the north quays. This would allow segregated cycle lanes to be provided on the building side running contra-flow to traffic and buses, and interaction with bus stops would be avoided, since these would be located on the river side. This option faces the same issues as Network Option 13 in terms of providing access to the area west of O'Connell Street, and doesn't offer any appreciable advantages over that option, and is therefore not considered further.

This option is not considered further.

7.16 Network Option 16: In-river Route

A floating pontoon solution would not be feasible, since the Liffey is tidal to Heuston Station, and there is insufficient headroom under most of the bridges to accommodate the required clearance to allow the passage of cyclists under normal tidal conditions. A solution involving a cofferdam-type recessed cycleway with water-retaining sidewalls to hold back the river would be unattractive to use and would face considerable environmental, aesthetic, and cost challenges.

Finally, an elevated option would have issues of aesthetic impacts and restricted accessibility at junctions. On that basis, all in-river options have been determined to be not feasible.

This option is not considered further.

7.17 Conclusion of Stage 1 Assessment

In conclusion, for the Stage 1 Network Options Assessment, 7 of 17 options were selected to be brought forward to Stage 2 as shown in Table 7.1 below:

Table 7.1: Conclusions of Stage 1 Assessment

Network Option	Description	Brought Forward to Stage 2
1	Do Nothing	No
2A	One-way Cycle Lanes on North and South Quays	No
2B	One-way Cycle Tracks on North and South Quays	Yes
3	One-way Riverside Cycle Tracks on North and South Quays	Yes
4	Two-way Cycle Track on North Quays – Building Side	No
5	Two-way Cycle Track on North Quays – River Side	Yes
6	Two-way Cycle Track on South Quays – Building Side	No
7	Two-way Cycle Track on South Quays – River Side	Yes
8	Two-way Facility on North and South Quays	Yes
9	Two-way Facility parallel to North Quays	Yes
10	Two-way Facility parallel to South Quays	Yes
11	Remote Route(s)	No

¹⁹ Sections 6.6, 6.7, 6.8, 6.9

Network Option	Description	Brought Forward to Stage 2
12	Two-way Public Transport on South Quays	No
13	Two-way Public Transport on North Quays	No
14	One-way Cycle Lanes with Contra-flow Bus Lanes	No
15	Reversal of Traffic Flow Direction on Quays	No
16	In River Route	No

It is clear from the assessment that the feasible route options for the Liffey Cycle Route are all along or adjacent to the River Liffey Corridor, generally retaining existing traffic and public transport access and circulation arrangements. This is consistent with the outcomes of earlier studies into the Liffey Cycle Route.

The options that emerged from the Stage 1 assessment were brought forward to a more comprehensive and in-depth assessment on a Section by Section basis along the River Liffey Corridor. The more detailed Stage 2 assessment of each option scrutinised in greater detail:

- 1) The geometric viability of each remaining option;
- 2) The nature and scale of the associated negative scheme impacts; and
- 3) The degree to which the scheme objectives are met by each option.

The Section by Section Assessment was undertaken on the remaining route options summarised below:

Network Option	Description	Brought Forward to Stage 2
2B	One-way Cycle Tracks on North and South Quays	Yes
3	One-way Riverside Cycle Tracks on North and South Quays	Yes
5	Two-way Cycle Track on North Quays – River Side	Yes
7	Two-way Cycle Track on South Quays – River Side	Yes
8	Two-way Facility on North and South Quays	Yes
9	Two-way Facility parallel to North Quays	Yes
10	Two-way Facility parallel to South Quays	Yes

These remaining options have been considered across both quays along any given Section of the River Liffey Corridor, as follows (from north to south):

Option	Description
(i)	Two-way parallel route north of the river
(ii)	One-way building-side cycle track on the north side of the river
(iii)	One-way riverside cycle track on the north side of the river

Option	Description
(iv)	Two-way riverside cycle track on the north side of the river
(v)	Two-way riverside cycle track on the south side of the river
(vi)	One-way riverside cycle track on the south side of the river
(vii)	One-way building-side cycle track on the south side of the river
(viii)	Two-way parallel route south of the river

8. OPTIONS ASSESSMENT STAGE 2 – HIGH LEVEL IMPACT ASSESSMENT

The character and land use and settlement patterns of the River Liffey Corridor vary along the length for this scheme, reflecting the different stages of the city's development. The transport patterns along the river also vary through these sections, as described in Chapter 2 of this report. The corridor has therefore been considered as a series of discrete sections. The Sections for assessment are:

- Section 1: Phoenix Park to Father Matthew Bridge (Church Street);
- Section 2: Father Matthew Bridge to O'Connell Bridge;
- Section 3: O'Connell Bridge to Memorial Bridge;
- Section 4: Memorial Bridge to Tom Clarke Bridge.

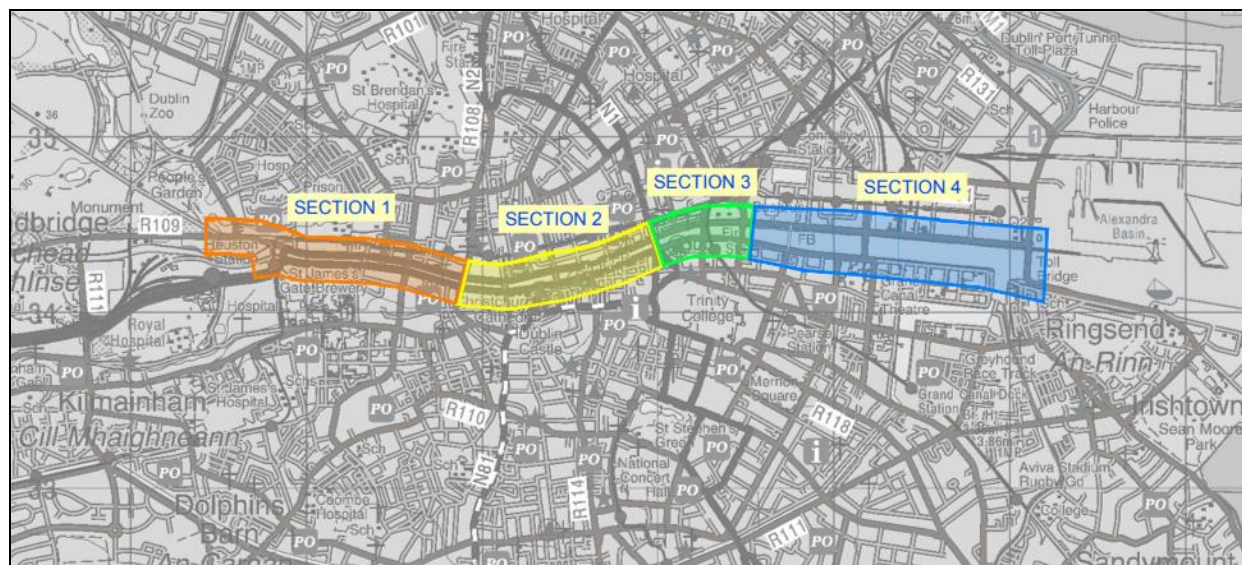


Figure 8.1 Route Corridor Sections

Some of these sections have been further subdivided along the more complex central and eastern sections of the route. The sub-sections have been referenced alphabetically east to west.

So, for example, the two-way parallel route north of the river through Section 1, sub-section B would be Option 1B(i); the one-way riverside cycle track on the north side of the river through Section 2, sub-section B would be Option 2B(iii); etc.

8.1 Section 1: Phoenix Park to Father Matthew Bridge

The Phoenix Park to Father Matthew Bridge section of the route has been subdivided into subsections, generally extending between bridges where the major radial routes cross the River. These are (from west to east):

- Subsection 1A: Phoenix Park to Sean Heuston Bridge (300m);
- Subsection 1B: Sean Heuston Bridge to Frank Sherwin Bridge (100m);
- Subsection 1C: Frank Sherwin Bridge to Rory O'More Bridge (450m);

- Subsection 1D: Rory O'More Bridge to James Joyce Bridge (100m);
- Subsection 1E: James Joyce Bridge to Liam Mellows Bridge (150m); and
- Subsection 1F: Liam Mellows Bridge to Father Matthew Bridge (300m).

8.1.1 Sub-Section 1A – Phoenix Park to Sean Heuston Bridge



Photo 8.1 Parkgate Street

The scheme will have to make provision for connection to the existing cycling facilities on Conyngham Road and Chesterfield Avenue. As such, all options through this section are on the north side of the river only. The options in this sub-section are, from north to south:

1A(i): Two-way parallel cycle track via Benburb Street

This route option follows the northern footpath to Benburb Street adjacent to the Luas Red Line tracks where the cycle route can run parallel to the River Liffey one block to the north of the quays. This route option is feasible but would require appropriate crossing arrangements to be implemented – particularly at the western end to tie into the Conyngham Road outbound cycle route.

Feasible

1A(ii): One-way cycle track on the buildings side north of the river

The provision of a segregated cycle track eastbound is feasible through this section, subject to reorganisation of parking and loading facilities.

Feasible

1A(iii): **One-way westbound cycle track to complement 1A(ii)**

The provision of a segregated cycle track westbound is feasible through this section, subject to reorganisation of parking and loading facilities.

Feasible

1A(iv): **Two-way online cycle track on the southern side – similar to option 1A(i)**

This route option is feasible but would require appropriate crossing arrangements to be implemented, particularly at the western end to tie into the Chesterfield Avenue cycle route, the Conyngham Road inbound cycle route, and a connection to Infirmary Road.

Feasible

All options can be designed to cross the LUAS tram rails at right angles, to avoid the risk of bicycle wheels becoming trapped in the grooves of the embedded rails.

Table 8.1.1 Sub-section 1A Stage 2 Assessment

Route Option	1A(i)	1A(ii)	1A(iii)	1A(iv)
Pass/Fail	Pass	Pass	Pass	Pass

8.1.2 Sub-Section 1B - Sean Heuston Bridge to Frank Sherwin Bridge



Photo 8.2 Sub-section 1B

From Sean Heuston Bridge to Frank Sherwin Bridge there are 8 potential options as described below.

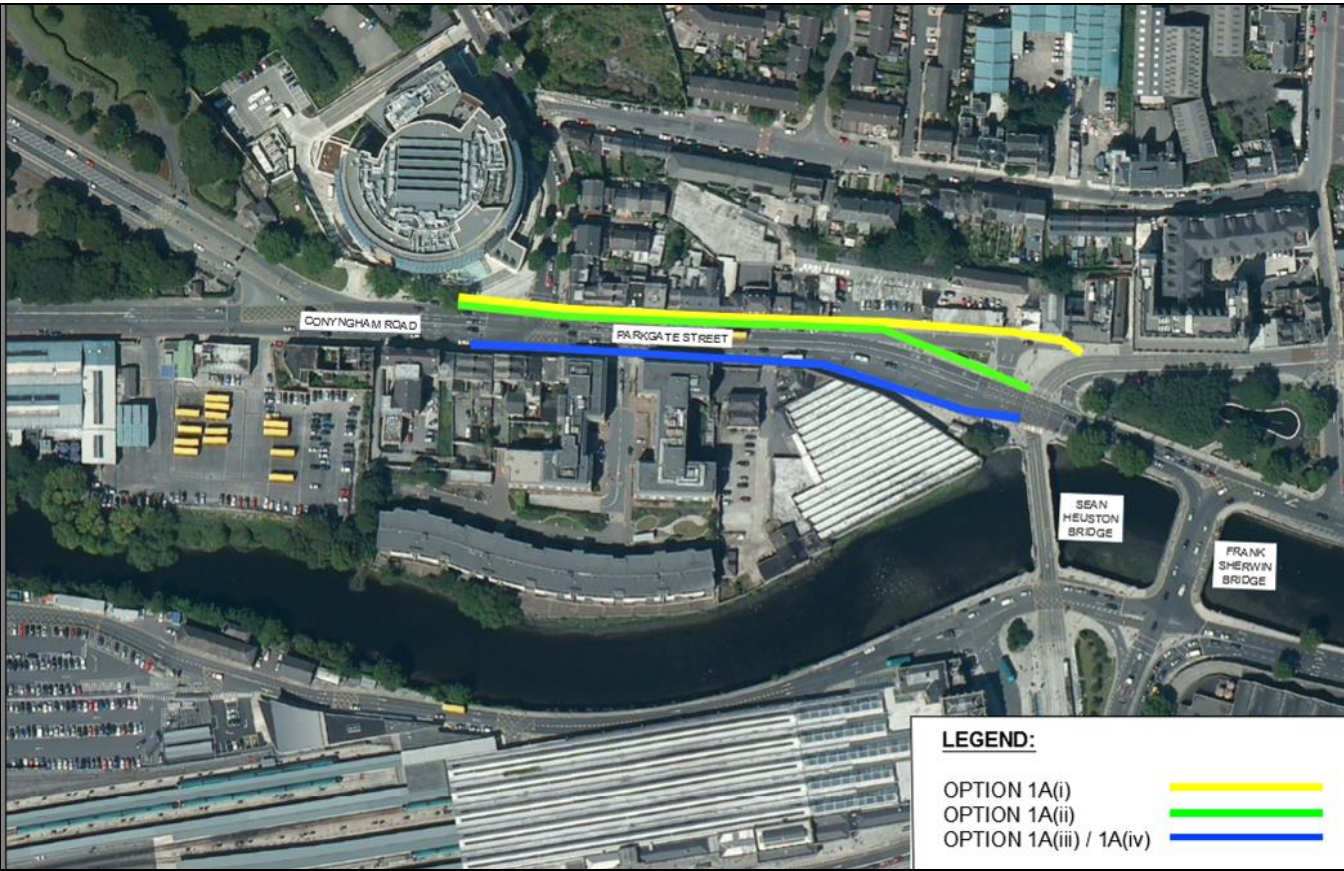


Figure 8.2 Sub-Section 1A Viable Options

All options listed above and shown in Figure 8.1 are viable options for the sub-section between Parkgate Street and Sean Heuston Bridge.

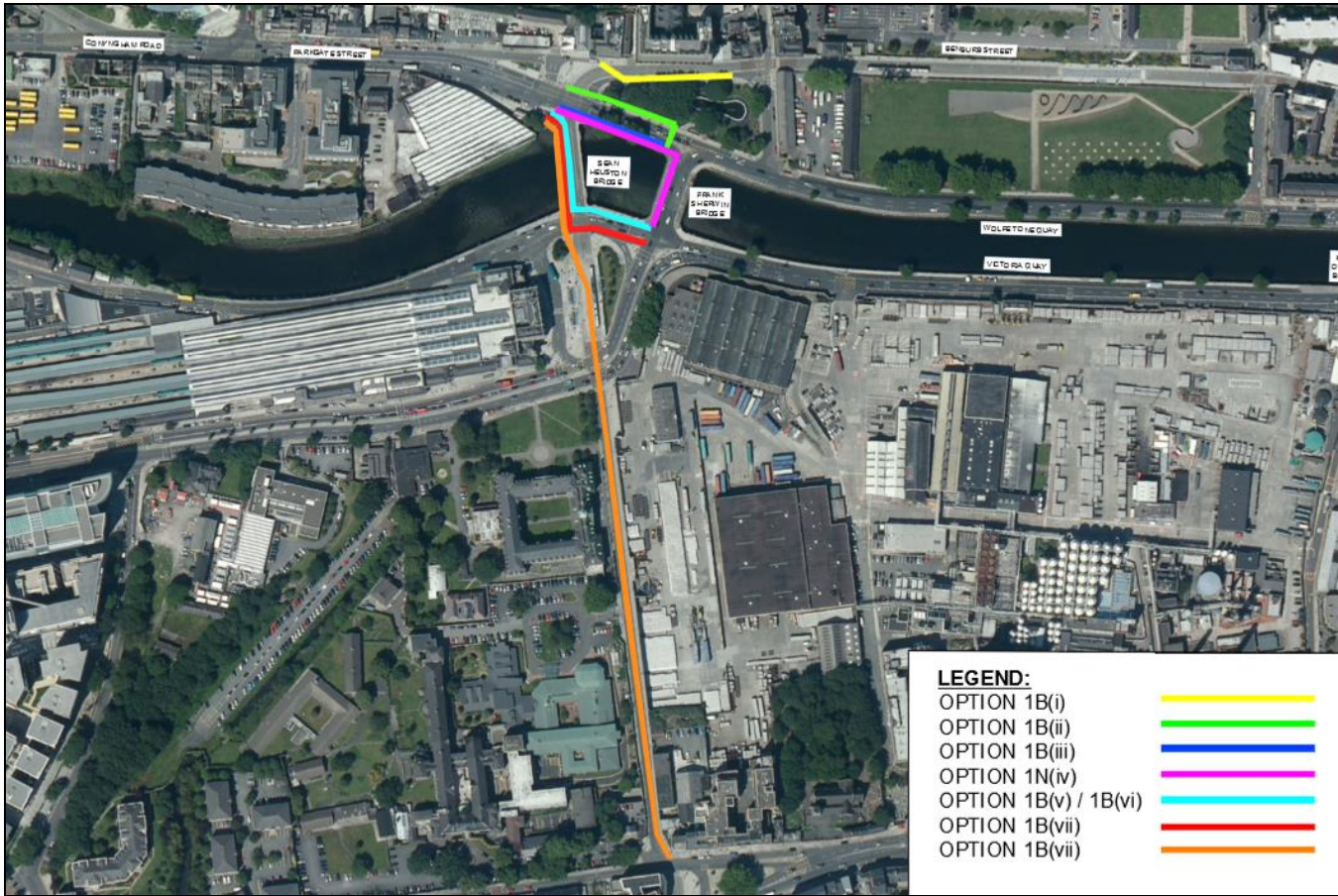


Figure 8.3 Sub-Section 1B Potential Options

- 1B(i):

Two-way parallel cycle track via Benburb Street
This two-way option would continue from Option 1A(i) by crossing the Luas Red Line tracks to run adjacent to the south side footpath along Benburb Street. This option requires either the removal of the loading bay and large cabinet on the footpath, or the displacement of the general traffic lane (providing for local access only) onto the Luas Red Line. This option is feasible.

Feasible
- 1B(ii):

One-way cycle track on the buildings side north of the river
A conventional on-road facility is feasible but would require reconfiguration of the roadway, and the provision of a complementary facility in the westbound direction.

Feasible
- 1B(iii):

One-way cycle track on the riverside north of the river
In order to accommodate a westbound cycle lane in addition to an eastbound cycle lane, bus lane and traffic lane, and a westbound traffic lane, it would be necessary to displace pedestrians on the riverside onto a new boardwalk. A preliminary assessment has indicated that this would be feasible without significant adverse impacts on either Sean Heuston or Frank Sherwin Bridges. Alternatively, it may be feasible to move the road corridor northward by encroaching slightly on the western end of the Croppy's Acre park. This option is feasible.

Feasible
- 1B(iv):

Two-way cycle track on the riverside north of the river
Similar to the combination of Options 1B(ii) and 1B(ii), this would be achieved either by the provision of a new boardwalk between Sean Heuston and Frank Sherwin Bridges, or by encroachment onto the western part of the Croppy's Acre park. Therefore, this option is feasible.

Feasible
- 1B(v):

Two-way cycle track on the riverside south of the river
This route option would require a new bridge west of Sean Heuston Bridge to connect Parkgate Street to the southern side of the river. The route would continue along the river side south of the river, requiring some localised reconfiguration of the road space. This option is feasible.

Feasible
- 1B(vi):

One-way cycle track on the riverside south of the river
Similar to Option 1B(v), this option is feasible but would require a new bridge for cyclists adjacent to Sean Heuston Bridge.

Feasible

- 1B(vii):

One-way cycle track on the buildings side south of the river
Similar to Option 1B(v), this option is feasible but would require a new bridge for cyclists adjacent to Sean Heuston Bridge.

Feasible
- 1B(viii):

Two-way parallel cycle track via James's Street
The only potential parallel route on the south side is along the LUAS tracks on Steeven's Lane to James's Street. The use of this link has already been ruled out at the Network Options Assessment level, on the grounds that it would fail to serve cycling demand on the north side of the river, due to its distance from the river corridor, and would therefore fail to achieve the scheme objectives. Therefore, this option is not feasible through this section.

Not Feasible

Table 8.1.2 Section 1B Stage 2 Assessment

Route Option	1B(i)	1B(ii)	1B(iii)	1B(iv)	1B(v)	1B(vi)	1B(vii)	1B(viii)
Pass / Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail

Figure 8.3 shows the remaining sifted options based on the pass-fail assessment above.

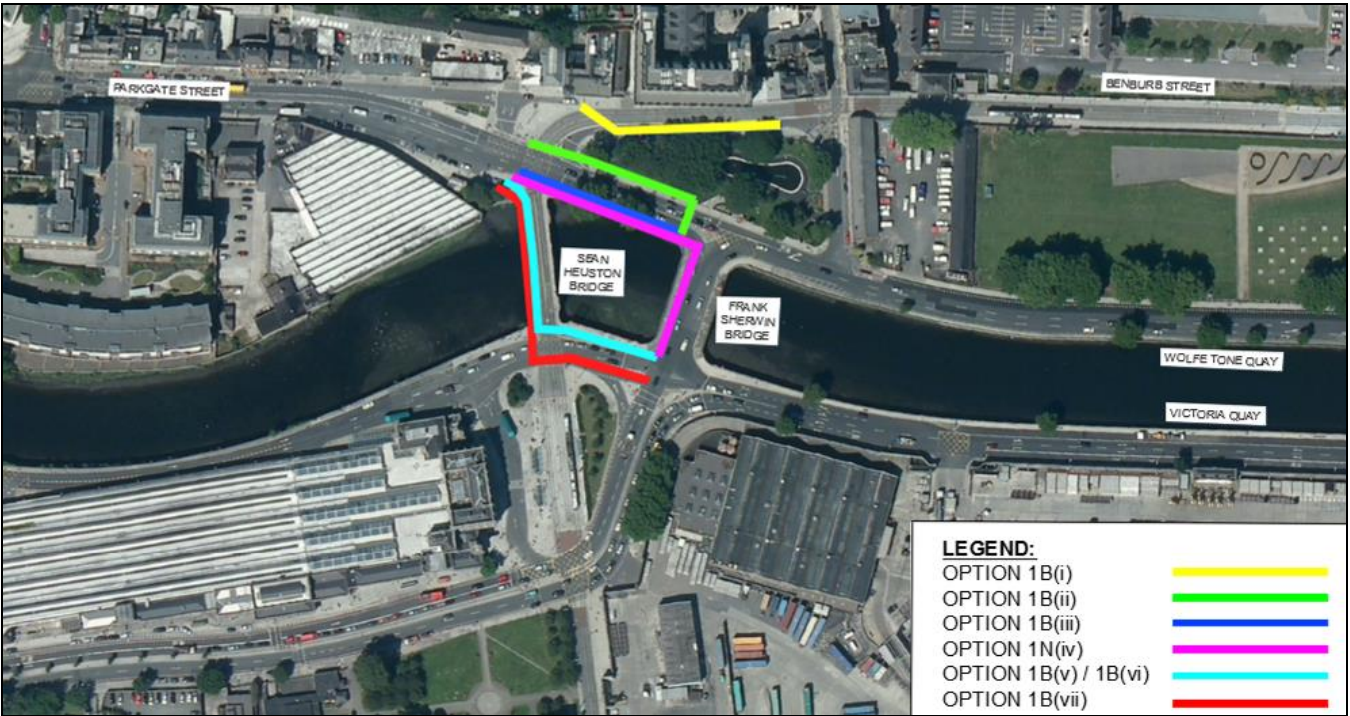


Figure 8.4 Sub-section 1B Sifted Options

8.1.3 Sub-Section 1C – Frank Sherwin Bridge to Rory O’More Bridge

From Frank Sherwin Bridge to Rory O’More Bridge there are 8 potential options. The route options are described below. In each case, it is assumed that Wolfe Tone Quay and Victoria Quay have surplus road space allocated to traffic and that this could be reconfigured to better use the available space:

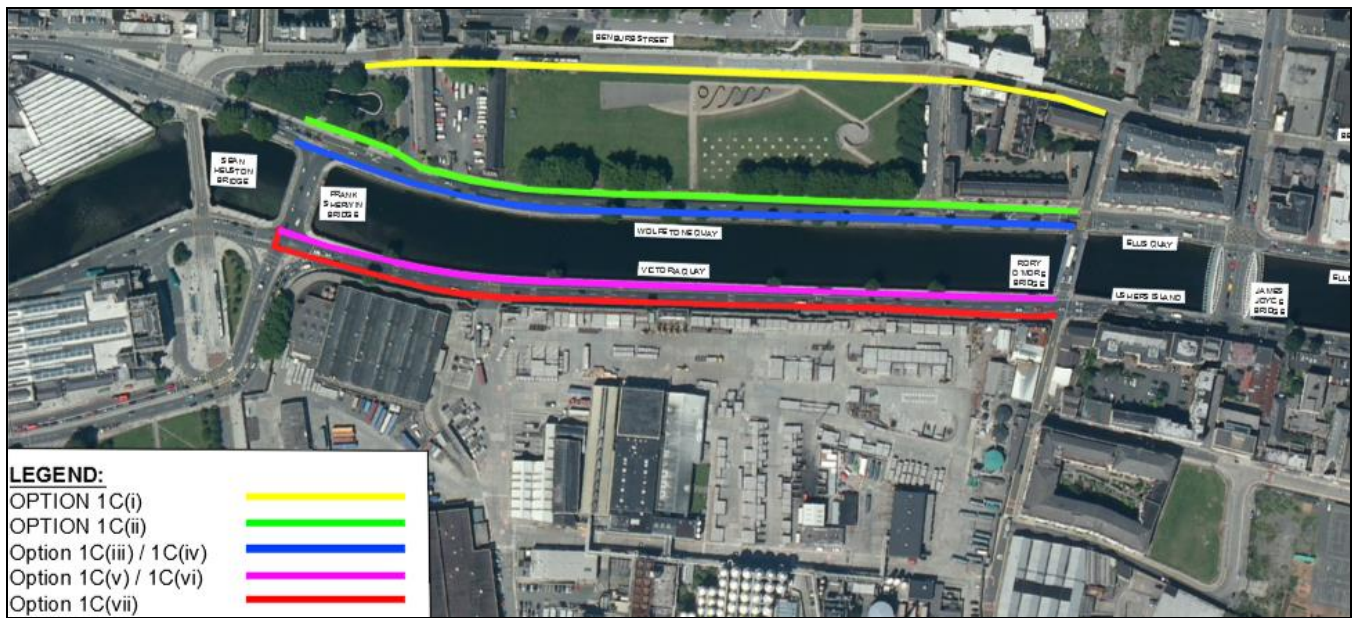


Figure 8.5 Sub-Section 1C Potential Options

1C(i): Two-way parallel cycle track via Benburb Street

This two-way route option would continue along Benburb Street to Ellis Street. This would require the partial demolition of the Dublin Civil Defence Buildings adjacent to the Croppy’s Acre park, and encroachment into the northern side of the park by circa.4m to accommodate the cycleway behind the Luas platform and footpath. Between Liffey Street West and Ellis Street, local traffic would be displaced onto the Luas Red Line to allow the cycleway to occupy the existing traffic circulation lane. Although requiring land acquisition, this option is feasible.

Feasible



Photo 8.3 Benburb Street
1C(ii): One-way cycle track on the buildings side north of the river

The option would run adjacent to the northern footpath of Wolfe Tone Quay. This would require the existing road space to be reconfigured. This could be achieved by shortening the right turn lane to Rory O’More Bridge. This option is feasible.

Feasible



Photo 8.4 Wolfe Tone Quay looking towards Sarsfield’s Quay

1C(iii): One-way cycle track on the riverside north of the river

The option would run adjacent to the southern footpath of Wolfe Tone Quay. This would require the existing road space to be reconfigured. This could be achieved by shortening the right turn lane to Rory O’More Bridge. This option is feasible.

Feasible

1C(iv): **Two-way cycle track on the riverside north of the river**

The option would run adjacent to the southern footpath of Wolfe Tone Quay. This would require the existing road space to be reconfigured. This could be achieved by shortening the right turn lane to Rory O'More Bridge but might also require narrowing the existing building-side footpath on Sarsfield Quay to achieve the additional width required for a two-way facility. This option is feasible.

Feasible

1C(v): **Two-way cycle track on the riverside south of the river**

Victoria Quay is wide enough to accommodate a cycling facility, but the riverside parking and one traffic lane on approach to the St. John's Road junction would have to be removed. Alternatively, a section of boardwalk could be constructed on the approach to Frank Sherwin Bridge to retain the second right turn lane. This option is feasible.

Feasible



Photo 8.5 Victoria Quay

1C(vi): **One-way cycle track on the riverside south of the river**

Victoria Quay is wide enough to accommodate a cycling facility, but the riverside parking and one traffic lane on approach to the St. John's Road junction would have to be removed. Alternatively, a section of boardwalk could be constructed on the approach to Frank Sherwin Bridge to retain the second right turn lane. This option is feasible.

Feasible

1C(vii): **One-way cycle track on the buildings side south of the river**

Similar to Option 1C(v), this option may be constructed with reconfiguration of the roadway. However, the design would have to allow for stopping buses and Heavy Goods Vehicles accessing St. James's Gates. This option is feasible.

Feasible

1C(viii): **Two-way parallel cycle track via James's Street**

The only potential parallel route on the south side is along the Luas Red Line tracks on Steeven's Lane to James's Street. The use of this link has already been ruled out at the Network Options Assessment level, on the grounds that it would fail to serve cycling demand on the north side of the river, due to its distance from the river corridor, and would therefore fail to achieve the scheme objectives. Therefore, this option is **not feasible**.

Not Feasible

Table 8.1.3 Sub-section 1C Stage 2 Assessment

Route Option	1C(i)	1C(ii)	1C(iii)	1C(iv)	1C(v)	1C(vi)	1C(vii)	1C(viii)
Pass/Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail

The following Figure 8.5 shows the remaining sifted options based on the pass-fail assessment above.

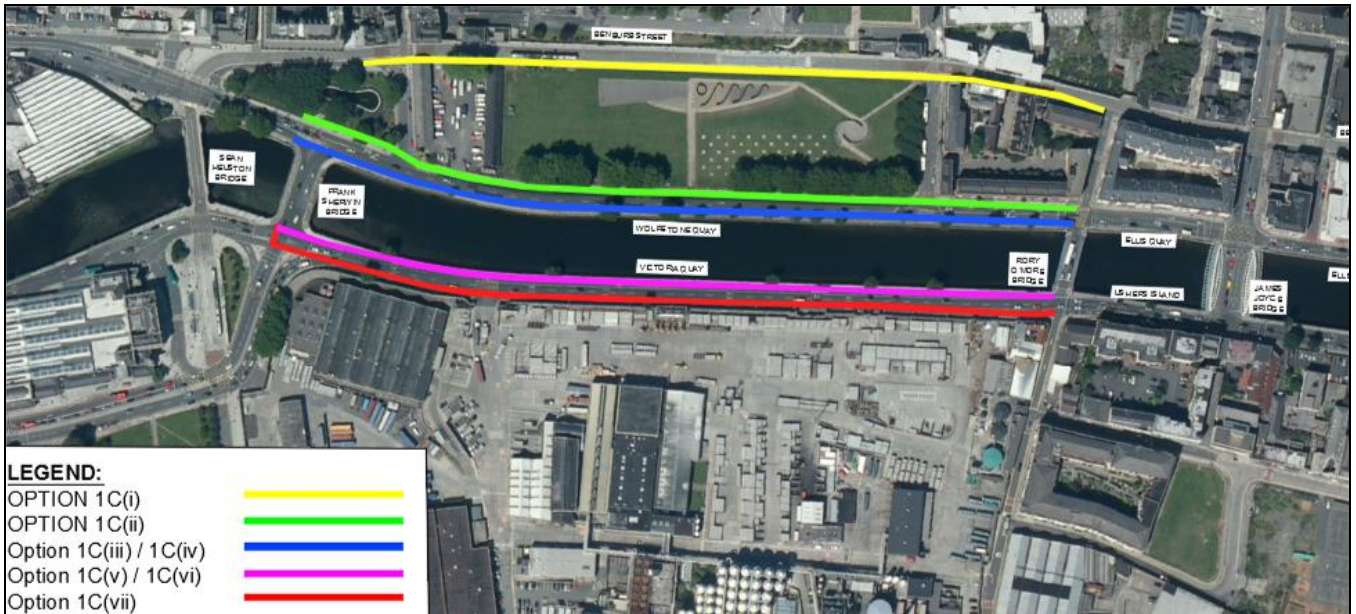


Figure 8.6 Sub-section 1C Sifted Options

8.1.4 Sub-Section 1D - Rory O'More Bridge to James Joyce Bridge

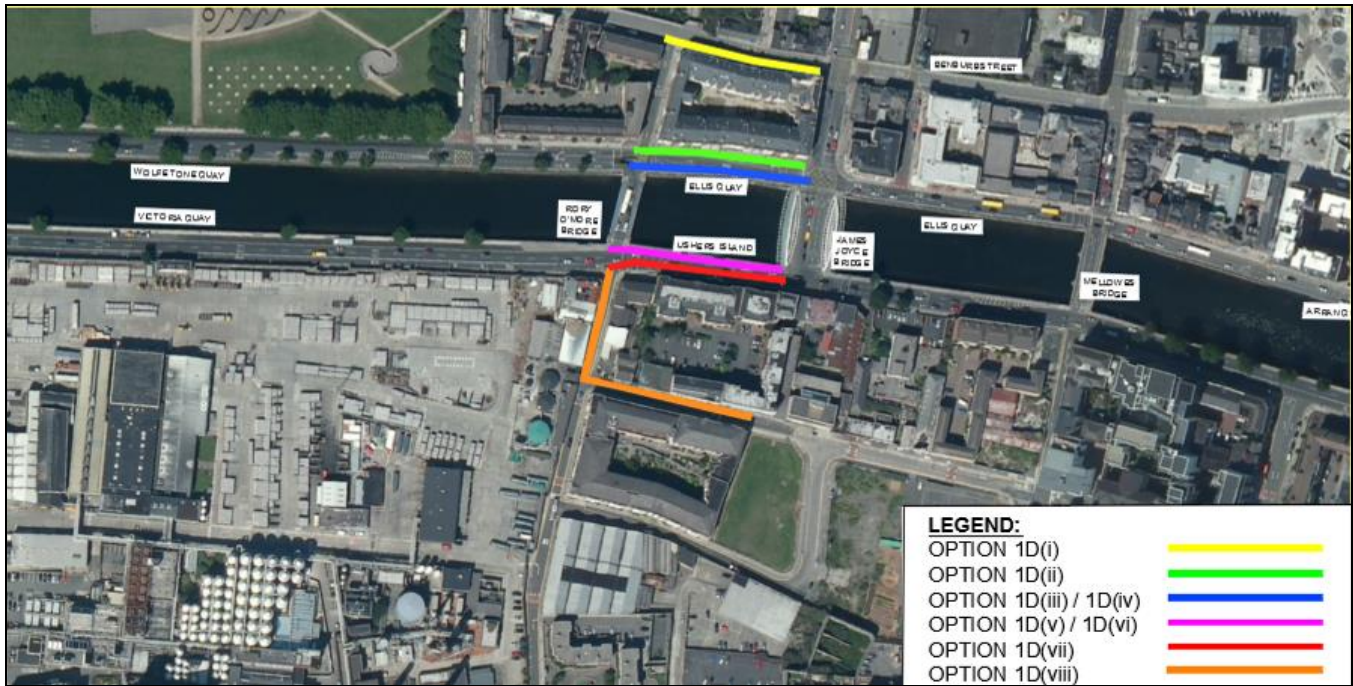


Figure 8.7 Sub-Section 1D Potential Options

The options on this short sub-section of the route are as follows:

1D(i): **Two-way parallel cycle track north via Benburb Street**
A continuation of Option 1C(i) where a two-way cycle track runs along the existing road carriageway and local access traffic is displaced onto the Luas Red Line to share with Luas. Existing part time coach parking and car parking facilities would have to be removed. This option is feasible.

Feasible



Photo 8.7 Ellis Quay West

1D(ii): **One-way cycle track on the buildings side north of the river**

This option would run adjacent to the northern footpath of Ellis Quay West. At present, the left turn and straight-ahead traffic movements are separated, to allow the left turn to be held while the pedestrian crossing across Blackhall Place operates. This arrangement would be retained, with cyclists being released first before an early cut-off to allow the left turn traffic movement on demand. This option is feasible.

Feasible

1D(iii): **One-way cycle track on the riverside north of the river**

This variant on Option 1D(ii) is feasible and can be accommodated with some reconfiguration of the existing roadway.

Feasible

1D(iv): **Two-way cycle track on the riverside north of the river**

This is similar to Option 1D(iii) but would require additional width to accommodate a two-way facility. While a boardwalk could be accommodated along the quayside to increase the available width for pedestrians and cyclists, the arrangement of the tied arches and safety barriers of the James Joyce Bridge may preclude the extension of the two-way facility across the junction with Blackhall Place. Therefore, a bus gate arrangement may be required for the eastward continuation of the facility through the Blackhall Place junction. This would diminish bus priority.

Feasible

1D(v): **Two-way cycle track on the riverside south of the river**

This option would require some road reconfiguration and narrowing the southern footpath to minimum 2.0m. The two-way cycle track would occupy one existing traffic lane, with two adjacent traffic lanes provided (one potentially as a bus lane).

Feasible

1D(vi): **One-way cycle track on the riverside south of the river**

This variant on Option 1D(v) is feasible and with the reduced road space requirement for a with-flow facility will require less extensive reconfiguration of the roadway than in the case of Option 1D(v).

Feasible

1D(vii): **One-way cycle track on the buildings side south of the river**

Similar to Option 1D(vi), this option may be accommodated with reconfiguration of the roadway. General traffic turning left to Watling Street can be accommodated from the left most lane maintaining the current traffic regime. This option is feasible.

Feasible

1D(viii): **Two-way parallel cycle track via Island Street**

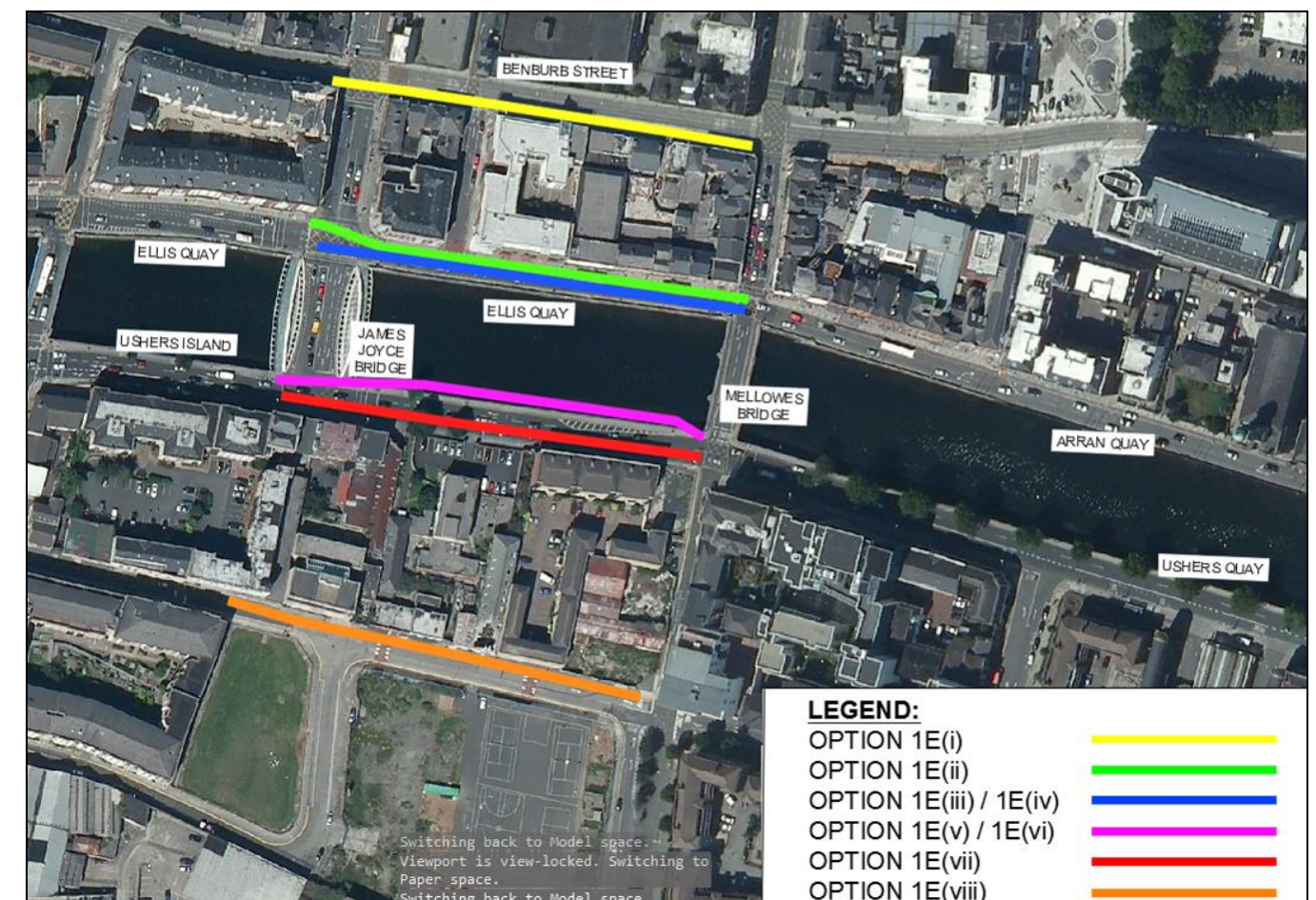
Feasible

[illegible]

LEGEND:

- OPTION 1D(i) —
- OPTION 1D(ii) —
- OPTION 1D(iii) / 1D(iv) —
- OPTION 1D(v) / 1D(vi) —
- OPTION 1D(vii) —
- OPTION 1D(viii) —

8.1.5 Sub-Section 1E - James Joyce Bridge to Liam Mellows Bridge



The following describes the available options within this sub-section of the Liffey Cycle Route:

This option is a continuation of Option 1D(i) via a two-way cycle track along the existing road carriageway with local access traffic displaced onto the Luas Red Line to share with Luas. Existing part time loading and car parking facilities would have to be removed.

Feasible



Photo 8.8 Ellis Quay East

1E(ii): One-way cycle track on the buildings side north of the river

The existing road cross-section of Ellis Quay is too narrow to accommodate a 3m bus lane, a 3m traffic lane and a 2m cycle lane, without reducing the width of the existing footpath. A quay wall realignment or boardwalk solution to achieve greater width would not resolve the problem, since the bridge parapets at either end preclude the additional width being carried through the junctions, and the architectural form of both bridges prevents the parapets being sympathetically modified. Indeed, Liam Mellows Bridge at the eastern end of Ellis Quay is the oldest bridge across the River Liffey. Therefore, to carry a cycling route along this section of the quays, either the bus lane or the traffic lane must be diverted onto an alternative route, or a series of bus gates would be required, or a locally reduced cycle facility width must be contemplated.

The nearest alternative route to the north is via Benburb Street. General traffic would have to cross the bus lane twice if general traffic were diverted onto Benburb Street, which would reduce the quality of service for buses on a key public transport corridor which carries in excess of 350 buses in the AM peak period [7AM – 10AM]. Furthermore, the route alongside the Luas Red Line is designed for local access, and large vehicles would struggle to turn into it without encroaching onto the Luas reservation. Finally, routing general traffic along the Luas line would reduce the quality of service for the tram and cause significant delays.

An alternative, considered in the earlier studies of the Liffey Cycle Route, involved rerouting general traffic via Blackhall Place, North Brunswick Street and Church Street. This proposal also had the disadvantage of requiring general traffic to cross the bus lane at each end of the diversion, potentially causing delays to all road users.

A further alternative is to reroute the bus lane. Given the lower number of vehicles, it might be acceptable to route bus services along the Luas Red Line. Based on the turning space required for buses, this diversion would have to be implemented over a longer distance than just Ellis Quay – that is, from Liffey Street West to Church Street to avail of wider linking streets. It is unlikely that the Luas Red Line would have capacity for taxis, and these would have to remain on Ellis Quay sharing with general traffic. In order to comfortably accommodate bus passengers, the cobbled surface of the Luas line would have to be re-laid as asphalt. This option would displace, delay and discommode a significant volume of bus passengers, and delay a significant volume of Luas passengers, in favour of a smaller volume of cyclists²⁰. Therefore, while this option can potentially meet the headline objectives of the Liffey Cycle Route, it cannot be achieved without significant impacts on other modes of transport.

A further option previously considered involved constructing a boardwalk between junctions and implementing a bus gate upstream of the Queen Street junction. This would require the bus lane and general traffic lane to run alternately through the same space, and the cycleway would traverse what is currently the traffic lane through the junction. This would diminish bus priority.

A minimum cycle facility width of 1.5m can be provided along Ellis Quay with a 200mm buffer to the bus lane, subject to modification to the road cross section. Given the constrained road corridor width available at this location, the existing footpath width will also have to be reduced. However, it is noted that pedestrian demand in this area is low and that existing street furniture (bollards) currently reduces the effective pedestrian provision.

The reduction in the cycle facility width would potentially inconvenience faster cyclists, so the pinch-point should be maintained only where essential, and a boardwalk should be considered for pedestrians where footpath provision is reduced elsewhere to allow the provision of a 2m minimum width cycling facility. Preliminary design proposals will have to carefully consider the placing of street furniture, including public lighting and traffic signal paraphernalia to maximise the residual walking corridor on each side of the road.

On balance, it is considered that a reduced cycle facility width locally is preferable to diverting either the general traffic or bus lanes from the quays, or the diminution in bus priority associated with the bus gate proposal. Therefore, this variant is brought forward to the Stage 3 assessment.

Feasible

²⁰ Each bus carries up to 125 passengers, while each tram carries up to 360 passengers.

1E(iii): One-way cycle track on the riverside north of the river

This option is feasible subject to the same compromises as Option 1E(iii). The pedestrian demand on the riverside is lower than that on the buildings side, which may present less potential for pedestrians to step onto the cycle track. However, it would mean that buses in the bus lane would be immediately adjacent to the narrow buildings side pedestrian footpath, resulting in fast moving buses cause unease for pedestrians.

Feasible

1E(iv): Two-way cycle track on the riverside north of the river

This is similar to Option 1E(iii), but would require additional width to accommodate a two-way facility. While a boardwalk could be accommodated along the quayside to increase the available width for pedestrians and cyclists, the historic parapet of Liam Mellows Bridge would preclude the extension of the two-way facility across the junctions with Blackhall Place and Queen Street. Therefore, a bus gate arrangement would be required for the eastward continuation of the facility through the Blackhall Place junction. This would diminish bus priority.

Feasible

1E(v): Two-way cycle track on the riverside south of the river

The traffic regime in this part of the city is reliant on a right turn onto James Joyce Bridge, and it is not considered to be feasible to reroute this right turn. This right turn accommodates general traffic and a considerable number of buses over James Joyce towards Prussia St. If the right turn were combined with the straight-ahead traffic lane, the straight traffic could not run at the same time as any riverside cycle facility. This would in turn have the undesirable effect of reducing the quality of service for general traffic and bus traffic (158 buses towards Prussia St, with a carrying capacity of 20,000 patrons [PM peak])²¹ while the cycle facility received a green signal.

Providing a boardwalk from just upstream of Liam Mellows Bridge to just downstream of James Joyce Bridge to accommodate pedestrians has advantages in that it provides riverside space to accommodate a cycle facility downstream of James Joyce Bridge. However, even displacing pedestrians to a boardwalk at this location fails to provide enough width to accommodate a 3.5m wide two-way cycling facility and a bus lane, a straight-ahead traffic lane and a right turning lane. It is not considered to be feasible to provide a bus gate arrangement outbound, since it would create an unacceptable vulnerability in the city centre's traffic circulation network.

Not Feasible



Photo 8.9 Usher's Island

1E(vi): One-way cycle track on the riverside south of the river

This variant on Option 1E(v) faces similar challenges. However, the available width can accommodate a 2m wide one-way cycle track downstream of the James Joyce Bridge. The cycle track would slew on-road through the junction to get past the arches and safety barriers of the James Joyce Bridge. This would require the through cycle lane to always operate on a separate traffic signal phase to the right turning lane. This option is considered feasible.

Feasible

1E(vii): One-way cycle track on the buildings side south of the river

This option is feasible but requires reconfiguration of the road space. In this instance, by reducing the length of the right turning lane, pedestrians can be accommodated on a new boardwalk and the exiting footpath space on the river side can be reassigned to the right turning lane. It would be challenging to provide for a right turn for cyclists onto James Joyce Bridge and this movement may have to be diverted onto an alternative route.

Feasible

1E(viii): Two-way Parallel Route via Island Street

From Rory O'More Bridge, a parallel route is feasible by diverting to Watling Street and Island Street. Road reconfiguration would be required to remove all traffic from Watling Street as far as Island Street, and to reduce Island Street to one-way westbound with all parking removed.

Feasible

²¹ Traffic Count Data June 2018 published by Dublin City Council

Table 8.1.5 Section 1E Stage 2 Assessment

Route Option	1E(i)	1E(ii)	1E(iii)	1E(iv)	1E(v)	1E(vi)	1E(vii)	1E(viii)
Pass/Fail	Pass	Pass*	Pass*	Pass**	Fail	Pass	Pass	Pass

*requires footpath width reduction on Ellis Quay
**requires bus gate at Blackhall Place junction

The following Figure 8.9 shows the remaining sifted options based on the pass-fail assessment above.

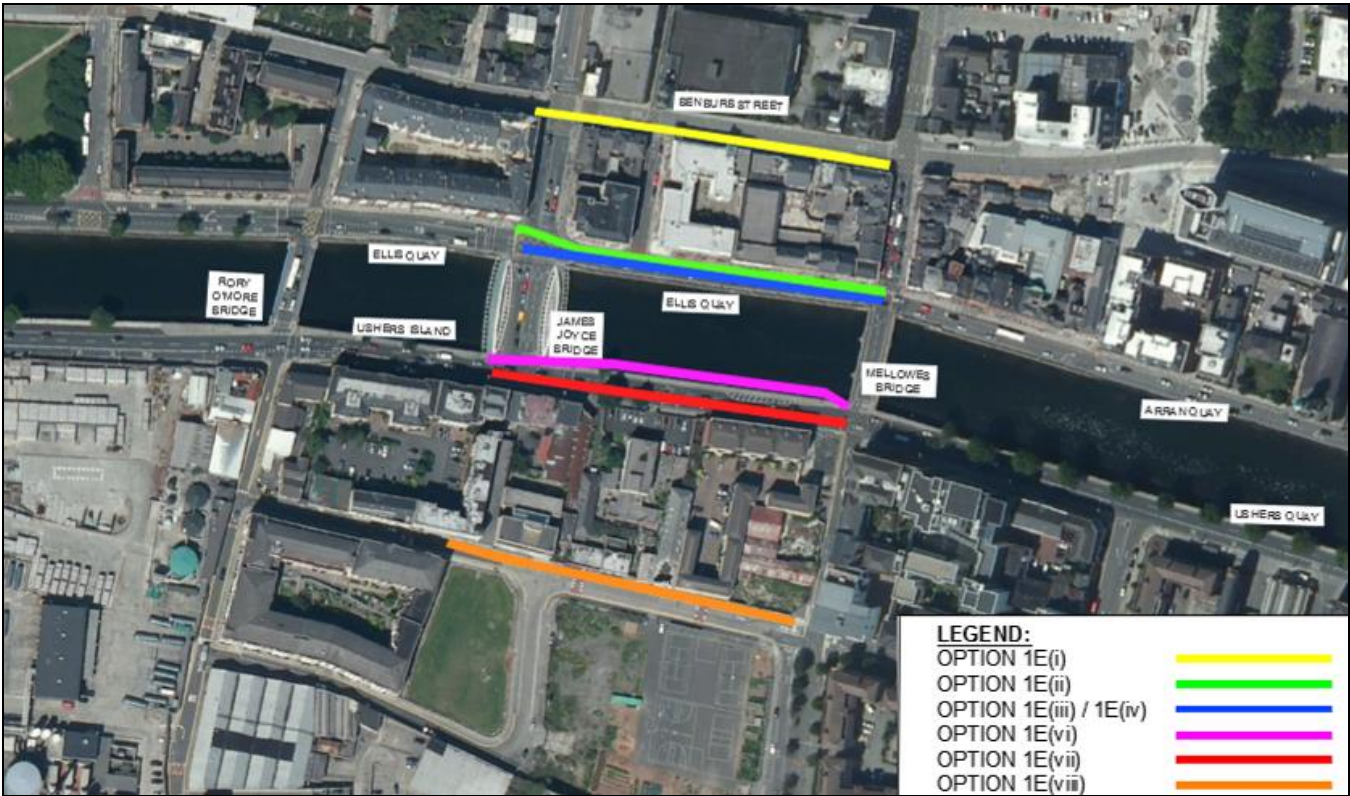


Figure 8.10 Sub-Section 1E Sifted Options

8.1.6 Sub-Section 1F - Liam Mellows Bridge to Father Matthew Bridge

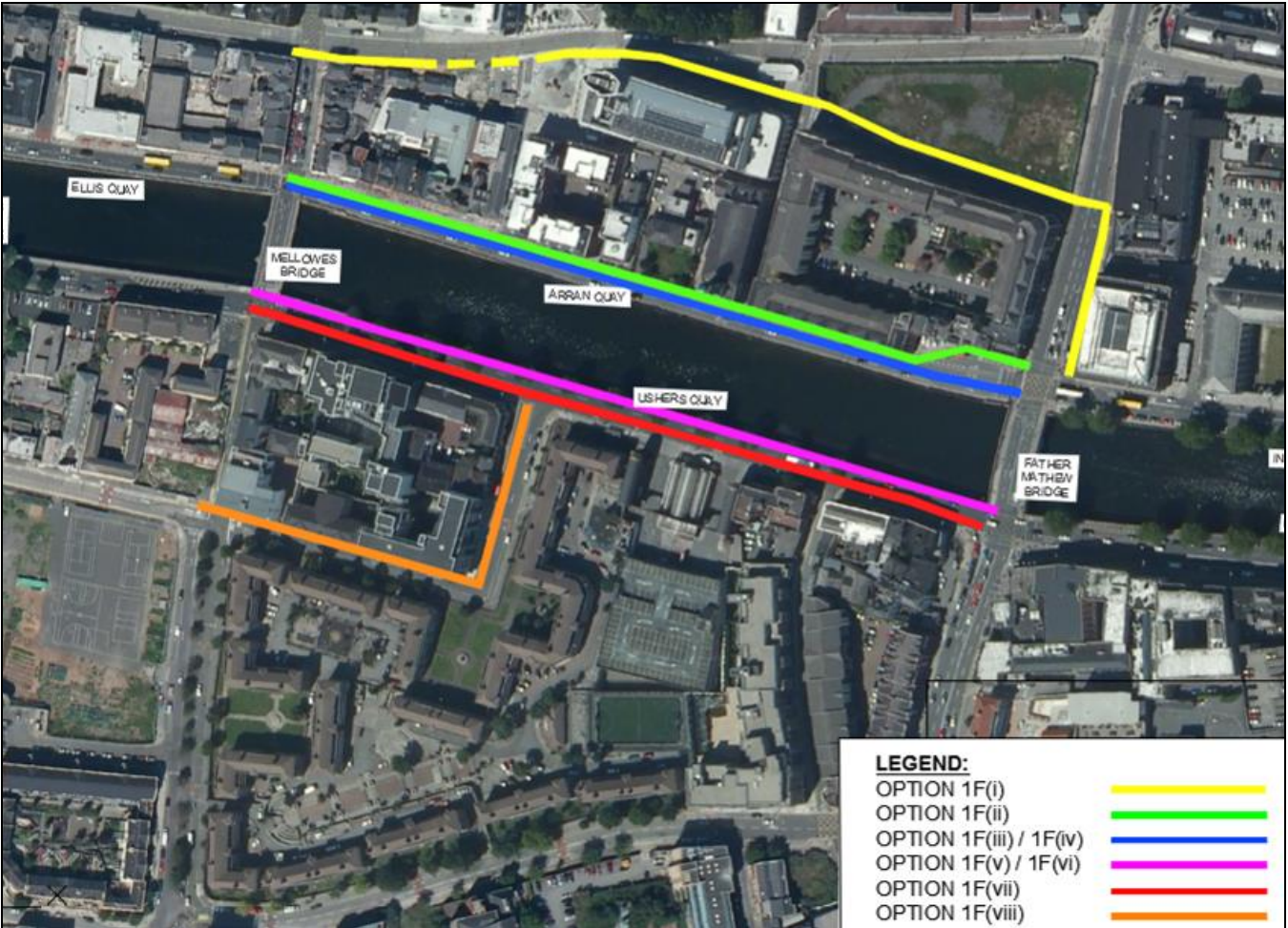


Figure 8.11 Sub-Section 1F Potential Options

The following describes the available options within this sub-section of the Liffey Cycle Route:

- 1F(i): **North Side parallel cycle track via Benburb Street and Arran Quay Terrace**
The reservation that exists to the south of the Luas Red Line along Benburb Street does not continue east of Queen Street. An apartment building with a café at the ground floor has recently been constructed between the Luas line and Coke Lane at the southern end of Smithfield Plaza. Cyclists would have to traverse a short section of the Luas line (modified with VeloSTRAIL or similar to be safe for cyclists) to pass this building, with traffic signals controlling access through the short pinch point whenever not in use by an eastbound tram. Given the relatively low frequency of trams, this would have less disruptive effect for cyclists than normal traffic signals.

East of the cafe, the plaza area would be reconfigured to accommodate the cycleway. This would then continue through the paved area between the Smithfield Luas stop and Phoenix Street North. East of Lincoln Lane / Bow Street, the route would continue along Hammond Lane. The vacant site to the north of Hammond Lane is identified on Dublin City Council’s mapping as a site for a new Family Court. There is no online record of an associated planning application. It is therefore assumed that the OPW could cede a small area along this site’s southern boundary to accommodate the Liffey Cycle Route.

Alternatively, the roadway could be further narrowed, and the northern footpath removed as an interim measure, before the site is developed. As a further alternative, Hammond Lane could be closed to traffic, since there are no accesses along it, and there are local alternatives available, including Lincoln Lane and May Lane.

Feasible

1F(ii): One-way cycle track on the buildings side north of the river

The existing road cross-section of Arran Quay is too narrow to accommodate a 3m bus lane, a 3m traffic lane and a 2m cycle lane, without narrowing the existing footpaths. A quay wall realignment or boardwalk solution to achieve greater width wouldn't solve the problem, since the bridge parapets at the western end precludes the additional width being carried through the upstream junction, and the architectural form of Liam Mellows Bridge prevents the parapet being sympathetically modified. Therefore, to carry a cycling route along this section of the quays, a locally reduced footpath width must be contemplated. Since there is surplus footpath width available on the northeast corner of the junction, and given the narrow footpaths upstream and downstream, it is considered acceptable to locally narrow the footpath to accommodate the Liffey Cycle Route at this location. This option is feasible.

Feasible

1F(iii): One-way cycle track on the riverside north of the river

This option is possible subject to the same compromises as Option 1F(ii). This option is feasible.

Feasible

1F(iv): Two-way cycle track on the riverside north of the river

Refer to Section 1E(iv).

Feasible

1F(v): Two-way cycle track on the riverside south of the river

Usher's Quay has sufficient road width to accommodate a two-way cycle track, a traffic lane and a bus lane without any impact on existing pedestrian facilities. The completion of Luas Cross City and the associated limitations on access to the south quays further east has restricted the volume of traffic travelling west along the south quays, in turn reducing the capacity requirement at this location. As such, the second traffic lane may be omitted to facilitate the Liffey Cycle Route scheme. This option is feasible.

Feasible

1F(vi): One-way cycle track on the buildings side south of the river

Similar to Option 1F(v), this option may be constructed with reconfiguration of the roadway. This option is feasible.

Feasible

1F(vii): One-way cycle track on the riverside south of the river

This variant on Option 1F(v) is feasible.

Feasible

1F(viii): Two-way parallel cycle track via Usher Street

The route described in 1D(viii) and 1E(viii) along Watling Street and Island Street would return to the quays via Usher Street. A second alternative is available via Bridgefoot Street and Oliver Bond Street, but the gradient on the former is very severe and cyclists would likely avoid it. This option is feasible.

Feasible

Table 8.1.6 Section 1F Stage 2 Assessment

Route Option	1F(i)	1F(ii)	1F(iii)	1F(iv)	1F(v)	1F(vi)	1F(vii)	1F(viii)
Pass/Fail	Pass	Pass*	Pass*	Pass**	Pass	Pass	Pass	Pass

*requires footpath width reduction on Arran Quay

**requires bus gate at Blackhall Place junction

The following Figure 8.12 shows the remaining sifted options based on the pass-fail assessment above.

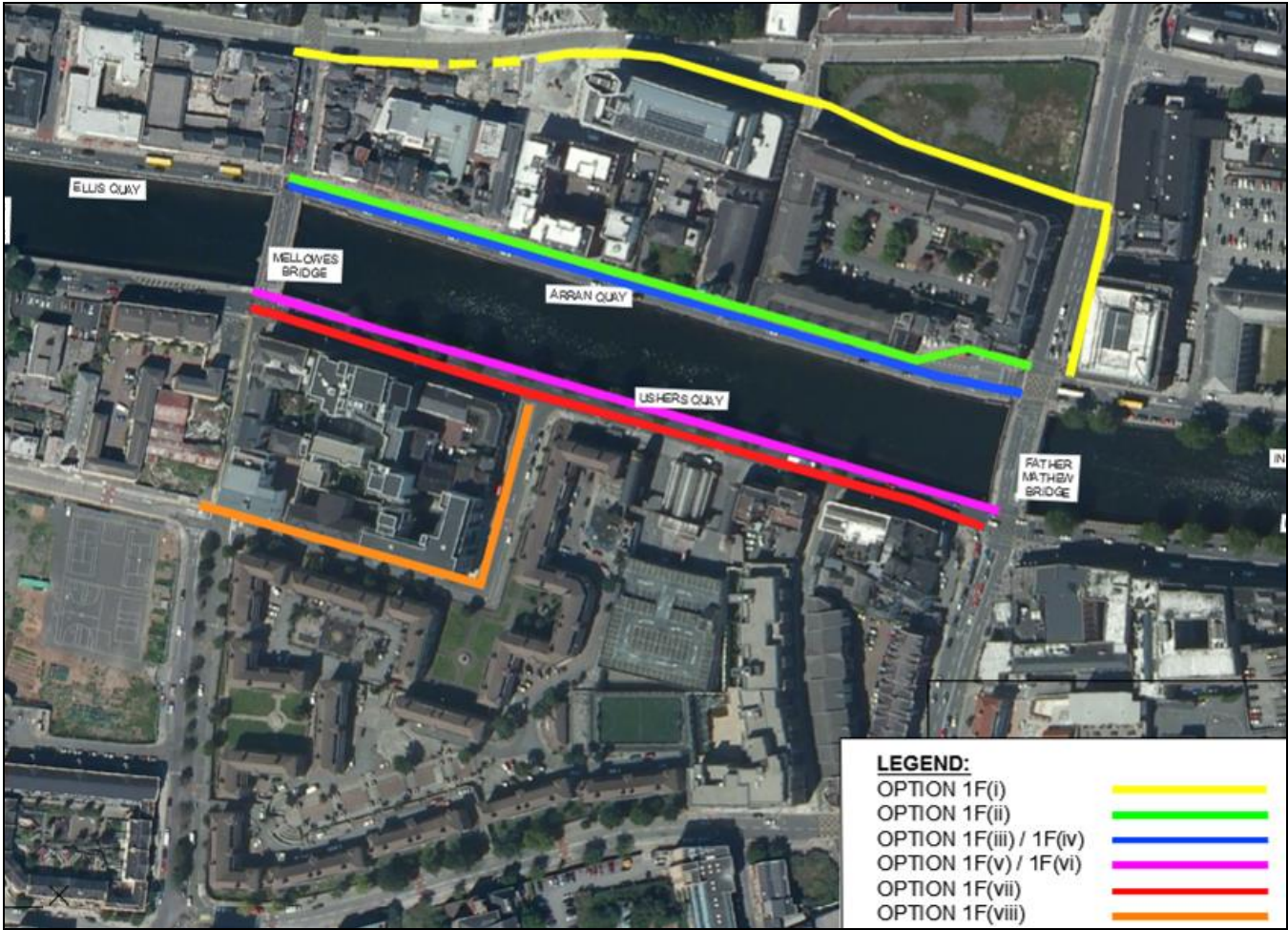


Figure 8.12 Sub-Section 1F Sifted Options

8.1.7 Combined Route Options through Section 1

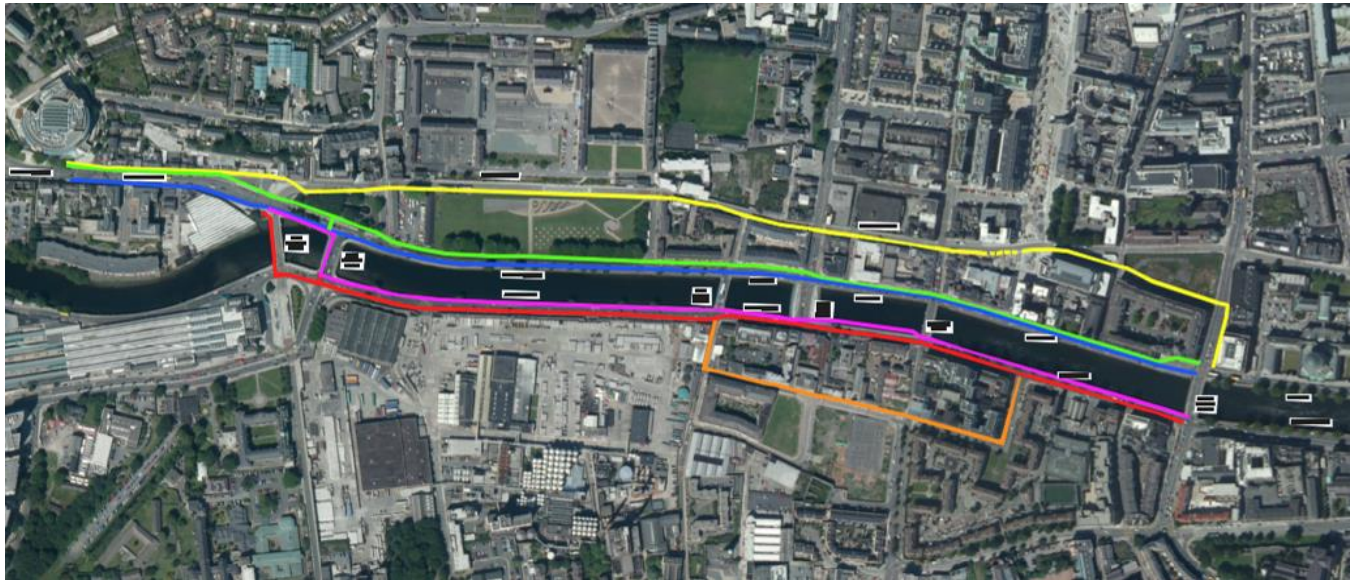


Figure 8.13 Section 1 - Outcome of Stage 1 Assessment

By combining the viable options through the individual sub-sections, as described above, a shortlist of options can be compiled for more detailed assessment:

Table 8.1.7 Section 1: Stage 2 Assessment

Option	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Sub-section	Parallel Two-way Cycle Track North	One-way Cycle Track Buildings Side North	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	Two-way Cycle Track Riverside South	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South	Parallel Two-way Cycle Track South
1A	Pass	Pass	Pass	Pass	-	-	-	-
1B	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail
1C	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Fail
1D	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
1E	Pass	Pass*	Pass	Pass**	Fail	Pass	Pass	Pass
1F	Pass	Pass*	Pass	Pass**	Pass	Pass	Pass	Pass
Overall	Pass	Pass	Pass	Pass	Fail	Pass	Pass	Fail

*requires footpath width reduction on Ellis Quay and Arran Quay

**requires bus gate at Blackhall Place junction

From the foregoing Stage 2 Assessment for Section 1 the 8 options assessed were reduced to a shortlist of 5 options as follows:

- Two-way cycle track parallel to north quays;
- One-way cycle track on the buildings side north of the river;

- One-way cycle track on the riverside north of the river;
- Two-way cycle track on the riverside north of the river;
- One-way cycle track riverside south of the river; and
- One-way cycle track on the buildings side south of the river.

The parallel route along Island Street has not been considered at this stage due to the availability of more direct alternatives, but could potentially be revisited later if necessary.

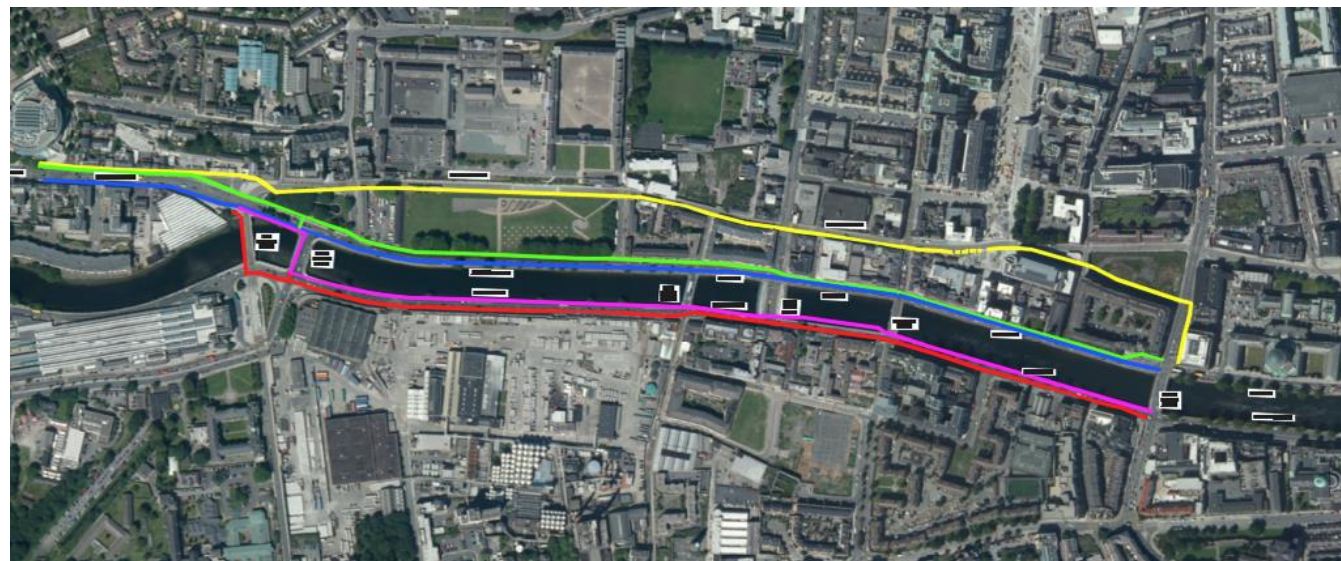


Figure 8.14 Section 1 End to End Route Options

These will be subjected to a multi-criteria comparison in line with the Common Appraisal Framework guidance at Options Assessment Stage 3 to identify which of these solutions is optimal.

8.2 Section 2: Father Matthew Bridge to O'Connell Bridge

The Father Matthew Bridge to O'Connell Bridge section of the route has been subdivided into three subsections, extending between road bridges where the major radial routes cross the River.

Sub-section 2A: Father Mathew Bridge to O'Donovan Rossa Bridge (Church St to Winetavern St);

Sub-section 2B: O'Donovan Rossa Bridge to Grattan Bridge (Winetavern St to Parliament St); and

Sub-section 2C: Grattan Bridge to O'Connell Bridge (Parliament St to O'Connell St).

8.2.1 Sub-Section 2A - Father Mathew Bridge to O'Donovan Rossa Bridge

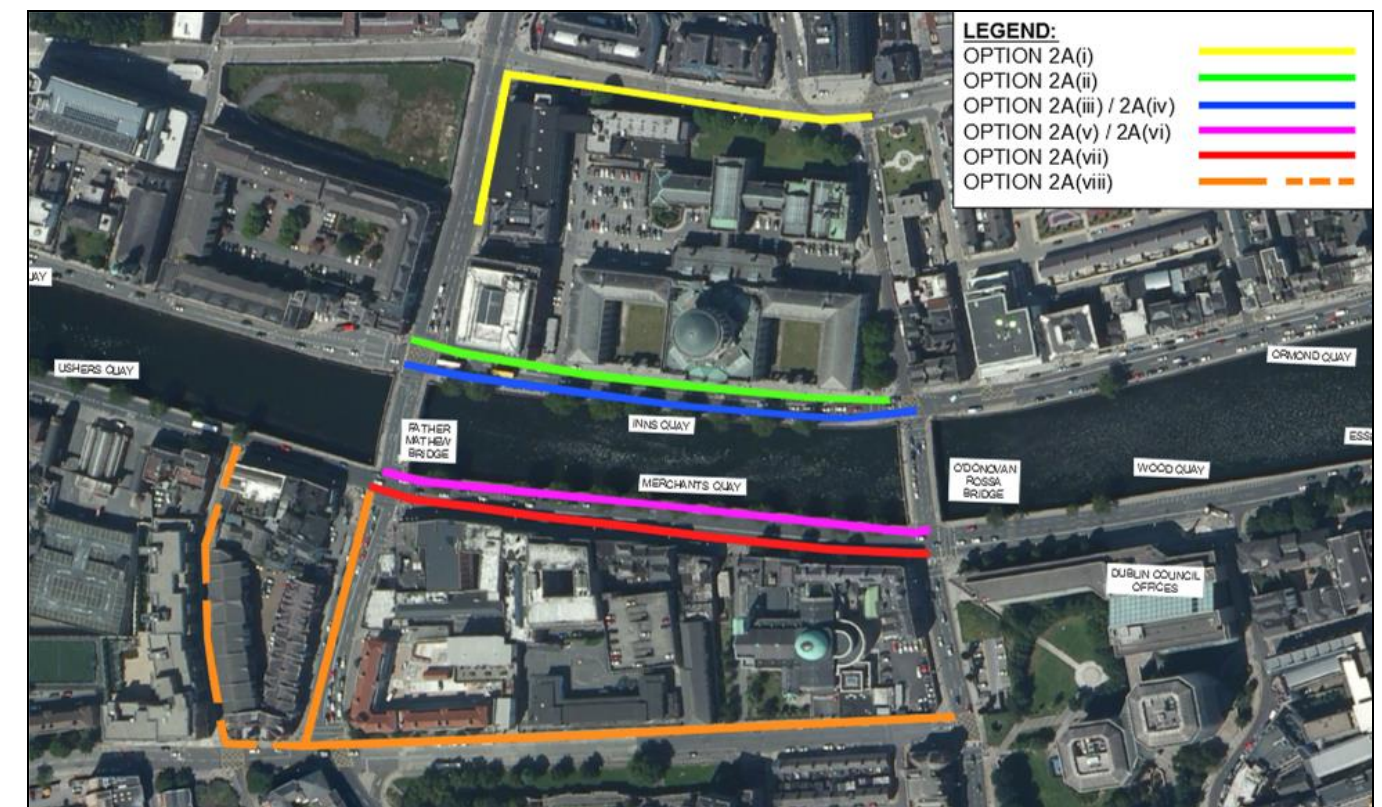


Figure 8.15 Sub-Section 2A Potential Options

The following describes the available options within this sub-section of the Liffey Cycle Route:

2A(i): Two-way parallel cycle track via Chancery Street

The Four Courts complex blocks a continuation of Option 1F(i), and it is assumed that the security concerns attached to this site would preclude the acquisition of a route through the complex. Therefore, the only possible connection would be behind the Four Courts complex. This section of Chancery Street has previously been annexed for the Luas Red Line, and there is a Luas stop situated behind the Four Courts. Given frontage development to the north of the Luas line, the only opportunity for the Liffey Cycle Route would be to acquire land from the rear of the Four Courts complex. This would enable the development of a route to the south of the Luas Red Line behind the Luas stop.



Photo 8.11 Chancery Street behind Four Courts

It is likely that the acquisition of these lands would have operational and security implications, and it is also likely that the walls and railings of the Four Courts are listed on the Record of Protected Structures as part of the curtilage of the building. The route is also considered to be indirect, given the lack of upstream connectivity. Based on the foregoing, this option is considered to be not feasible.

Not Feasible

2A(ii): **One-way cycle track on the buildings side north of the river**

Inns Quay currently carries two lanes of traffic, a bus lane, and parking along the riverside. There are also fine mature trees on the river side. It is considered feasible to remove one lane of traffic and / or the parking on the riverside, whilst retaining the trees. It is possible to fit a cycling facility on this section of the quays.

Feasible

2A(iii): **One-way cycle track on the riverside north of the river**

This variant on Option 2A(ii) is feasible.

Feasible

2A(iv): **Two- way cycle track on the riverside north of the river**

Similar to Option 2A(ii), this can be achieved with reconfiguration of the existing road space as described. This option is feasible.

Feasible

2A(v): **Two-way cycle track on the riverside south of the river**

Merchant's Quay currently carries two lanes of traffic, a bus lane, and parking along the riverside. There are also trees on the river side. The completion of Luas Cross City and the associated limitations on access to the south quays further east has restricted the volume of traffic travelling west along the south quays, in turn reducing the capacity requirement at this location. As such, the second traffic lane may be omitted to facilitate the Liffey Cycle Route scheme. This option is feasible.

Feasible

2A(vi): **One-way cycle track on the riverside south of the river**

This variant on Option 2A(v) is feasible.

Feasible

2A(vii): **One-way cycle track on the buildings side south of the river**

Similar to Option 2A(v), this can be achieved with reconfiguration of the existing road space as described. This option is feasible.

Feasible

2A(viii): **Two-way parallel cycle track via Cook Street**

From Father Matthew Bridge, a parallel route is feasible by diverting to Lower Bridge Street and Cook Street. This would require the removal of one lane on Lower Bridge Street. Alternatively, there may be a feasible variant via Wormwood Gate and St. Augustine Street to the west, but this would require the removal of cobbles on the latter.

Feasible

Table 8.2.1 Section 2A Stage 2 Assessment

Route Option	2A(i)	2A(ii)	2A(iii)	2A(iv)	2A(v)	2A(vi)	2A(vii)	2A(viii)
Pass/Fail	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass

The following Figure 8.16 shows the remaining sifted options based on the pass-fail assessment above.

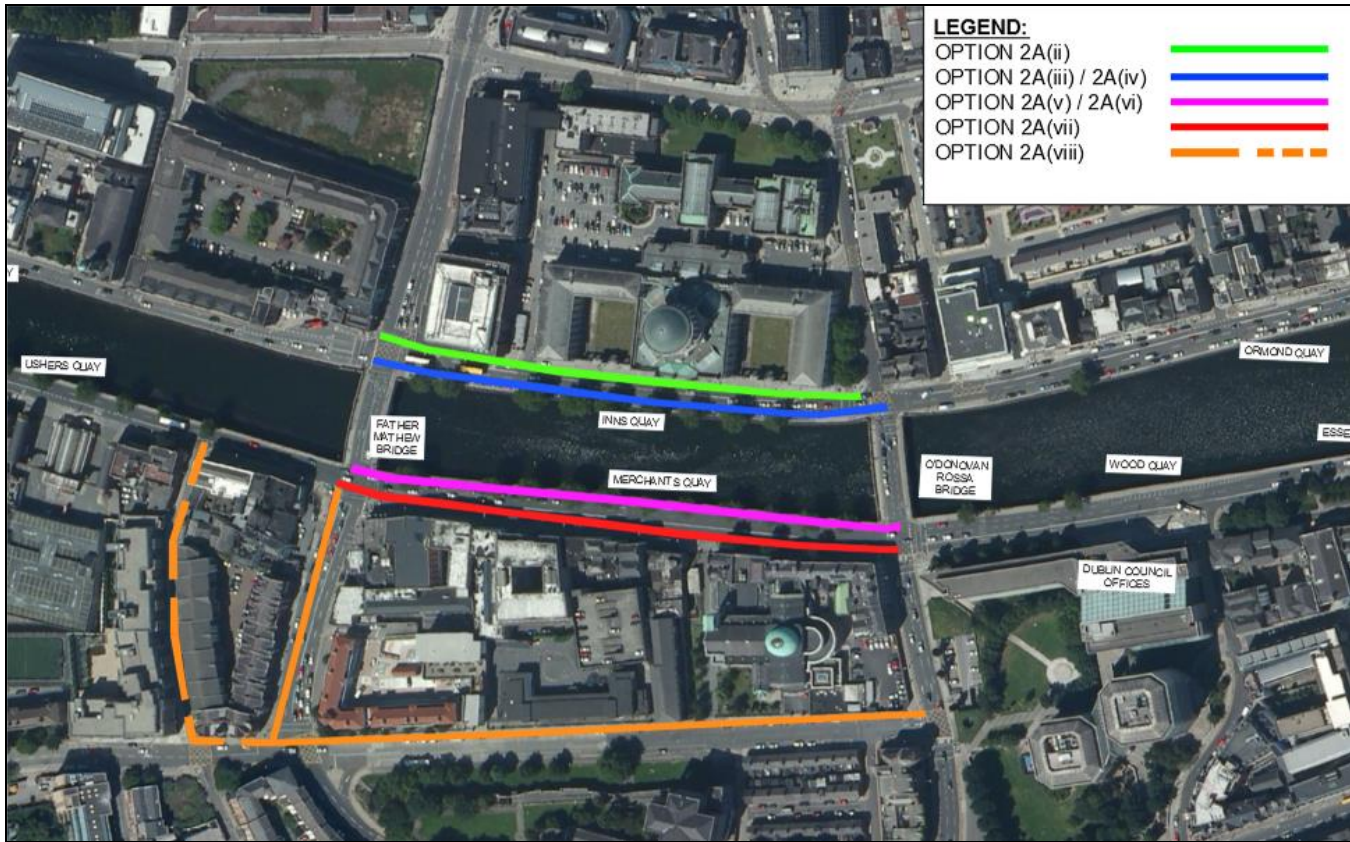


Figure 8.16 Sub-Section 2A Sifted Options

8.2.2 Sub-Section 2B - O'Donovan Rossa Bridge to Grattan Bridge

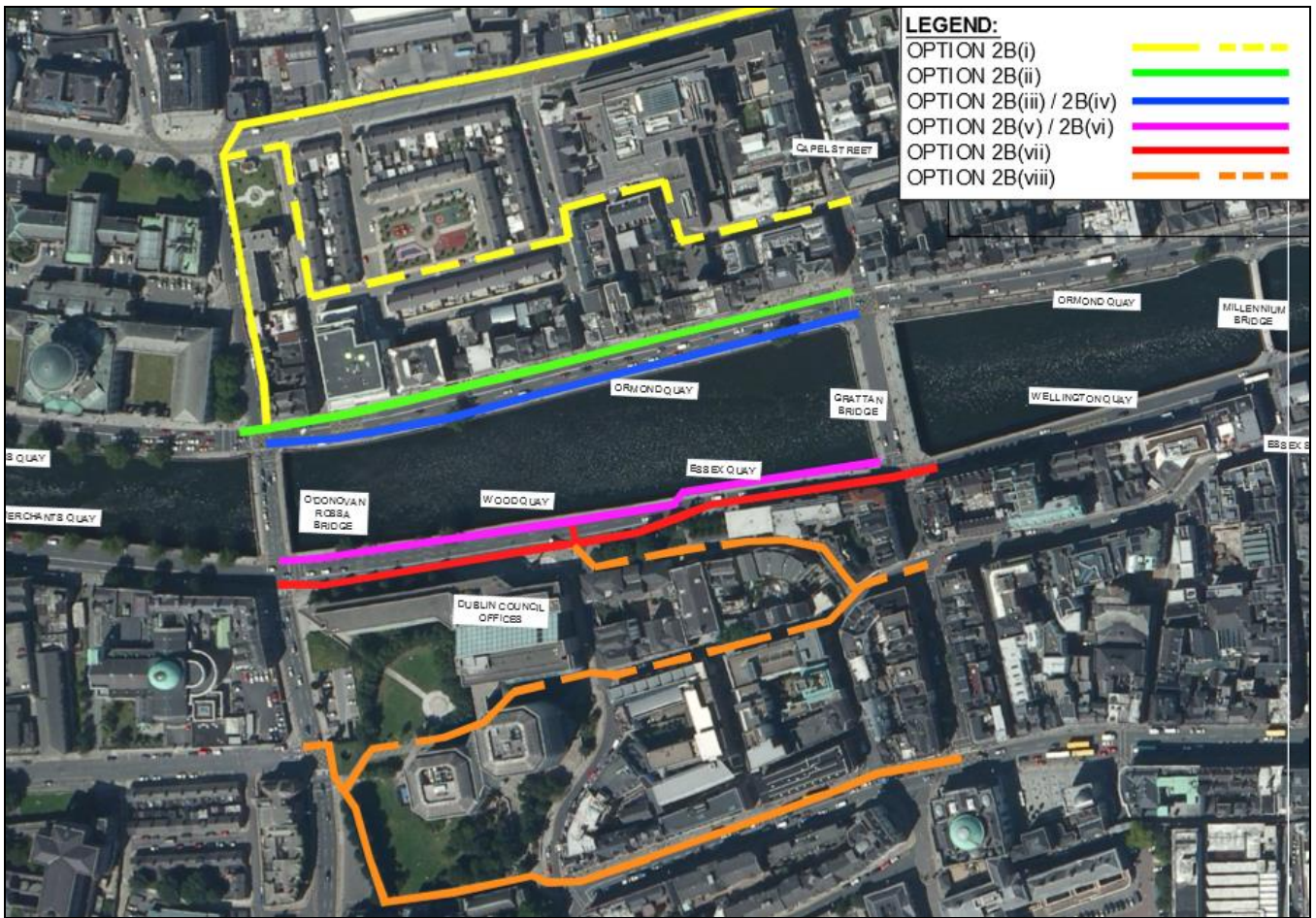


Figure 8.17 Sub-Section 2B Potential Options

The following describes the available options within this sub-section of the Liffey Cycle Route:

2B(i): Two way parallel cycle track via Chancery Street
This section of Chancery Street / Mary's Abbey is wider and includes a separate traffic lane north of the Luas Red Line. Similar to Benburb Street to the west, local access traffic would be displaced onto the Luas line, and a two-way cycle track provided in the existing traffic lane. This option is considered to be feasible.

There is a possible variant route through Ormond Square and Strand Street Little that could provide a pleasant cycling environment. This route is indirect and would require an awkward crossing of Arran Street East, which would be unsuitable for heavy volumes of cyclists. Therefore, this variant is considered to be sub-optimal and is not preferred compared with the more direct route described above.

Feasible

2B(ii): One-way cycle track on the buildings side north of the river
Ormond Quay Upper has recently been reconfigured to improve bus priority along the route. Until recently, this section of the quays carried one bus lane and two general traffic lanes in a conventional "bus lane on left" arrangement. These recent changes

have resulted in the curtailment of one eastbound general traffic lane at the eastern end to allow the provision of an extended left turn lane (towards Jervis Street) inside the bus lane on the approach to the Capel Street junction. However, this has left only a shared lane facility for cyclists, which would not achieve the objectives of the Liffey Cycle Route scheme. This arrangement will have to be revised to accommodate the Liffey Cycle Route. There is sufficient space to accommodate this, retaining a bus lane and a general traffic lane through the junction, and separating the right turning traffic into its own lane.

Feasible

2B(iii): One-way cycle track on the riverside north of the river

This variant on Option 2B(ii) can be accommodated with similar reconfiguration of the road space. This option is feasible.

Feasible

2B(iv): Two-way cycle track on the riverside north of the river

Similar to Option 2B(iii), this can be achieved with reconfiguration of the existing road space as described. This option is feasible.

Feasible

2B(v): Two-way cycle track on the riverside south of the river

Wood Quay currently carries two lanes of general traffic, a bus lane, and a right turn lane towards O'Donovan Rossa Bridge. Given recent traffic restrictions associated with Luas Cross City in the city centre, the second through traffic lane is superfluous and may be removed. Therefore, it is feasible to fit a cycling facility on this section of the quays.

Essex Quay to the east is very narrow, with only 8m or slightly over between the existing kerb on the building side and the quay wall. In order to retain provision for a traffic lane and a bus lane on this section of the quays, any cycle route would have to be accommodated outside the existing carriageway. A boardwalk would therefore be required. Grattan Bridge has already been modified to accommodate a boardwalk tie-in on the north-eastern corner, and it is assumed a similar modification could be accommodated at its southwestern corner. Consideration should be given to extending the boardwalk to O'Donovan Rossa Bridge.

The GDA Cycle Network Plan includes a recommendation for a new pedestrian / cycle bridge across the Liffey, as an extension of Cycle Route 9 (Heytesbury Street) to join the Liffey Cycle Route. This would also provide improved connectivity between Fishamble Street and Arran Street East. This bridge, if it were provided as part of the Liffey Cycle Route, would offer an alternative link to Route Option 2B(iv) from Route Option 2B(v), bypassing the pinch-point on Essex Quay.

Feasible

2B(vi): One-way cycle track on the riverside south of the river

This variant on Option 2B(v) is feasible.

Feasible

2B(vii): One-way cycle track on the buildings side south of the river

Unlike Option 2B(vi), this would require the displacement of the existing road carriageway to the north at Essex Quay. This would be challenging to achieve in a live traffic environment. It is further likely that this would require realignment or strengthening of the quay wall, and the construction of a boardwalk for pedestrians. This option is considered to be difficult but potentially feasible.

Feasible

2B(viii): Two-way parallel cycle track south of the river

From O'Donovan Rossa Bridge, a parallel route is feasible along John's Lane East (laneway north of Christchurch Cathedral). This would then continue onto Lord Edward Street as a two-way facility along the northern side of the road. Alternatively, there may be a feasible variant via the Civic Offices, Essex Street West and Essex Gate. There is a further variant that would connect Wood Quay to Essex Gate via Exchange Street Lower, which would require the removal of cobbles.

Feasible

Table 8.2.2 Section 2B Stage 2 Assessment

Route Option	2B(i)	2B(ii)	2B(iii)	2B(iv)	2B(v)	2B(vi)	2B(vii)	2B(viii)
Pass/Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass

Figure 8.18 shows the remaining sifted options based on the pass-fail assessment.

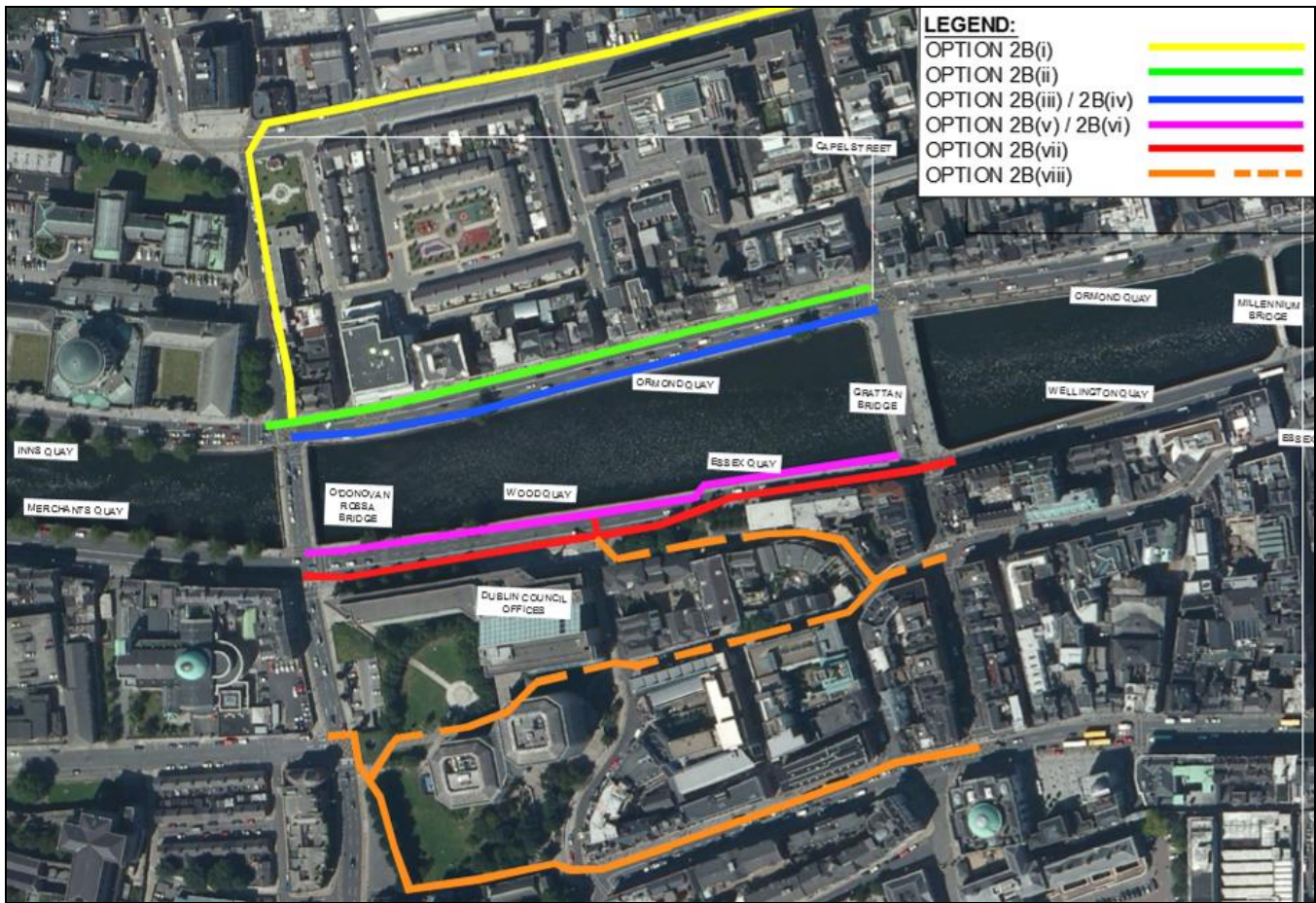


Figure 8.18 Sub-Section 2B Sifted Options

8.2.3 Sub-Section 2C - Grattan Bridge to O'Connell Bridge

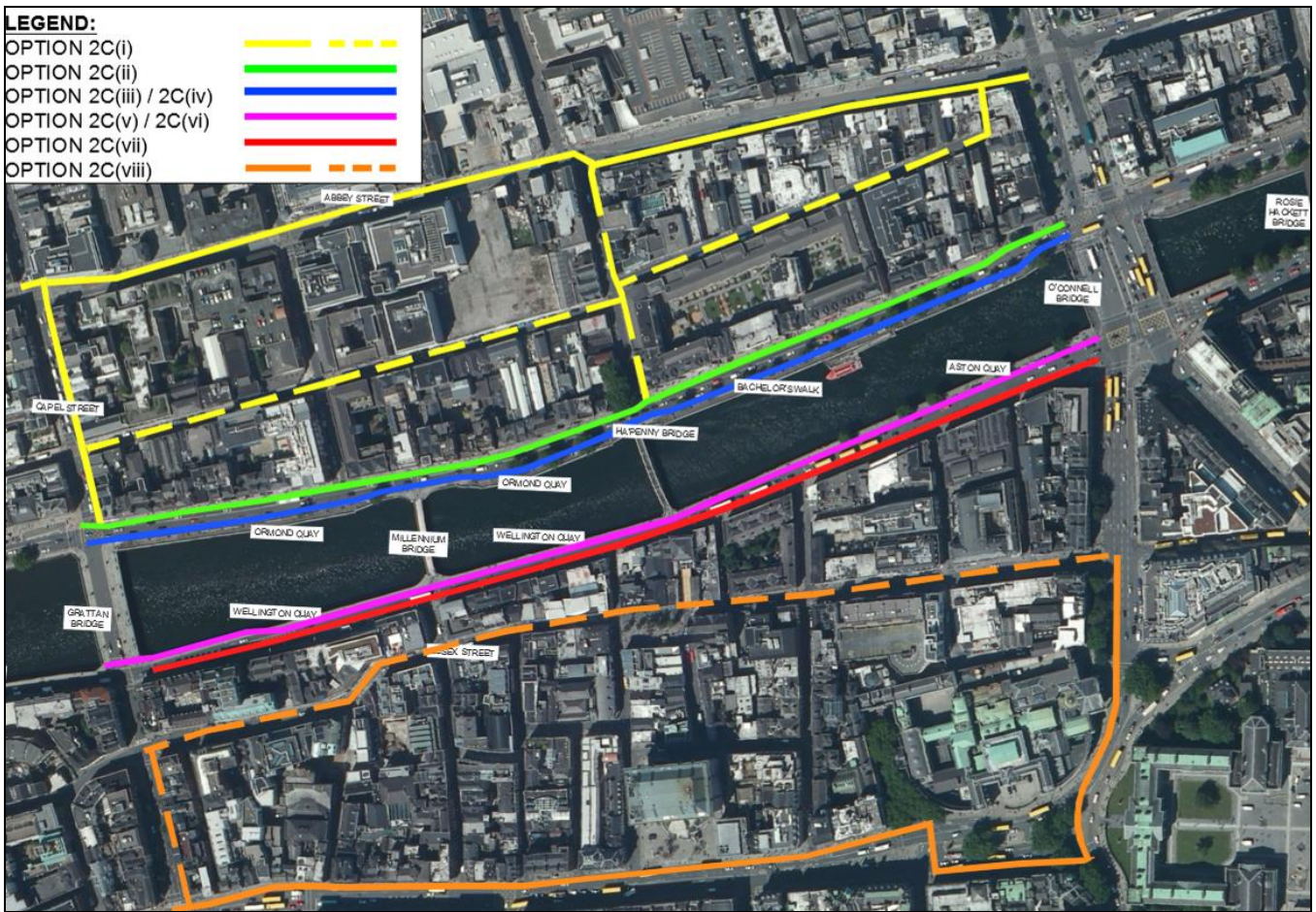


Figure 8.19 Sub-Section 2C Potential Options

The following describes the available options within this sub-section of the Liffey Cycle Route:

2C(i): Two-way parallel cycle track via Abbey Street or Strand Street

Abbey Street Upper is too narrow and constrained to accommodate the Liffey Cycle Route between Capel Street and Liffey Street. There is no scope to accommodate the Liffey Cycle Route on this section, without causing unacceptable disruption to Luas Red Line services. While Middle Abbey Street has sufficient width, the blockage further west on the route renders it not feasible.

There is a possible variant route through Strand Street Great and North Lotts, but this is discontinuous and doesn't connect to O'Connell Street at the eastern end. North Lotts is cobbled, and the cobbles would need to be replaced. There is also no active street frontage on these latter streets, which could give rise to personal safety concerns for cyclists. This is therefore considered not to be a feasible solution for the Liffey Cycle Route.

Not Feasible

2C(ii): **One-way cycle track on the buildings side north of the river**

Ormond Quay Lower and Bachelors' Walk have recently been reconfigured to improve bus priority along the route. Until then, this section of the quays carried one bus lane and two general traffic lanes in a conventional "bus lane on left" arrangement. These recent changes have resulted in the provision of a bus lane and bus stopping area along Ormond Quay Lower and Bachelors' Walk, and the retention of only one general traffic lane.

At present, cyclists are accommodated in the bus lanes, supplemented in places by discontinuous advisory cycle lanes. Considering the very high number of buses which stop at several very busy bus stops along this section where the footpaths are regularly congested with high volumes of pedestrians, the provision of a building side Liffey Cycle Route fails to meet the principles of sustainable safety, specifically, functionality, legibility²² and forgivingness. Therefore, it is considered **not** feasible to accommodate the Liffey Cycle Route on the buildings side.

Not Feasible



Photo 8.12 Ormond Quay looking east at Liffey Street / Swift's Row



Photo 8.13 Bachelors' Walk looking west from O'Connell Bridge

2C(iii): **One-way cycle track on the riverside north of the river**

Unlike Route Option 2C(ii), this option would place the cycle route outside the existing traffic arrangements, requiring less substantial (but nonetheless significant) alterations to the latter. This would require the removal of the existing footpath and trees in favour of the cycling facility. The existing trees vary in terms of age and girth and could possibly be replaced by newer smaller trees in planter boxes along the boardwalk.

Pinch-points exist at the Millennium and Ha'penny Bridges where the Liffey boardwalks stop short of the existing bridge abutments. The boardwalks should be extended to tie directly into the parapets of the Ha'penny and Millennium Bridges to enhance the pedestrian facility. A preliminary assessment indicates that this should be feasible without requiring modification to the main bridge superstructures. Some minor amendments to the existing steps at the Ha'penny Bridge will be necessary.

Feasible

2C(iii): **Two-way cycle track on the riverside north of the river**

This variant on Option 2C(iii) is feasible but may require a slight relaxation in the width requirement for a two-way cycle route. There may be scope to include compensatory planting to replace the trees removed.

Feasible

²² National Cycle Manual – Principles of Sustainability: Section 1.9.2

2C(v): Two-way cycle track on the riverside south of the river

Aston Quay and Wellington Quay are generally narrower than Bachelors' Walk except at the very eastern end. The quays are further constrained by pinch-points at the Ha'penny and Millennium bridges. Previous options considered included narrowing the building side footpath at pinch-points to accommodate a cycleway, however, these pinch-points coincide with the areas of peak pedestrian need, particularly at the crossing from the Merchant's Arch to the Ha'penny Bridge. Narrowing these footpaths is not considered to be an appropriate solution. The constrained width at and between the two pinch-points is such that it is not possible to carry a lane of traffic, a bus lane, and a cycleway through, while retaining the extended bus stop provisions implemented in 2017 in conjunction with the opening of Luas Cross City. Given that BusConnects will likely intensify bus activity on this section of the quays, it is expected that the number of available bus stops will need to be retained or increased.



Photo 8.14 Aston Quay looking east from Millennium Bridge

One possible solution for this section of the quays requires the implementation of a bus gate from just east of Ha'penny Bridge to just west of Millennium Bridge. Boardwalks would also be required on the immediate approaches to Ha'penny Bridge, and from Millennium Bridge to Grattan Bridge. The parapet of Grattan Bridge would be modified for the tie-in in the same manner as done for the boardwalk on the northern side of the river. All riverside parking / taxi ranks would be removed. Between the Ha'penny and Millennium Bridges, general traffic and buses would share a lane, with access managed from the bus gate to the east. The cycleway would occupy the existing general traffic lane. The provision of a bus gate at this location would create an unacceptable vulnerability in the city's public transport infrastructure, as well as potentially compromising the ability of emergency service vehicles to traverse Dublin City Centre. On that basis, this is considered to not feasible solution for the Liffey Cycle Route.

Not Feasible

2C(vi): One-way cycle track on the riverside south of the river

This variant on Option 2C(v) can be achieved without requiring general traffic to share a lane with buses. The cycle facility could be provided where the riverside footpath is, with pedestrians displaced onto new boardwalks along Aston and Wellington Quays. This boardwalk should tie directly into the parapets of the Ha'penny and Millennium Bridges. A preliminary assessment indicates that this is feasible without requiring modification to the main bridge superstructures. Some minor amendments to the existing steps and entrance wing walls (2001 refurbishment)²³ at the Ha'penny Bridge will be necessary. These works would avoid impacting on pedestrian capacity at the important crossing from the Merchant's Arch to the Ha'penny Bridge.

Feasible

2C(vii): One-way cycle track on the buildings side south of the river

Cyclists are currently accommodated in the bus lanes along Aston and Wellington Quays. Considering the very high number of buses using the bus lane and numerous bus stops with large numbers of passenger movements, it is not feasible to provide segregation of cyclists from bus operations. The footpath is too narrow for a cycle track to bypass island bus stops that would be large enough to accommodate the high number of passengers. The provision of a building side Liffey Cycle Route therefore fails to meet the principles of sustainable safety, specifically, functionality, legibility and forgiveness. Therefore, it is considered not feasible to accommodate the Liffey Cycle Route on the buildings side.

Not Feasible

2C(iv): Two-way parallel cycle track via Temple Bar or College Green

There are two options for a parallel route. These are Essex Street East / Temple Bar / Fleet Street and Dame Street / College Green. The route through Temple Bar is currently cobbled and the cobbles would have to be removed to make it comfortably passable by cyclists. However, Temple Bar would have to maintain all of its existing functionality, including access, loading, congregation space, etc. Given the multitude of spatial demands in Temple Bar, and the presence of significant numbers of tourists, including those congregating outside bars and restaurants, the Liffey Cycle Route would impose a considerable intrusion into the area. Since Temple Bar has thrived as a pedestrian oasis, it is considered to be an inappropriate solution to route a primary transit corridor through its centre. This option is therefore considered to be unviable. The second route option further south on Dame Street / College Green is feasible and is indeed being developed for the separate Cycle Route 10 from George's Street, Rathmines and beyond to the city centre. Dublin City Council's separate Clonskeagh to City Centre Cycle Route Project will follow this route. The College Green Plaza has been delayed by a recent adverse planning decision by An Bord Pleanála. Even with that project in place, the design did not have the capacity to cater for its anticipated demands on Cycle Route 10 and the Liffey Cycle Route traffic together. Therefore, this is not considered to be a feasible solution.

Not Feasible

²³ Bridges of Dublin – Dublin City Council

Table 8.2.3 Section 2C Stage 2 Assessment

Route Option	2C(i)	2C(ii)	2C(iii)	2C(iv)	2C(v)	2C(vi)	2C(vii)	2C(viii)
Pass/Fail	Fail	Fail	Pass	Pass	Fail	Pass	Fail	Fail

Figure 8.20 shows the remaining sifted options based on the pass-fail assessment.

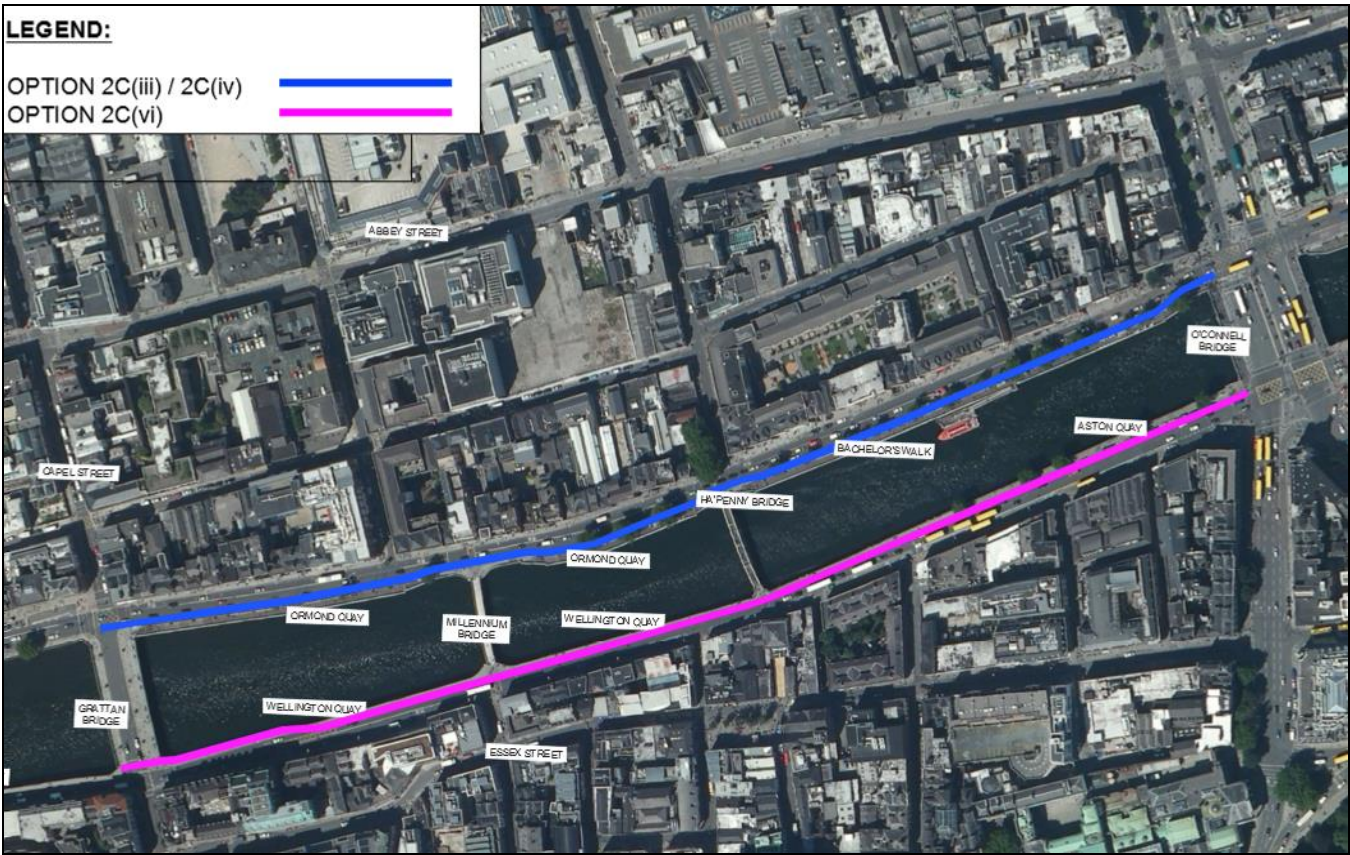


Figure 8.20 Sub-Section 2C Sifted Options

8.2.4 Combined Route Options through Section 2

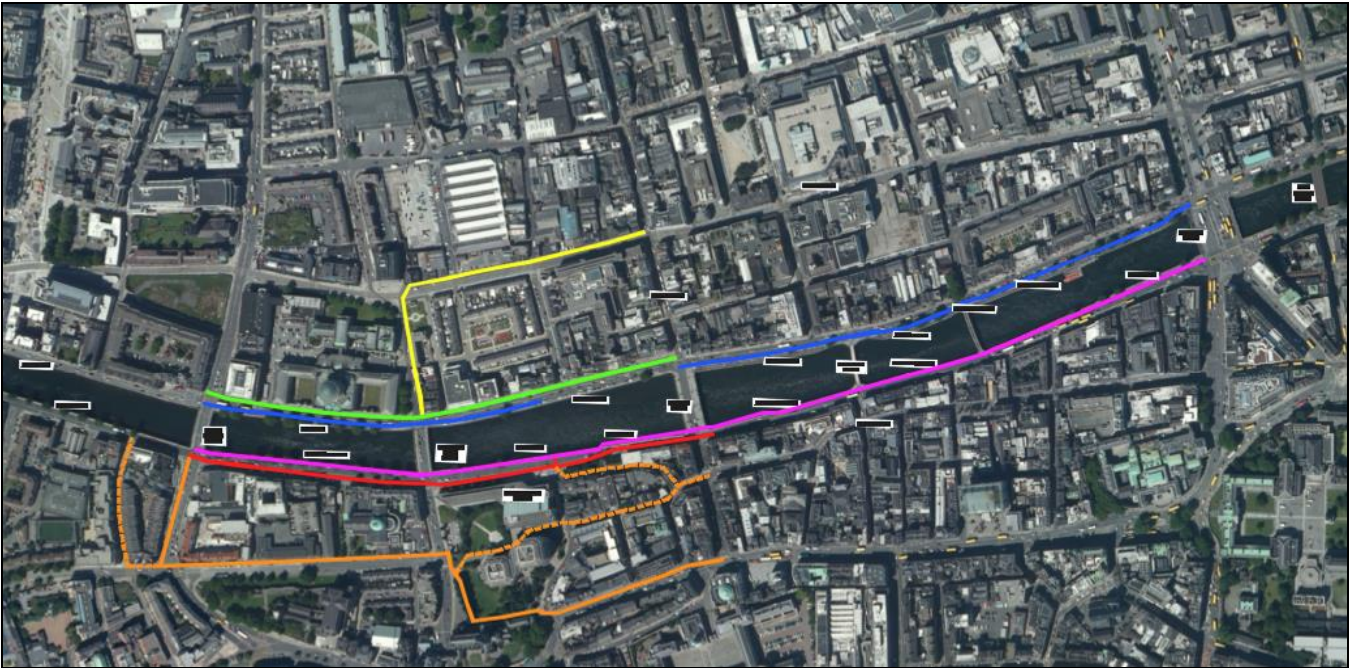


Figure 8.21 Section 2 - Outcome of Stage 1 Assessment

By combining the viable options through the individual sub-sections, as described above, a shortlist of options can be compiled for more detailed assessment:

Table 8.2.4 Section 2 Stage 2 Assessment

Option	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Sub-Section	Parallel Two-way Cycle Track North	One-way Cycle Track Buildings Side North	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	Two-way Cycle Track Riverside South	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South	Parallel Two-way Cycle Track South
2A	Fail	Pass	Pass	Pass	Pass	Pass	Pass	Pass
2B	Pass	Pass	Pass	Pass	Pass	Pass	Pass	Pass
2C	Fail	Fail	Pass	Pass	Fail	Pass	Fail	Fail
Overall	Fail	Fail	Pass	Pass	Fail	Pass	Fail	Fail

From the foregoing Stage 2 Assessment for Section 2 the 8 options were short-listed to Stage 3 as follows:

- One-way cycle track on the riverside north of the river;
- Two-way cycle track on the riverside north of the river;
- One-way cycle track on the riverside south of the river.

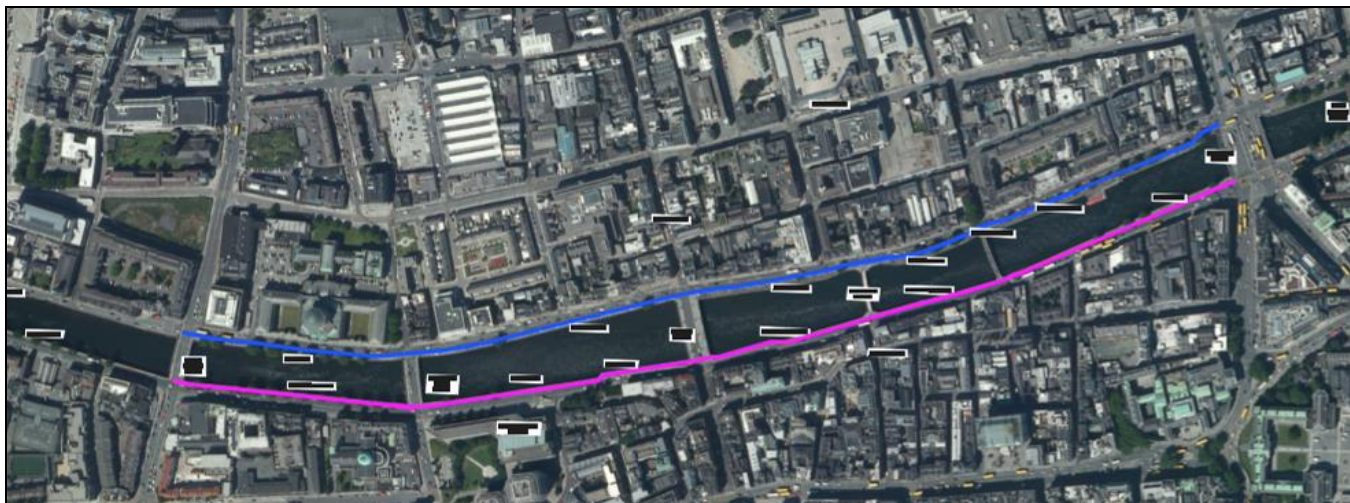


Figure 8.22 Section 2 End to End Route Options

8.3 Section 3: O'Connell Bridge to Memorial Bridge

The street network on the O'Connell Bridge to Memorial Bridge section of the route doesn't lend itself to being further subdivided, so this section has been considered in its entirety.

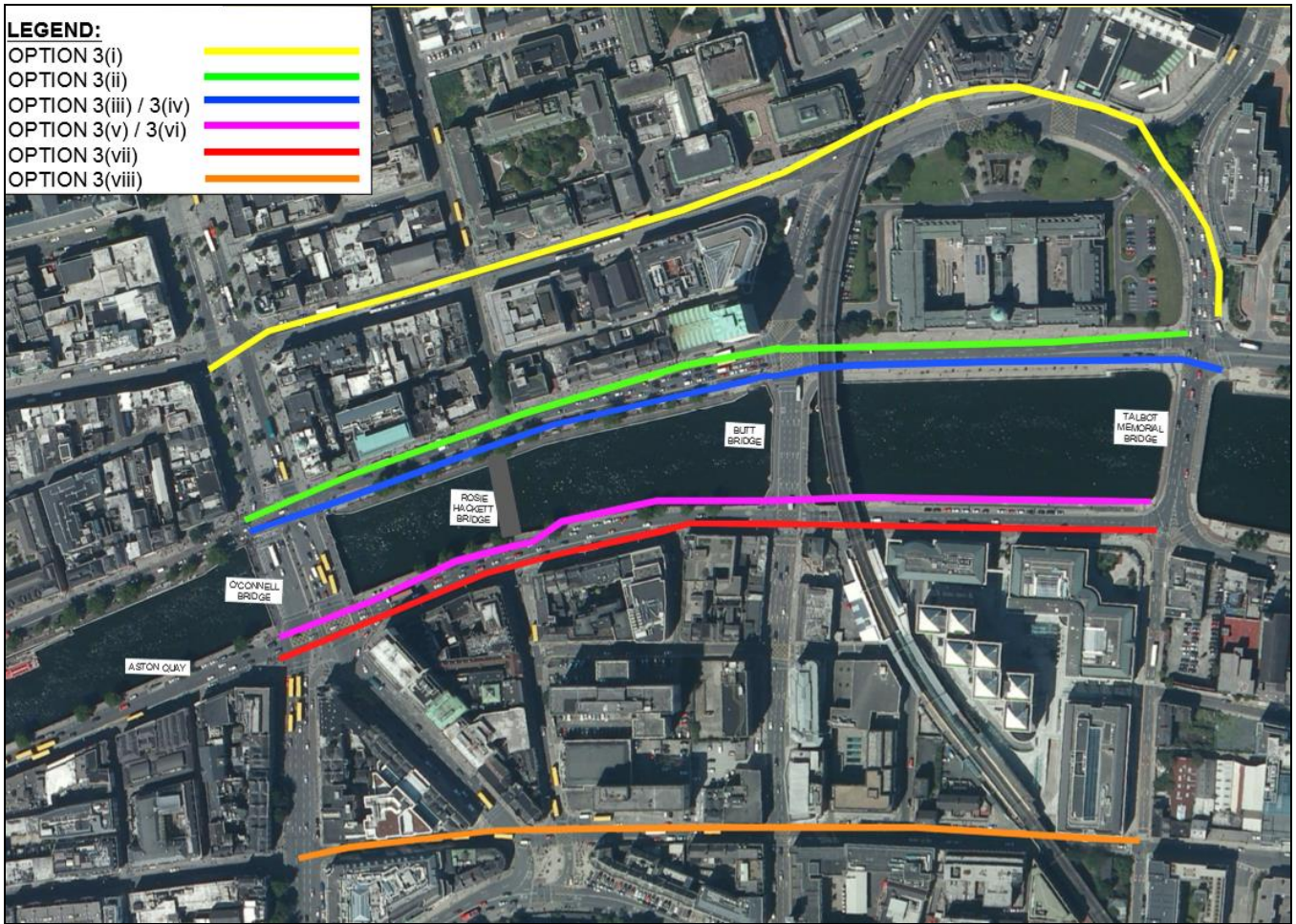


Figure 8.23 Section 3 Potential Options

The following describes the available options within this sub-section of the Liffey Cycle Route:

- 3(i) **Two-way parallel cycle track via Abbey Street**
Lower Abbey Street accommodates a Luas stop, and there is only a narrow passage for a single traffic lane to pass this to the north. This renders this route not feasible, since there is no space to provide a segregated cycleway. Further east, this route would have to traverse the hostile Beresford Place gyratory arrangement, along with crossing multiple heavy traffic streams, which would also pose significant challenges.
- Not Feasible
- 3(ii) **One-way cycle track on the buildings side north of the river**
Eden Quay has a busy bus lane and bus stopping area on the buildings side. It also carries a busy traffic lane, and a second riverside bus lane (which runs contra-flow east of Rosie Hackett Bridge). Cyclists are accommodated in a cycle lane perched between the bus lane and the bus stops. This unsatisfactory arrangement is further exacerbated by the very heavy traffic movement from Eden Quay left onto Beresford Place across

the through cycle lane. Given the high volume of bus activity at this location, and the heavy left turn demand, it is considered not feasible to safely accommodate the Liffey Cycle Route on the buildings side.

Not Feasible

3(iii) **One-way cycle track on the riverside north of the river**

The riverside bus lane between O'Connell Bridge and Rosie Hackett Bridge runs with-flow, and as such, there is no boarding or alighting activity present. East of Rosie Hackett Bridge, where the buses run in the contra-flow direction with boarding and alighting activity present, there is sufficient space available to displace the bus stops from the quay side to an extensive island bus stopping facility. As such, this option is considered to be potentially feasible. Further east, on Custom House Quay, there is ample room to accommodate a cycling facility on the riverside.

Feasible

3(iv) **Two-way cycle track on the riverside north of the river**

This variant on Option 3(iii) is feasible.

Feasible

3(v) **Two-way cycle track on the riverside south of the river**

It would be possible to reconfigure the western section of Burgh Quay to accommodate a cycleway on the riverside without appreciably affecting traffic capacity. On the narrower eastern section, either a lane of traffic would have to be removed, or a boardwalk provided for the cycleway. This would require the unremarkable parapet of Butt Bridge to be modified to tie in. On the east side of Butt Bridge, a short section of boardwalk may be required to connect to the wider section of George's Quay. This would require access to an existing flight of steps to be blocked. From there east, the wide paved area on the quayside could be reconfigured, or a boardwalk provided to accommodate the cycleway. This option is feasible.

Feasible

3(vi) **One-way cycle track on the riverside south of the river**

This variant on Option 3(v) is feasible. The narrower one-way cycling facility can be constructed without requiring the provision of a boardwalk.

Feasible

3(vii) **One-way cycle track on the buildings side south of the river**

Cyclists are currently accommodated in advisory cycle lanes along Burgh Quay. This option could only be accommodated if a lane of traffic were removed on Burgh Quay East. It would also necessitate the provision of island bus stops on George's Quay, where a lane of traffic would also have to be removed. The option is considered to be potentially feasible.

Feasible

3(viii) **Two-way parallel cycle track via Townsend Street**

The parallel route for this section would be along Fleet Street and Townsend Street. There is significant loading and parking activity along Townsend Street and the reduction of the street to a single lane would have a potentially negative impact on bus routes, particularly at the western end. It would be challenging to pass Tara Street Fire Station without impacting on the swept path of fire tenders exiting the station. On the basis of these complications, this option is considered not feasible.

Not Feasible

Table 8.3.1 Section 3 Stage 2 Assessment

Option	(i)	(ii)	(iii)	(iv)	(v)	(vi)	(vii)	(viii)
Sub-Section	Parallel Two-way Cycle Track North	One-way Cycle Track Buildings Side North	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	Two-way Cycle Track Riverside South	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South	Parallel Two-way Cycle Track South
3	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Fail
Overall	Fail	Fail	Pass	Pass	Pass	Pass	Pass	Fail

The following Figure 8.24 shows the remaining sifted options based on the assessment above.

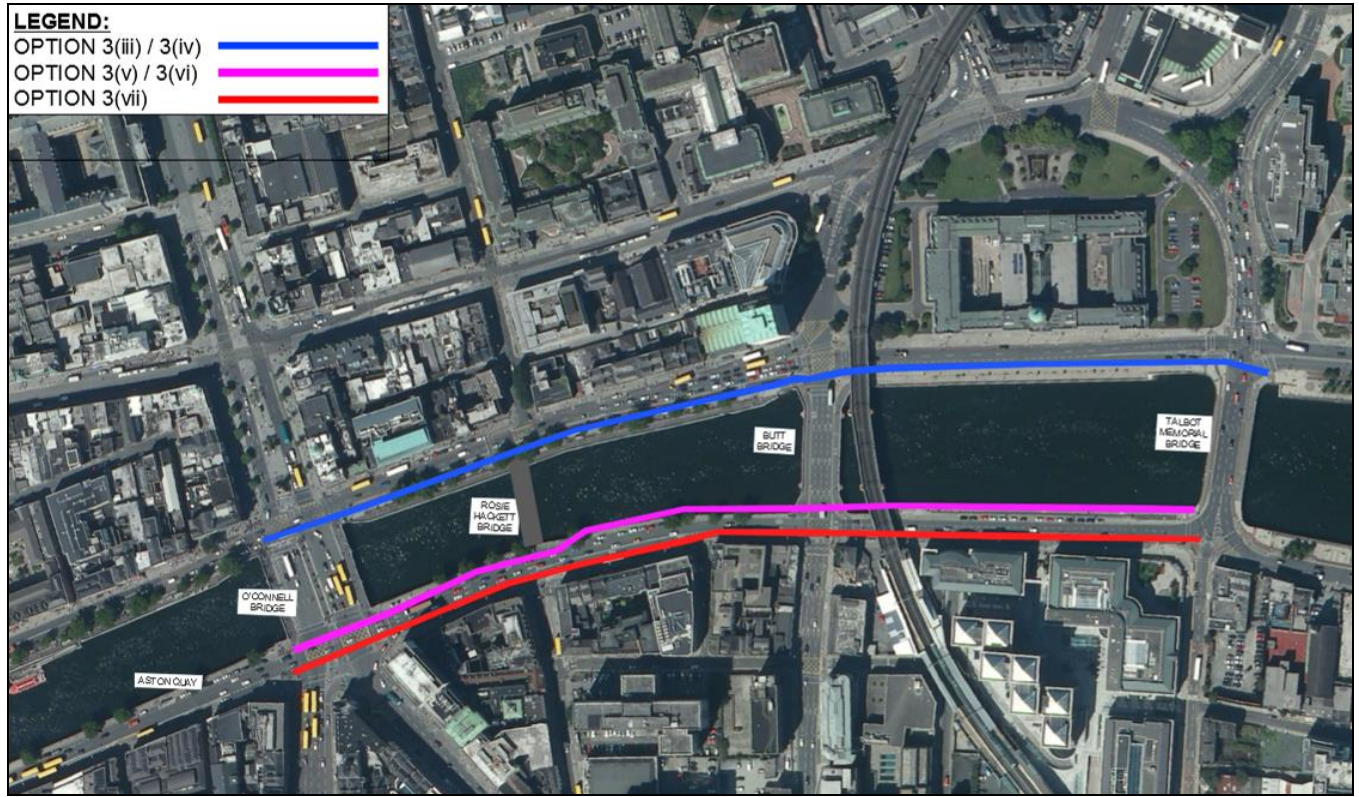


Figure 8.24 Sub-Section 3 Sifted Options

From the foregoing Stage 2 Assessment for Section 3 the 8 options were short-listed to 5 as follows:

- One-way riverside North of the river;
- Two-way cycle track Riverside North of the River;
- Two-way cycle track Riverside South of the River;
- One-way cycle track Riverside South of the River; and
- One-way cycle track Buildings Side South of the River.

8.4 Section 4: Memorial Bridge to Tom Clarke Bridge

Dublin City Council and the National Transport Authority have both separately developed proposals to provide the Liffey Cycle Route through the Dublin Docklands. There are currently discontinuous two-way cycle routes along the Campshires on both sides of the river. These are currently being improved, connected and realigned to create a continuous two-way route on both sides of the river. Given competing demands for road space in the eastern side of the city, there is no better feasible alternative to the planned improvements. On that basis, a Route Options Assessment for this section of the Liffey Cycle Route would be redundant. The planned cycling facilities are as follows:

- 1) Two-way cycle route along City Quay and Sir John Rogerson's Quay between Memorial Bridge and Beckett Bridge – implemented in 2018 as part of the Liffey Flood Defence Scheme;
- 2) Upgrades to the North Campshires two-way cycle track to provide a continuous segregated two-way facility from the Point Roundabout to Memorial Bridge;
- 3) Proposed enhanced two-way cycleway between Beckett Bridge and Poolbeg on the South Campshires via proposed Dodder Opening Bridge – to be implemented as part of the latter.

These proposals are consistent with and complementary to the National Transport Authority's BusConnects proposals. They will provide high quality two-way cycleways on both sides of the river. These will be linked at existing river crossing points and at proposed new bridges identified in the North Lotts and Grand Canal Dock SDZ. It is expected that these works will be fully implemented before 2023. It is likely that further local cycleways will be developed on parallel routes, such as Sheriff Street, in tandem with local property developments.

8.5 Conclusion of Stage 2 Assessment

A number of route options have emerged from the Stage 2 Assessment for each of Sections 1, 2 and 3. These route options are brought forward to the Stage 3 Assessment, where they are compared under the Capital Appraisal Framework criteria.

9. OPTIONS ASSESSMENT STAGE 3

This section describes the assessment that has been undertaken for each section of the route. This informs the ranking of each option along each section, to allow a best overall route to be established.

9.1 Introduction

The 'Common Appraisal Framework for Transport Projects and Programmes' published by the Department of Transport, Tourism and Sport (DTTAS), March 2016,²⁴ provides a structured approach to determine overall preferences among alternative options.

A 'Multi-Criteria Analysis' (MCA) can be applied under common headings to determine the range of positive (benefits) and negative (costs) effects in a single framework to allow easy comparison of alternative options in decision-making. It offers the following criteria to undertake a comparative assessment:

- **Economy²⁵**
This criterion considers the cost of the scheme, comprising the capital, land acquisition, and operations and maintenance costs.
Other economic benefits of the scheme are also considered.
- **Integration²⁸**
This criterion considers how the scheme options integrate with the wider transportation networks, and other plans and policies.
- **Accessibility and Social Inclusion²⁸**
This criterion considers the potential of the scheme options to improve social conditions.
- **Safety²⁸**
This criterion compares the safety impacts of the scheme options.
- **Environment²⁸**
This criterion considers the relative impacts of the route options under the following sub-criteria:
 - Biodiversity;
 - Cultural Heritage [Archaeology and Cultural Heritage];
 - Landscape and Visual;
 - Land Use;
 - Noise and Air.
- **Physical Activity²⁸**
The Physical Activity criterion has not been considered, since all route options should deliver the same benefits under this criterion.

For each individual assessment criterion considered, routes have been relatively compared against each other based on a five-point scale, ranging from having significant advantages to having significant disadvantages over other scheme options. For illustrative purposes, this five-point scale is colour coded as presented in **Table 9.1** with advantageous routes graded to 'dark green' and disadvantaged routes graded to 'dark red'.

Table 9.1: Scheme Options Colour Coded Ranking Scale

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

9.2 Section 1: Phoenix Park to Father Matthew Bridge

Section 1 includes:

Sub-Section	Description
1A:	Phoenix Park to Sean Heuston Bridge (300m)
1B:	Sean Heuston Bridge to Frank Sherwin Bridge (100m)
1C:	Frank Sherwin Bridge to Rory O'More Bridge (450m)
1D:	Rory O'More Bridge to James Joyce Bridge (100m)
1E:	James Joyce Bridge to Liam Mellows Bridge (150m)
1F:	Liam Mellows Bridge to Father Matthew Bridge (300m)

Six route options emerged from the Stage 2 Assessment of Section 1. These are shown in the table and diagram below:

Table 8.1.7 Section 1: Stage 2 Assessment

Option	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Sub-section	Parallel Two-way Cycle Track North	One-way Cycle Track Buildings Side North	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South
1A	Pass	Pass	Pass	Pass	-	-
1B	Pass	Pass	Pass	Pass	Pass	Pass
1C	Pass	Pass	Pass	Pass	Pass	Pass
1D	Pass	Pass	Pass	Pass	Pass	Pass
1E	Pass	Pass*	Pass	Pass**	Pass	Pass

²⁴ www.dttas.ie/sites/default/files/publications/corporate/english/com

²⁵ Page 41- Economy, Safety, Environment, Accessibility and Social Inclusion, Integration, Other Gov't Policies, Non-Quantifiable economic impacts

Option	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Sub-section	Parallel Two-way Cycle Track North	One-way Cycle Track Buildings Side North	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South
1F	Pass	Pass*	Pass	Pass**	Pass	Pass
Overall	Pass	Pass	Pass	Pass	Pass	Pass

*requires footpath width reduction on Ellis Quay and Arran Quay

**requires bus gate at Blackhall Place junction

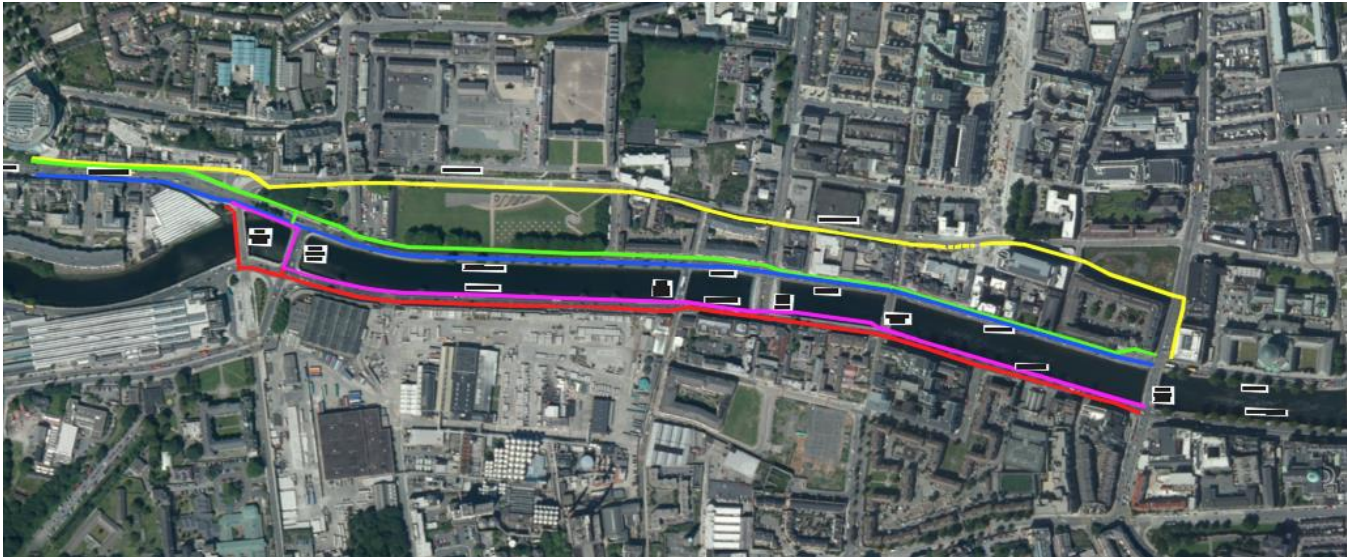


Figure 9.1 Section 1 End to End Route Options

In order to undertake the multi-criteria assessment on equivalent routes, the one-way facilities have been grouped together to form a fully functional Liffey Cycle Route facility. That is, one-way on the North side inbound must be accompanied by a similar route on the South side outbound. This allows for the following routes and combination of routes to be considered:

- A. Two-way Parallel Cycle Track North of River Liffey (inbound and outbound);
- B. Two-way Riverside Cycle Track North of the River;
- C. One-way Buildings Side Cycle Track on both Quays (inbound, North Quays and Outbound South Quays);
- D. One-way Riverside Cycle Track on both Quays (inbound North Quays and outbound South Quays).
- E. One-way Buildings Side Cycle Track North of the River eastbound and One-way Riverside Cycle Track South of the River westbound; and
- F. One-way Riverside Cycle Track North of the River eastbound and One-way Buildings Side Cycle Track South of the River westbound.

The multi-criteria assessment is undertaken on the above route option combinations under the following 5 headings.

9.2.1 Economic Criterion

The options along the riverside all require boardwalks, and therefore, these options are more expensive than the offline option.

In terms of benefits delivered, the routes generally score equally, since they are all much the same length. However, Option B requires the implementation of a bus gate at the Queen Street junction to allow the cycle route to pass the historic parapets of Liam Mellows Bridge. This will result in a diminution in level of service for both public transport and private vehicles. As such, this option performs poorer in terms of benefits than the other options.

9.2.2 Integration Criterion

Broadly speaking, all options offer similar benefits in terms of land-use integration but will differ at a local level along the route corridor based on ease of access from the adjoining buildings and side streets. The river-side cycle tracks will not be directly accessible from the building side of the street and would require people to cross the traffic lanes to get to onto the cycle route. While in Section 1 there is limited frontage activity, this is likely to increase in future, especially on the southern side of the river where more intensive redevelopment is expected in future. Route Option A parallel to the north quays has the disadvantage of displacing local access traffic onto the Luas line along sections of Benburb Street. This has the potential to discommode Luas services, both during and after construction. It is also less accessible from cycling routes on the south side of the river. This disadvantage doesn't arise in the case of the other route options.

At the western end of Section 1 for westbound cyclists the proposed cycle route will require to integrate with three separate continuation branch routes as follows:

- a) North-westward across the river to Parkgate Street, linking through the Phoenix Park towards Castleknock and Blanchardstown via Chesterfield Avenue (Primary Corridor 5 of the GDA Cycle Network) and towards Chapelizod along Conyngham Road (Primary Corridor 6);
- b) Westward along St. John's Road towards Kilmainham (Secondary Corridor 6A);
- c) Directly into Heuston Station, where there are 400 bicycle parking spaces and 185 Dublin Bike stands (in 5 banks);

According to the Cycling Demand Model published in the *Greater Dublin Area Cycle Network Plan (2013)*, 74% of cyclists pass Heuston on the Parkgate Street route, and the other 26% on the St. John's Road route. If the 585 cycle parking spaces at Heuston are included (assuming full usage, which is typical) the approximate proportions of cyclist demand extending westwards at Heuston are estimated as follows:

- a) Corridors 5 & 6: 45%;
- b) Corridor 6A: 15%;
- c) Heuston Station: 40%.

On the above basis 55% of cyclist demand is to continue on the southern side of the river and 45% to cross the river at Heuston Station.

For the Combined Route Options most cyclists will require to cross a major traffic stream at some point at the western end of the Liffey Cycle Route.

For the westbound river side route options (D and E) there would be major traffic stream crossings as follows:

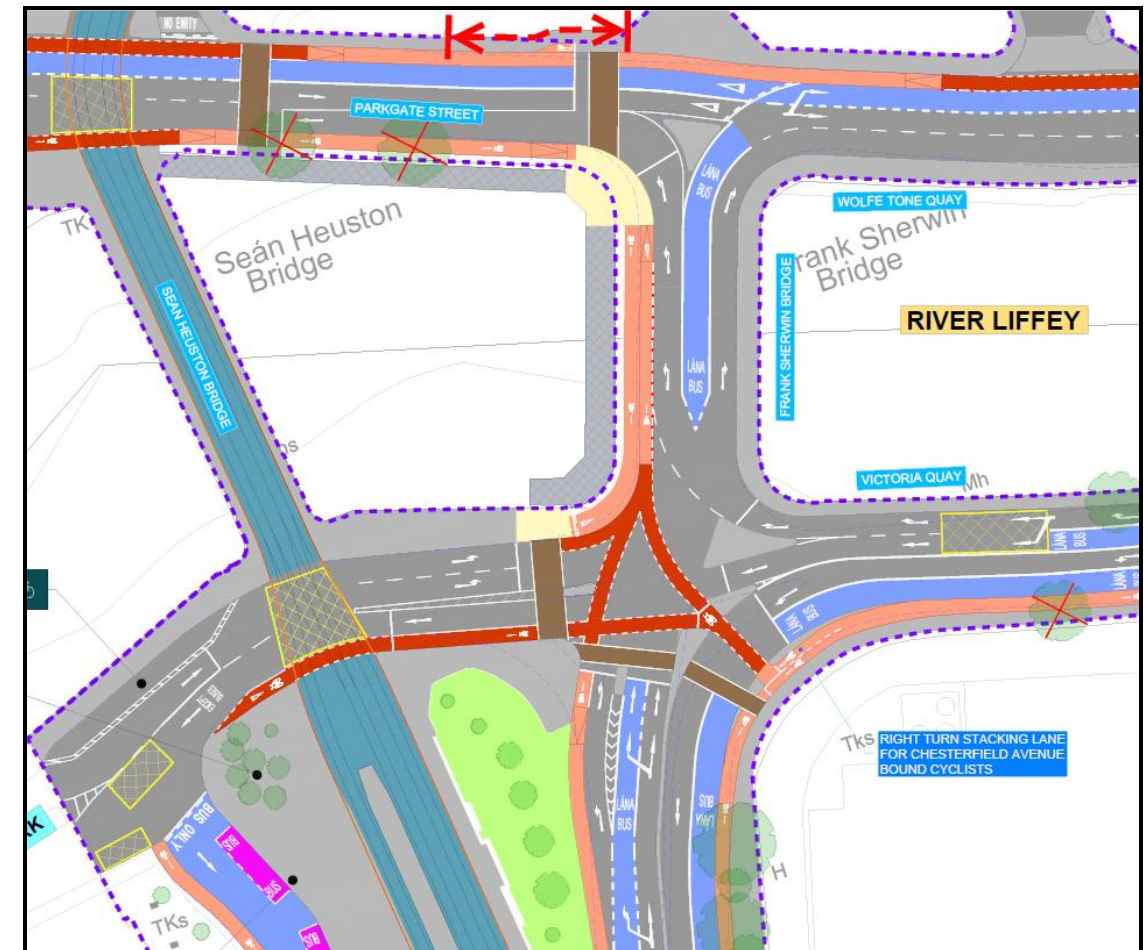
- To Heuston across the traffic streams to Parkgate Street and from St. John's Road at the southern end of Frank Sherwin Bridge;
- To Corridor 6A across the traffic streams to Parkgate Street and to St. John's Road at the southern end of Frank Sherwin Bridge;
- To Corridors 5 & 6 across the traffic stream to Parkgate Street at the northern end of Frank Sherwin Bridge. This will require a new traffic signal junction at the northern end of the bridge with adjustment of the existing signal staging at the southern end of the bridge to coordinate the movements.

For the westbound building side route options (C and F) there would be major traffic stream crossings as follows:

- To Corridor 6A no traffic stream crossing required;
- To Heuston and to Corridors 5 & 6 across the two traffic streams to and from St. John's Road at the southern end of Frank Sherwin Bridge. This crossing can be integrated with the existing traffic signal staging.

From the above description it can be seen that Options C and F would involve slightly less interactions between cyclists and general traffic at the branches from the Liffey Cycle Route at Heuston Station.

On the basis of the foregoing, Option C scores best under this criterion, followed by Options E and F. Option A scores worst.



Proposed Cycle Route Layout at Heuston Station for Option C

9.2.3 Accessibility and Social Inclusion Criterion

Due to the proximity of the routes to one another, all options will function the same for this criterion.

9.2.4 Safety Criterion

While, all options have been considered in the context of safety on a busy road corridor, it is considered all routes can be designed and implemented to satisfy the safety criterion. The routes along the riverside may be considered marginally more favourably under this criterion, since there is less interaction with side streets, vehicular accesses and pedestrians along the riverside.

The parallel route on the north side of the river faces personal safety issues for cyclists as night, since the area is relatively isolated with little passive surveillance due to the infrequent Luas service at night. This route is therefore considerably worse than the other options in terms of Safety.

9.2.5 Environment Criterion

The construction of boardwalks is required for all options along the river side, and the building-side one-way option (which requires traffic lanes to be shifted towards the river). All such, interventions pose a potential risk to the downstream Special Area of Conservation, Special

Protection Area, Natural Heritage Area, and Biosphere. These risks are marginal, and avoidable with prudent construction methods, but they do not arise at all in the case of a route remote from the river.

All options will generally avoid impacts on the listed bridges along the way. There will be a small impact on the railing on the approach to Sean Heuston Bridge if the boardwalk solution is preferred to taking land from the Croppy's Acre in subsection 1B.

The route options will not vary in terms of the significance of their land use, noise or air impacts. It is subjective whether the landscape and visual impacts of the route are positive or negative, and therefore, the routes have not been differentiated under this sub-criterion.

9.2.6 Section 1 - Conclusion

The multi-criteria assessment is summarised in Table 9.2 below. The detailed multi-criteria assessment is included in Appendix B, and explanatory notes are included below.

Table 9.2: Section 1 Stage 3 Multi-Criteria Assessment

Option	Option A: Two-way Offline Route North Side	Option B: Two-way Riverside North Side	Option C: One Way Buildings Side One- way (N&S)	Option D: One-way River Sides	Option E: Buildings Side NS River Side SS	Option F: River Side NS Buildings Side SS
Economy						
Integration						
Accessibility & Social Inclusion						
Safety						
Environment						
Rank	5	5	1	4	2	2

The most favourable scheme option for Section 1 is the construction of a pair of one-way cycle tracks along both sides following the existing traffic circulation regime, with the cycle tracks located on the buildings side.

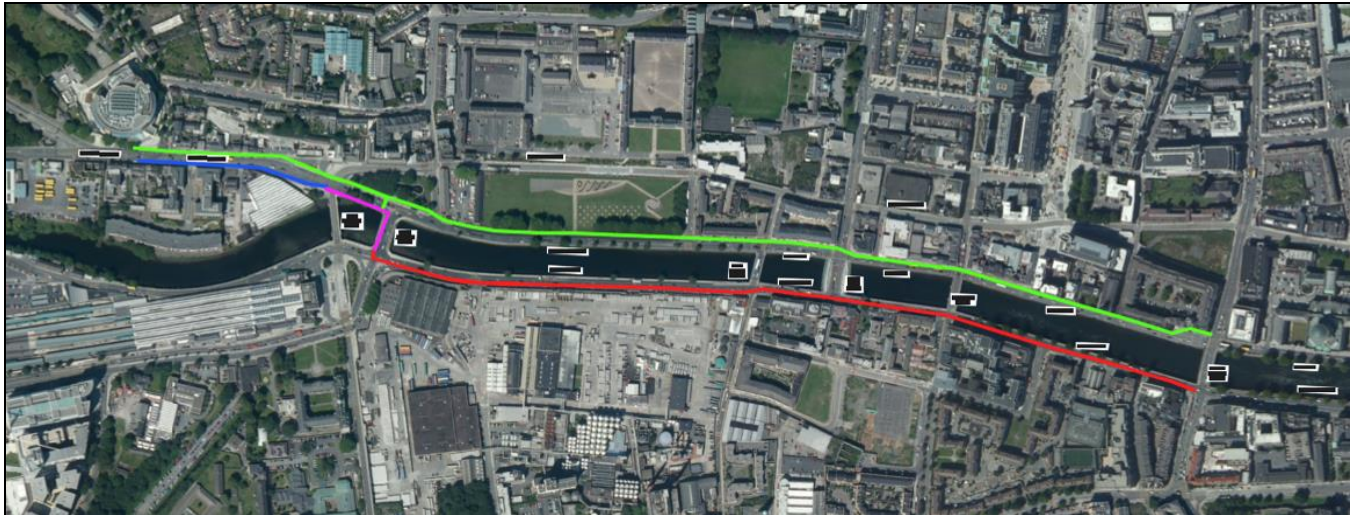


Figure 9.2 Section 1 Recommended Option

9.3 Section 2: Father Matthew Bridge to O’Connell Bridge

Section 2 includes:

Sub-Section	Description
2A:	Father Mathew Bridge to O’Donovan Rossa Bridge (Church St to Winetavern St)
2B:	O’Donovan Rossa Bridge to Grattan Bridge (Winetavern St to Parliament St)
2C:	Grattan Bridge to O’Connell Bridge (Parliament St to O’Connell St)

Three route options emerged from the Stage 2 Assessment of Section 2. These are shown in the diagram below. All options to emerge from the Stage 2 assessment in Section 2 are along the riverside.

Option	(iii)	(iv)	(vi)
Subsection	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	One-way Cycle Track Riverside South
2A	Pass	Pass	Pass
2B	Pass	Pass	Pass
2C	Pass	Pass	Pass
Overall	Pass	Pass	Pass

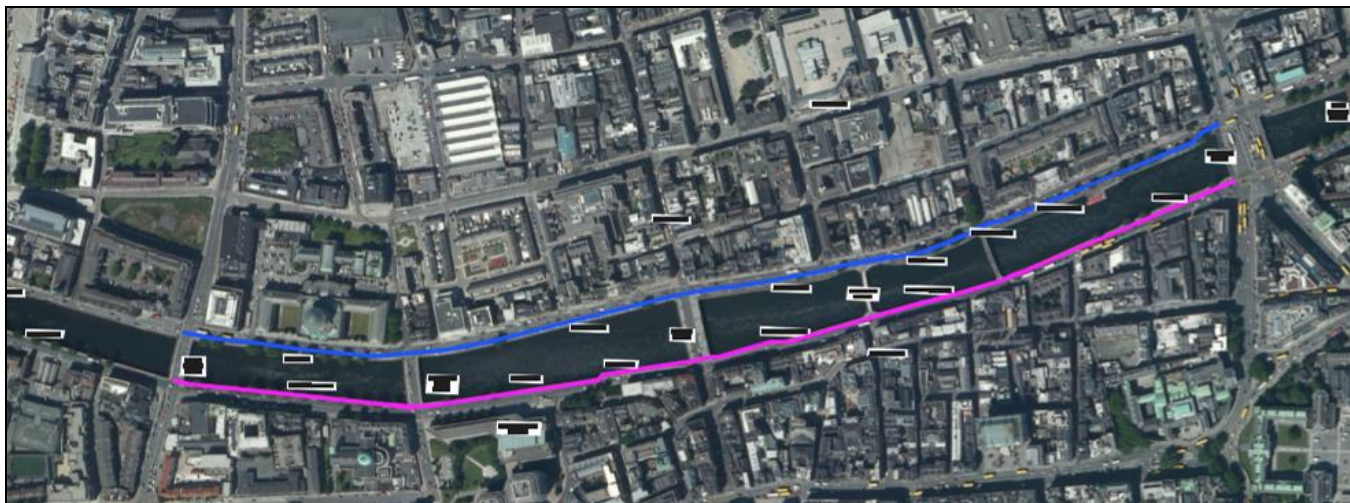


Figure 9.3 Section 2 End to End Route Options

In order to undertake the multi-criteria assessment on equivalent routes, the one-way facilities have been grouped together to form a fully functional Liffey Cycle Route facility. That is, one-way on the North side inbound must be accompanied by a similar route on the South side outbound. This allows for the following routes and combination of routes to be considered:

- a) Two-way Riverside Cycle Track North of the River; and
- b) One-way Riverside Cycle Track on both Quays (inbound North Quays and outbound South Quays).

9.3.1 Economic Criterion

In terms of cost, both options require boardwalks to accommodate displaced pedestrians. Option B requires boardwalks on the south side of the river, as well as the north side, and therefore, this option is more expensive.

All options have similar economic benefits. Therefore, the scoring follows the cost for this criterion, and Option A performs best.

9.3.2 Integration Criterion

In terms of integration, Option A will diminish the availability of road space for public realm along the north quays more so than Option B. Option B, although requiring interventions along both quays, proposes extensive provision of new boardwalks along the south side of the river to mitigate the adverse impacts on, and indeed to enhance the public realm. This will be a significant planning gain for the city compared to Option A. Both options will entail similar impacts on other modes of transport.

Therefore, Option B scores better under the Integration criterion.

9.3.3 Accessibility and Social Inclusion Criterion

Given the nature of the proposed development, and the proximity of the routes to one another in a macro sense, it is not anticipated that the impacts of the route options will differ under this criterion.

9.3.4 Safety Criterion

Both options require the diversion of riverside pedestrians onto boardwalks to some greater or lesser degree. These can be prone to anti-social behaviour, and this is a safety issue. However, it arises in both cases so the options score equally. It is recommended that consideration is given to enhance management and policing arrangements for the operational stage of the project.

9.3.5 Environment Criterion

From a Landscape and Visual perspective, there is limited greening of the River Liffey corridor in the core city centre, and it is highly desirable that what vegetation is there is retained or replaced. Both the one-way and two-way options along Bachelors' Walk requires the existing space between the building line and the quay wall to be given over to transit corridors, requiring the removal of all mature trees from this section. The loss of trees on Bachelors' Walk should be mitigated elsewhere along the scheme. Option B may afford an opportunity for mitigatory planting on the south side of the river in conjunction with the proposed provision of boardwalks for pedestrians.

The construction of boardwalks is required for all of the options in this section. All such interventions pose a potential risk to the downstream Special Area of Conservation, Special Protection Area, Natural Heritage Area, and Biosphere. These risks are marginal, and easily avoided with prudent construction methods.

The route options will not vary in terms of the significance of their architectural, archaeological, land use, noise or air impacts.

The multi-criteria assessment is summarised in Table 9.3 below. The detailed multi-criteria assessment is included in Appendix B, and explanatory notes are included below.

Table 9.3.1 Section 2A Multi-Criteria Assessment

Option	Option A: Two-Way North Quays River Side	Option B: One-Way Riverside Both Quays
Economy		
Integration		
Accessibility & Social Inclusion		
Safety		
Environment		
Rank	2	1

9.3.6 Section 2 Conclusion

The most favourable option for Section 2 is the construction of a segregated one-way cycleway on the riverside along both sides of the River Liffey, following the existing traffic circulation regime.

The preferred scheme will require a new boardwalk along the south quays between O'Connell Bridge and O'Donovan Rossa Bridge, and extension of the existing boardwalks on the north quays to tie into the parapets of the Millennium and Ha'penny footbridges.

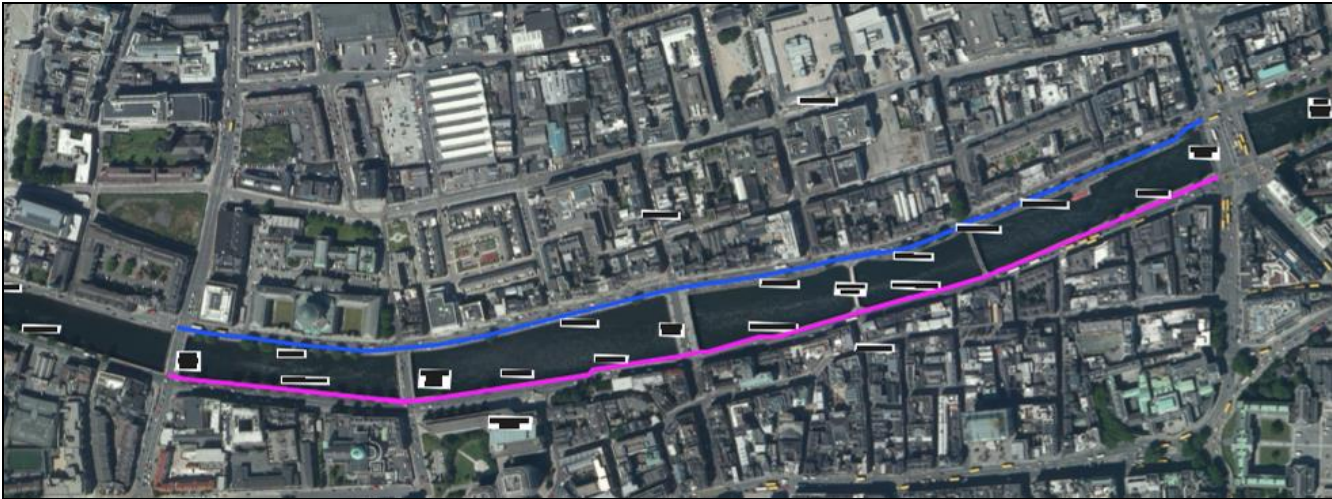


Figure 9.4 Section 2 Recommended Option

9.4 Section 3: O'Connell Bridge to Matt Talbot Memorial Bridge

Five route options emerged from the Stage 2 Assessment of Section 3. These are shown in the diagram below:

Option	(iii)	(iv)	(v)	(vi)	(vii)
Subsection	One-way Cycle Track Riverside North	Two-way Cycle Track Riverside North	Two-way Cycle Track Riverside South	One-way Cycle Track Riverside South	One-way Cycle Track Buildings Side South
3	Pass	Pass	Pass	Pass	Pass
Overall	Pass	Pass	Pass	Pass	Pass

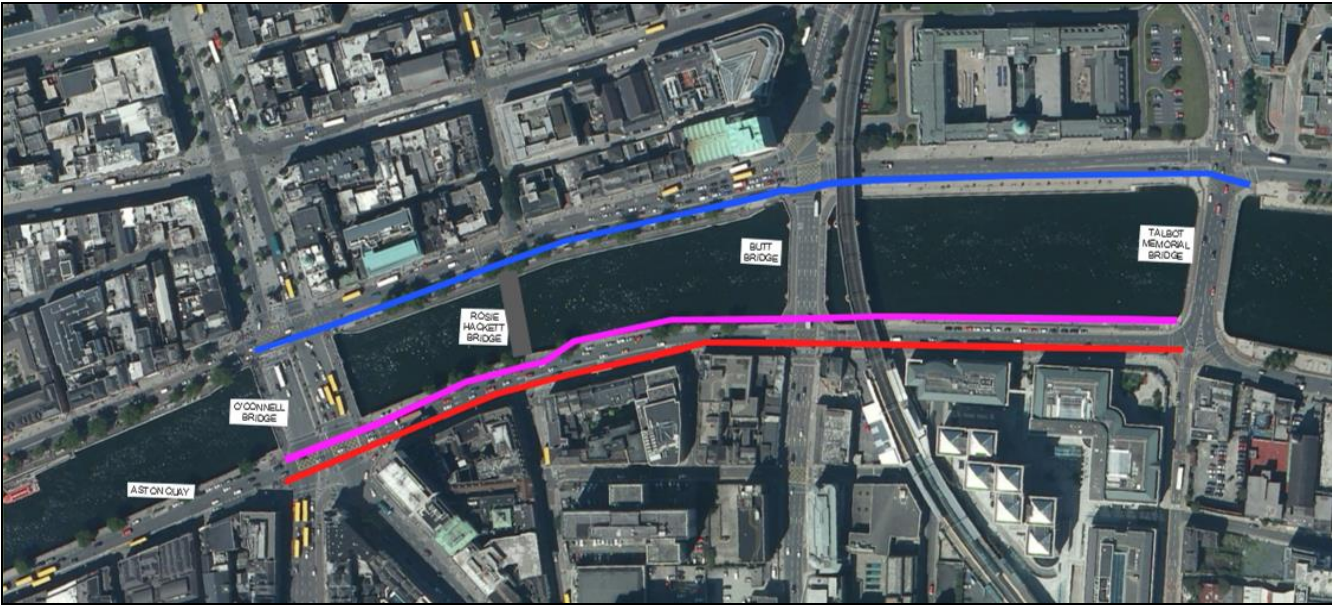


Figure 9.5 Section 3 End to End Route Options

In order to undertake the multi-criteria assessment on equivalent routes, the one-way facilities have been grouped together to form a fully functional Liffey Cycle Route facility. That is, one-way on the North side inbound must be accompanied by a similar route on the South side outbound. This allows for the following routes and combination of routes to be considered:

- a) Two-way Riverside Cycle Track North of the River;
- b) One-way Riverside Cycle Track on both Quays (inbound North Quays and outbound South Quays).
- c) Two-way Riverside Cycle Track South of the River;
- d) One-way Riverside Cycle Track North of the River eastbound and One-way Buildings Side Cycle Track South of the River westbound.

9.4.1 Economic Criterion

All options involve similar costs and entail similar benefits and therefore score equally under this criterion.

9.4.2 Integration Criterion

All options require some degree of reconfiguration of the quay sides but in all instances, there is sufficient space available to accommodate all road users, without severe impacts on the public realm. Therefore, the options score similarly in terms of integration.

9.4.3 Accessibility and Social Inclusion Criterion

Given the nature of the proposed development, and the proximity of the routes to one another in a macro sense, it is not anticipated that the impacts of the route options will differ under this criterion.

9.4.4 Safety Criterion

There is little to choose between the options in terms of safety, and they score equally under this criterion.

9.4.5 Environment Criterion

The route options will not vary in terms of the significance of their environmental impacts.

Table 9.4: Section 3 Multi-Criteria Assessment

CAF Overall Assessment	Option A: Two-Way North Quays River Side	Option B: One-Way Riverside Both Quays	Option C: Two-Way South Quays River Side	Option D: River Side NS Buildings Side SS
Economy				
Integration				
Accessibility & Social Inclusion				
Safety				
Environment				
Rank	1	1	1	1

9.4.6 Section 3 Conclusion

There is very little to choose between the options for Section 3. Therefore, any of the options could be incorporated in the recommended Liffey Cycle Route Option.

9.5 Section 4: Matt Talbot Memorial Bridge to Tom Clarke East Link Bridge

The Stage 2 Assessment has described how Dublin City Council and the National Transport Authority have mutually complementary plans to develop two-way riverside cycle routes on both sides of the River Liffey through the Docklands. It is therefore recommended that the preferred scheme for the Liffey Cycle Route should connect to both of these at Matt Talbot Memorial Bridge. This will require a reconfiguration of the bridge and of the junctions at either side of the bridge. There is a surplus of road space currently given over to private vehicular traffic on Memorial Bridge, and it is recommended that this should be reappropriated to accommodate this important cycle connectivity.

Given that other complementary proposals exist to continue the Liffey Cycle Route to the East Wall Road and Sir John Rogerson's Quay, further consideration is not necessary beyond Matt Talbot Memorial Bridge.

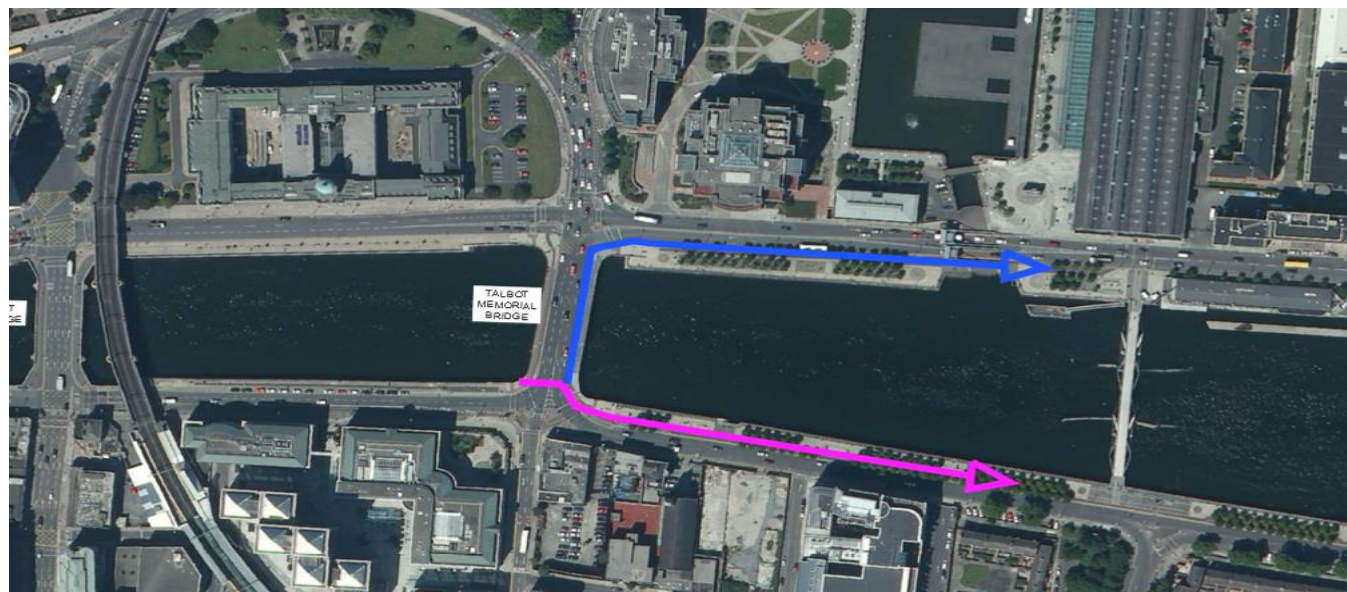


Figure 9.8 Section 4 Proposed Two-Way Cycle Routes

10. OPTIONS ASSESSMENT STAGE 4

The final stage of the Options Assessment process requires combining the four sections to establish the compatibility of the recommended route options in each section.

The following is the conclusion of the Stage 3 assessment:

	North Side	South Side
Section 1	One-way Buildings Side	One-way Buildings Side
Section 2	One-way River Side	One-way River Side
Section 3	One-way River Side or Two-way River Side	One-way River Side or Two-way River Side
Section 4	Two-way River Side	Two-way River Side

This is shown in Figure 10.1 below:

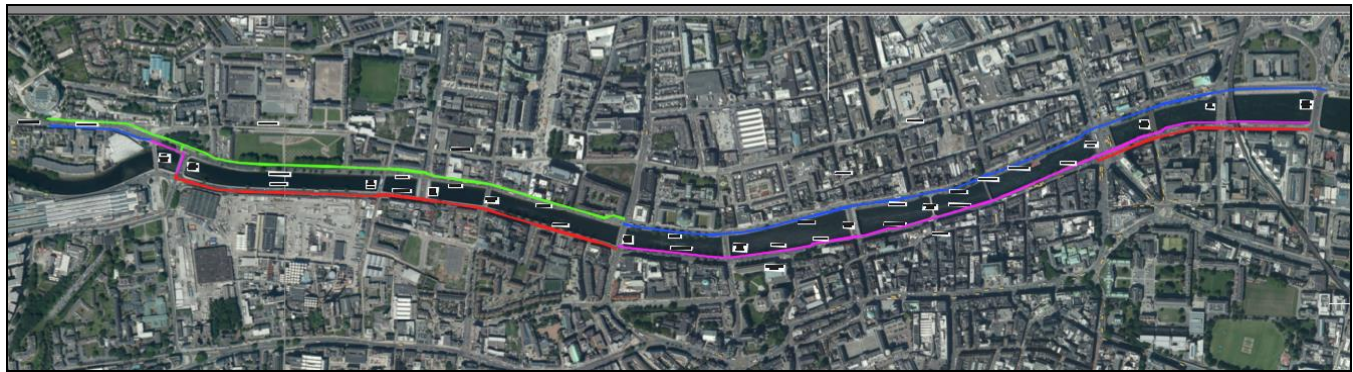


Figure 10.1 Outcome of Stage 3 Assessment

The options to emerge in each section are not consistent in terms of facility type and require transition arrangements to provide a continuous facility in each direction. Since a number of variant options have emerged through the short Section 3, this section has been treated as a transition between Sections 2 and 4.

10.1 Transition between Sections 1 and 2

The recommended option through Section 1 proposes one-way cycle tracks on the buildings side, whilst the recommended option through Section 2 proposes one-way cycle tracks on the riverside. Therefore, a transition is required either at the eastern end of Section 1, or at the western end of Section 2 to allow cyclists to cross the other traffic streams to cross from the building side to the riverside or vice versa.

The transition point has been selected at O'Donovan Rossa Bridge (boundary of Sections 2A and 2B). At this bridge there is a moderate flow of northbound traffic from Winetavern Street to Chancery Street, and the available road space is considerably greater than at Father Matthew Bridge to the west at Church Street, or at Grattan Bridge to the east.

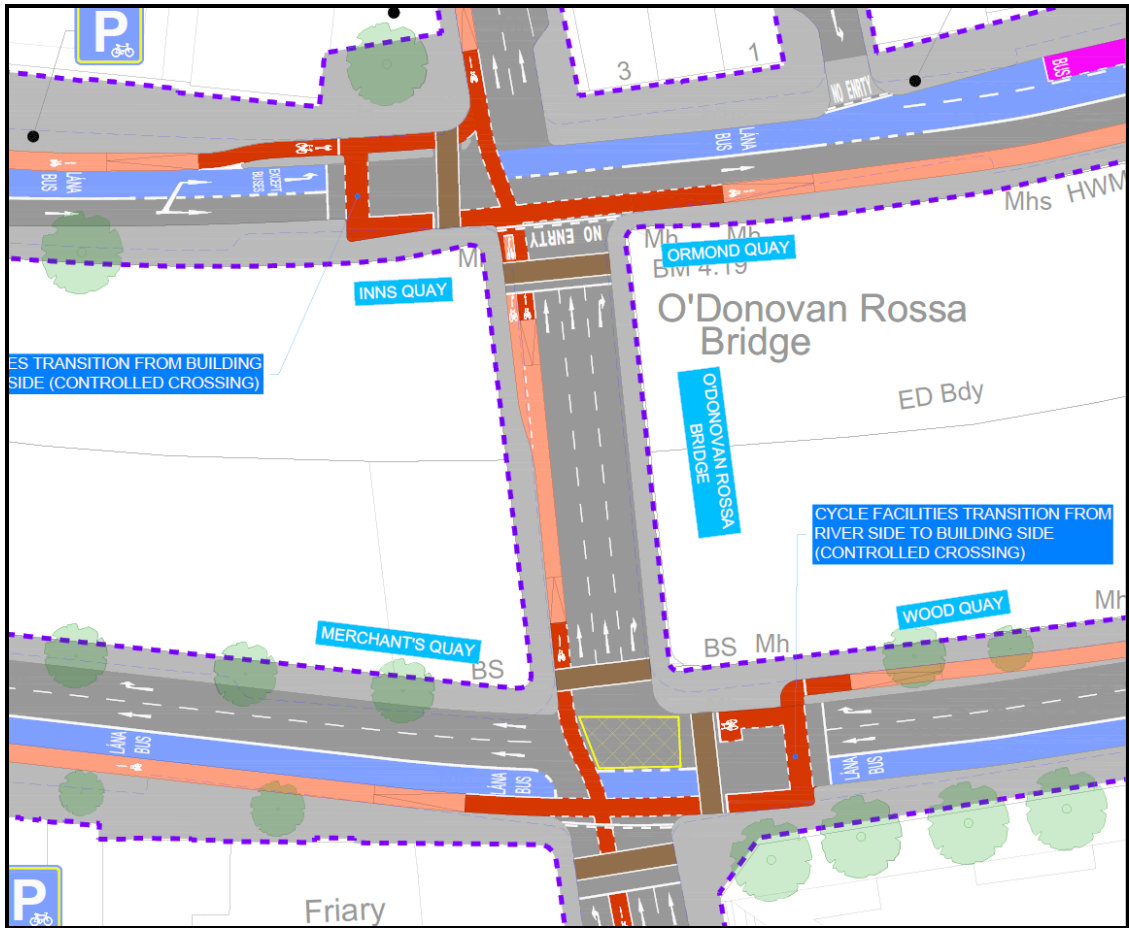


Figure 10.2 Proposed Transition at O'Donovan Rossa Bridge

10.2 Section 3 - Transition Between Sections 2 and 4

The recommended option through Section 2 proposes one-way cycle tracks on the riverside, whilst the recommended option through Section 4 proposes two-way cycle tracks on the riverside on both sides of the river. Either of these options is possible through Section 3. A building side option is also viable on the south side of the river, but this wouldn't connect to the upstream or downstream facilities and is therefore not considered to be appropriate over such a short distance.

It appears that Memorial Bridge affords the best opportunity in terms of space to manage the transition between the two-way facilities in the docklands and the one-way facilities to the west, since the conflicting demands on road space are not as acute there as in the case of Butt Bridge, Rosie Hackett Bridge, or O'Connell Bridge.

On that basis, the continuation of the one-way riverside circulatory arrangement as proposed in Sections 1 and 2 is marginally preferred over the provision of a two-way riverside facility on both sides of the river through Section 3.

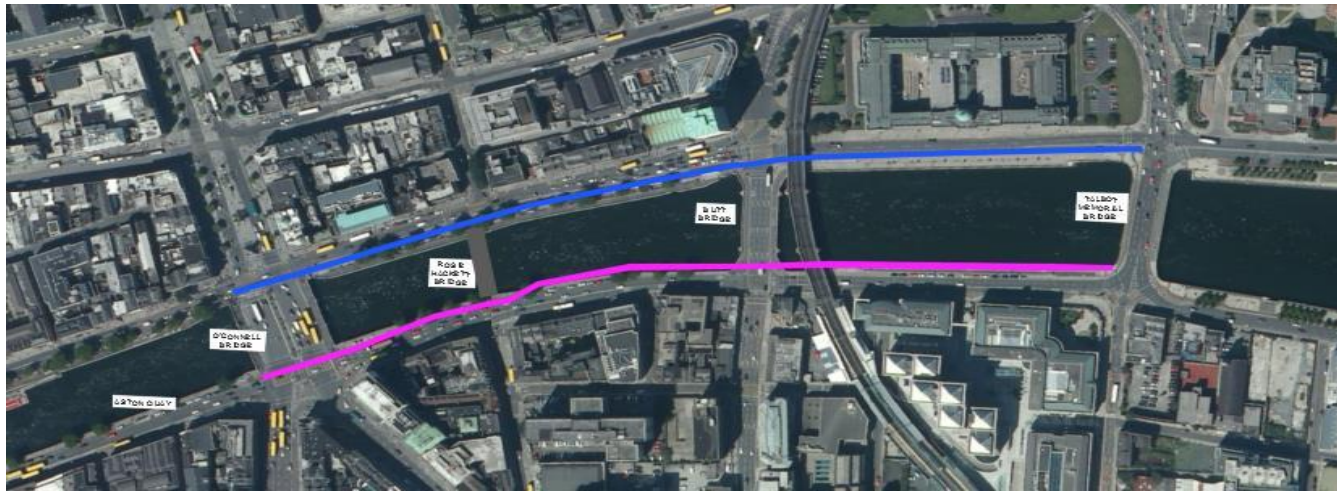


Figure 10.3 Section 3 Recommended Option

10.3 The Recommended Option

The recommended option for the Liffey Cycle Route is as follows:

- A 2.0m wide one-way segregated cycletrack on each side of Parkgate Street;
- A 2.0m wide one-way segregated cycletrack along the buildings side between Frank Sherwin Bridge and O'Donovan Rossa Bridge*;
- A 2.0m wide one-way segregated cycletrack along the river side from O'Donovan Rossa Bridge to Matt Talbot Memorial Bridge, with associated amendments to road carriageway and footpath provision, and the construction of sections of new riverside boardwalks; and
- A 3.5m** wide segregated two-way cycletrack through the campshires on each side of the River Liffey between Memorial Bridge and Tom Clarke East Link Bridge.

*Local pinch-point of 1.5m through the junction at the northern side of Liam Mellows Bridge; and

**Local pinch-points of 2.5m passing buildings in the campshires.

The cost of the recommended option is envisaged to be greater than €20m, and therefore a detailed business case should be prepared for the scheme, to include a fully detailed cost estimate and benefits appraisal in line with the Public Spending Code published by the Department of Public Expenditure and Reform.

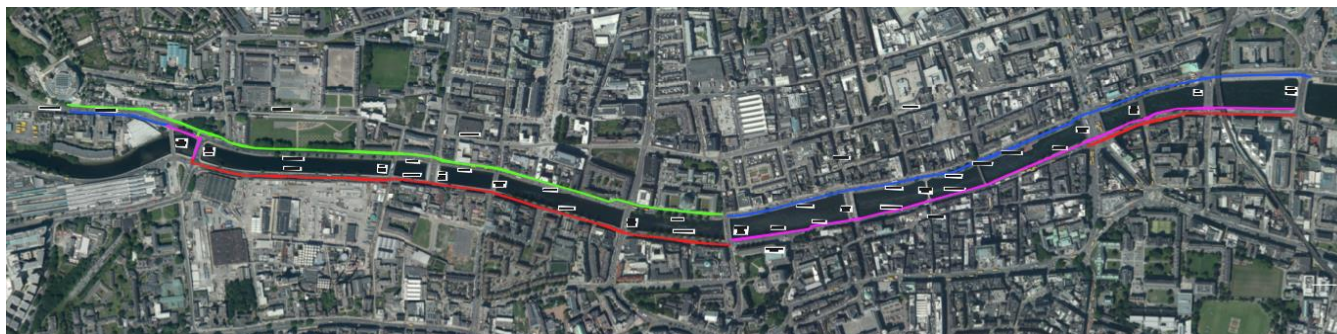


Figure 10.4 Liffey Cycle Route Recommended Option

APPENDIX A
ROUTE OPTION