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Dublin City Council

Royal Canal Greenway

Cycle & Pedestrian Route - Phase 3

Final Business Case

June 2022

Quality information

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Revision History

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1. Introduction

1.1 Scheme Overview

The 2.1km scheme involves the provision of a segregated cycleway and improved pedestrian facilities, which will run along the banks of the Royal Canal providing an improved link between North Strand Road and Phibsborough Road. This scheme represents Phase 3 of the Royal Canal Greenway and is a continuation of the recently completed Phase 2 section and will furthermore connect with other schemes such as the planned Clontarf to City Centre cycle route as the cycle network continues to expand. The scheme will improve walking and cycling accessibility along the canal between North Strand Road and Phibsborough Road and promote the use of active travel.

The route commences at Charleville Mall next to Newcomen Bridge before moving onto the existing canal towpath as it travels north towards its conclusion at Phibsborough Road. RCG Phase 4, a separate scheme, looks to continue the route to the Fingal County boundary linking with the wider Royal Canal Greenway which ends at the River Shannon near Longford.

To ensure the required widths are achieved, minor widening along the canal will be carried out in agreement with Waterways Ireland (the canal owner and operator). Additionally, soft boundary treatments are also proposed in order to mitigate any potential ecological landscape impacts.

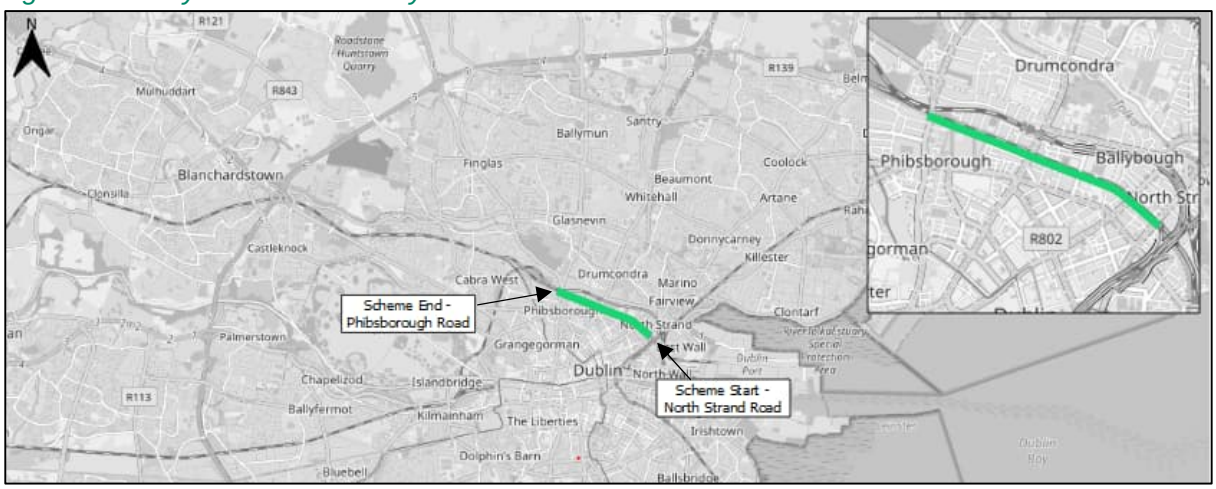
The route includes three at grade crossings of major radial arteries to the city. Namely, at Ballybough Road (Clarkes' Bridge), Russell Street (Russell Street Bridge) and Drumcondra Road (Binns Bridge). These crossings will provide new or relocated at-grade toucan crossing facilities across the radial arteries. New ramp structures are proposed at the East side of Clarkes' Bridge and at both sides of Russell Street Bridge to address the substantial level difference.

At lock number 3 the route will transfer onto the north side of the bank via a new bridge structure that will facilitate both cyclists and pedestrians as well as maintaining the vertical clearance specified by Waterways Ireland (WI), to ensure the operation of the lock is not compromised.

The constructed scheme will provide a segregated facility serving both pedestrians and cyclists along the entire route. Both the cycle track and footpaths will be directly adjacent to the canal bank and additional features, such as CCTV, lighting and landscaping improvements will be implemented to ensure both commuter and leisure cyclists are attracted.

The scheme extent is shown below in Figure 1.1.

Figure 1.1 – Royal Canal Greenway Phase 3 Scheme Extents



1.2 Project Brief

Given the progression of the scheme and the readiness to deliver, the following key points are noted in terms of key project outputs. These have been identified through the design process and are elements which have been utilised as part of the tendering process.

- 2.1km scheme length of segregated walking and cycling infrastructure
- 4 no. of new toucan crossings at Cross Guns Bridge (3), Drumcondra Road Lower, Russell Street and Summerhill Parade
- 1 no. improved crossings of toucan type at North Strand Road
- Notable landscaping and green space improvement
- Improved lighting and CCTV to enhance safety and facilitate an inclusive space

1.3 Purpose

This report sets out the business case for the Royal Canal Greenway Phase 3 scheme. This business case has been developed to:

- Outline existing issues in the locality and outline the case for change
- Define the aims and objectives of the Royal Canal Greenway Phase 3 scheme
- Appraise the options for change
- Set out an evidence-based representation of expected return on public investment.
- Ensure the scheme meets the objectives set and is good use of public funds

The report has been prepared in accordance with the Department of Public Expenditure & Reform (DPER) Public Spending Code (PSC) 2019, the Department of Transport (DoT) Common Appraisal Framework (CAF) 2016 (updated October 2021) and the Transport Infrastructure Ireland (TII) Project Appraisal Guidelines (PAG).

The economic appraisal element of the business case supports decision-making and accounts for the scheme's potential benefits and costs in monetary terms, or where a monetary equivalent can be estimated. In the transport sector, the economic appraisal usually takes the form of Cost-Benefit Analysis (CBA) and serves several functions at both individual scheme level and for state-wide comparisons on public investment.

- Scheme level – CBA defines the economic viability of the scheme in terms of transport benefits, provides a comparison of alternative options and takes account of relevant sensitivity testing.
- National level – economic appraisal compares schemes across sectors that would provide a positive return on investment.

CBA will usually only incorporate the monetised transport benefits; however, it is important to acknowledge that such benefits only represent a proportion of the total suite of benefits associated with a scheme. These wider non-monetised benefits also need to be considered as part of the broader case for change.

1.4 Approach to Scheme Appraisal

1.4.1 Qualitative Appraisal

According to guidance, a qualitative appraisal should be undertaken for all active mode projects.

Firstly, it is important to establish the relevant criteria to be used during appraisal. There are six main criteria listed by CAF and all of these should be considered, the additional sub-criteria will be dependent on relevance to the scheme.

PAG suggests a 7-point scoring scale for qualitative analysis, and this represents how likely a scheme is to provide either positive or negative impacts. The scoring criteria is demonstrated below.

1. Major negative
2. Moderate negative
3. Minor negative
4. Neutral
5. Minor positive
6. Moderate positive
7. Major positive

During the qualitative analysis, both quantitative and monetary indicators may be used to assist with scoring. Indicators are useful to make the process more objective.

Results from the analysis will be summarised in the Project Appraisal Balance Sheet (PABS).

1.4.2 Cost Benefit Analysis

A Cost Benefit Analysis (CBA) is required for any scheme cost above €20 million. CBA compares monetised active mode benefits to its costs and uses this comparison to assess whether a scheme represents good value of money.

For this purpose, we have developed a tool for the economic appraisal of active modes in line with guidance and parameters sets out in CAF and PAG to assist in undertaking a CBA for active mode schemes. The tool can be used to undertake a full CBA and provide a benefit and economic output summary. Our appraisal covers a wide range of economic benefits, this includes benefits relating to modal shift, health, reduced journey time, journey quality and recreation.

1.4.2.1 Estimating Demand

A significant input into the quantitative appraisal are user demand scenarios, this is how many walking/cycling trips are present prior to and post scheme implementation and how they differ. However, even when walking or cycling data is available, it can be difficult to forecast how the level of use will differ following an intervention.

Single forecasts are often not appropriate for active mode projects as there are so many factors which influence likelihood of use, such as: safety, infrastructure quality, personal levels of physical activity, and settlement/commuting patterns. Active travel scenarios allow for more possibilities to be explored and acknowledge the fact that changes in usage following intervention can be unpredictable. Demand scenarios used in the appraisal of this scheme allow for uncertainty by testing three potential levels of demand: ‘low scenario’, ‘central scenario’, and ‘high scenario’.

For this scheme, existing count data for cyclists is available from the DCC counters, located close to the study area. Future demand scenarios can be estimated by applying the three levels of cycling growth to represent the low, central, and high scenario. Users’ growth levels have been established by reviewing other schemes that have seen increases in cycling and walking following an intervention / to reflect policy targets.

The forecast was based on the recent trends of the Charleville Mall DCC counter in the east end of the scheme. The National Planning Framework (NPF) projects a 25% increase in Dublin city's population between 2016 and 2040. Therefore, a 4% annual increase was applied to background cycling and walking demand for the calculation of the future number of users that will continue to cycle along the study area even without the development of the proposed scheme. Further details on the future cycle and walking demand and the forecast of new users due to the proposed scheme are presented in Chapter 5.

1.5 Structure of the Report

Following this introductory chapter, the rest of the report is structured as follows:

- Chapter 3 – Rationale for Investment
- Chapter 4 – Objectives
- Chapter 5 – Alternatives and Options to Address the Problem
- Chapter 6 – Demand Analysis
- Chapter 7 - Costs
- Chapter 8 – Scheme Impacts
- Chapter 9 – Financial Appraisal
- Chapter 10 – Economic Appraisal
- Chapter 11 – Scheme Appraisal Balance Sheet
- Chapter 12 – Governance Plan
- Chapter 13 – Risk Management
- Chapter 14 – Delivery and Procurement Approach
- Chapter 15 – Monitoring and Evaluation Approach
- Chapter 16 – Conclusion

2. Rationale for Investment

2.1 Introduction

This chapter sets out the overarching rationale for investment, demonstrating the need for the RCG Phase 3 scheme. The section covers the policy context and adherence and sets out the drivers for change and problem identification. Moreover, consideration is given to the impacts of Covid-19.

2.2 Public Policy Context

This section sets out the broader public policy context underpinning the Royal Canal Greenway Phase 3 scheme. As Table 2.1 shows, there is a strong international, national, and local policy basis for this scheme. If implemented, the scheme would directly and indirectly achieve a range of policy objectives, including investment in low-carbon and sustainable transport, development of a network of national and local greenways, encouraging increased levels of physical activity across the population, attracting tourism and investment, and improving safety for vulnerable road users.

Table 2.1 – Relevant Policy for Royal Canal Greenway Phase 3

Level	Policy
European and International Policy	• Road Infrastructure Safety Management (RISM) Directive • EuroVelo 'Guidance on the Route Development Process'
National Policy	• Project Ireland 2040 – National Planning Framework • Climate Action and Low Carbon Development Act • Climate Action Plan 2021 • National Investment Framework for Transport in Ireland • A New Vision for Sustainable Mobility • Strategy for the Development of Future National and Regional Greenways • Fáilte Ireland Investment Strategy 2016-2022 • National Physical Activity Plan for Ireland 2017
Regional and Local Policy	• Dublin City Development Plan 2022-2028 • Dublin City Council Climate Change Action Plan 2019-2024 • Greater Dublin Area Transport Strategy 2022-2042

2.2.1 European and International Policy

2.2.1.1 Road Infrastructure Safety Management (RISM) Directive

The European Union has set a 'Vision Zero' target, which aims to halve fatalities on European roads by 2030, and further reduce this to 'almost zero' by 2050. This is influenced by the 'Safe Systems' approach, which is a road safety concept which states that deaths and serious injuries are largely preventable by good design and maintenance of road infrastructure. The 'Vision Zero' target is accompanied by a suite of European and National policies and programmes aimed at achieving this strategic ambition.

Accordingly, the Directive on Road Infrastructure Safety Management (RISM) defines procedures for EU member states to improve safety on the trans-European (TEN-T) road network. Under RISM, each member state is required to carry out actions to monitor and improve road safety on the network, this includes network-wide 'Safety Ranking', regular Road Safety Inspections, Road Safety Audits during planning and design of infrastructure, certification and knowledge exchange with Local Authorities and European partners. While the TEN-T network currently covers only the motorways between Dublin and Cork, Limerick/Foynes and Newry, the Directive note states it is

"*desirable for those RISM principles to be applied to other parts of the European road network*", and TII have extended the RISM principles to the rest of the national road network.

RISM was updated in 2019 to require Member States to consider the needs of 'vulnerable road users' in network planning, design and operation. Vulnerable road users are defined as "*non-motorised road users, including, in particular, pedestrians and cyclists*". In planning and designing road infrastructure, the updated RISM Directive places much greater emphasis on separating and protecting vulnerable road users from the risks of high-speed and high-volume traffic, and requires authorities to consider things such as:

- *"Provision for cyclists, including the existence of alternative routes or separations from high-speed motor traffic;*
- *Density and location of crossings for pedestrians and cyclists;*
- *Provision for pedestrians and cyclists on affected roads in the area; and*
- *Separation of pedestrians and cyclists from high-speed motor traffic or the existence of direct alternative routes on lower class roads".*

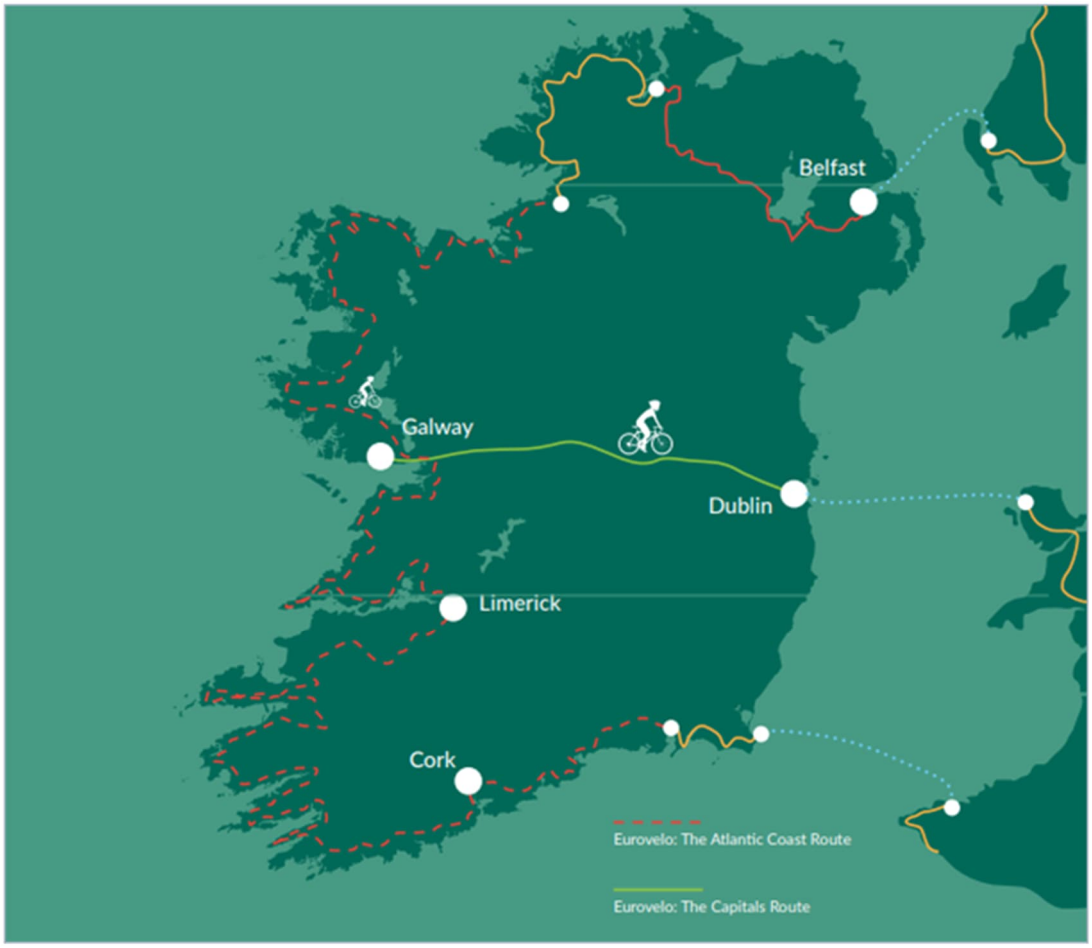
Relevance to Royal Canal Greenway Phase 3

2019 update of RISM introduced the need to consider 'vulnerable road users' during planning, design and operation. Vulnerable road users are often cyclists and pedestrians, the main users of our scheme. In order to provide these users with safe travel it is important to protect and if possible, segregate them from the rest of the traffic as planned in the Royal Canal Greenway Phase 3 scheme.

2.2.1.2 EuroVelo 'Guidance on the Route Development Process'

When complete, the Royal Canal Greenway Phase 3 will form a section of the EuroVelo 2 'Capitals Route', a 5000KM transnational cycling route that will connect Dublin with London, Berlin, Warsaw, Minsk, and Moscow. The route will also pass through 17 UNESCO world heritage sites. As a route of significance, it is therefore important to also be mindful of the EuroVelo design principles and standards when designing and choosing a route to be implemented.

Figure 2.1 – Ireland EuroVelo Routes



EuroVelo's '*Guidance on the Route Development Process and European Certification Standards Handbook for Route Inspectors*' establishes guiding principles for the selection and designing of EuroVelo routes in order to ensure high standards and consistency across the network. The principles are:

- **Safety** – "*avoid public roads with large motor traffic volumes and high speeds. Provide safe junction. Consider social safety*". It also states that public roads hosting on-road cycle routes must not carry more than 2000 motor vehicles per day and preferably should carry less than 500.
- **Attractiveness** – "*include and connect cultural, historical and natural sights, culinary or other attractions, whilst avoiding unpleasant areas*".
- **Coherence and Directness** – "*provide uninterrupted route infrastructure but link to attractions connected to the theme of the route and provide signing. Avoid unnecessary detours*".
- **Comfort** – "*minimise elevation. Provide good surfaces and sufficient good quality services (accommodation, food, bike repair etc)*".

Relevance to Royal Canal Greenway Phase 3

As the Greenway scheme forms part of the EuroVelo 2, as mentioned above, it is important to follow the outlined design principles. Such design principles will ensure that the route is of high-quality and assist in achieving outlined objectives, such as increased mode attractiveness as well as improved safety and convenience.

2.2.2 National Policy

2.2.2.1 'Project Ireland 2040' – National Planning Framework

Project Ireland 2040 is Ireland's National Planning Framework (NPF) and provides a high-level strategic plan for shaping planning policy as well as future growth and development in Ireland up until 2040. The NPF aims to avoid the 'mistakes' made in previous planning policy – mistakes that have led to urban sprawl, unbalanced regional development and increased car dependency. Mistakes will be avoided by ensuring investment is closely aligned with the overarching principles in the NPF.

The NPF is based on ten 'National Strategic Outcomes' (NSO), which are an expression of the shared national goals or benefits the NPF aims to strive towards. These NSO are shown in Figure 2.2 below.

Figure 2.2 – Project Ireland 2040 'National Strategic Outcomes'

The Royal Canal Greenway Phase 3 scheme closely aligns with several of the NSOs, as detailed below in Table 2.2.

Table 2.2 – Alignment of Royal Canal Greenway Phase 3 with National Strategic Outcomes (NSO)

NSO	Relevance to Royal Canal Greenway Phase 3
Enhanced regional accessibility	A component phase of a wider scheme to promote connectivity.
Sustainable mobility	Provision of the Greenway promotes sustainable mobility by providing a safe, attractive, and realistic option to the car which is likely to generate a modal-shift.
High-quality international connectivity	The Greenway will form part of EuroVelo 2 which provides connectivity to other parts of Europe and makes Dublin better connected.

NSO	Relevance to Royal Canal Greenway Phase 3
Transition to low-carbon and climate resilient society	The Greenway is likely to generate a modal-shift towards active travel and reduce the number of car trips, reducing car trips will assist in lowering transport-related carbon emissions and help Dublin achieve its climate action objectives.

The NPF also includes 'National Policy Objectives', which provides a more specific statement on the types of actions and investments necessary to achieve the NSO; two of which are particularly relevant to this scheme:

- *"Support the objectives of public health policy including Health Ireland and National Physical Activity Plan, through integrating such policies, where appropriate and at the applicable scale, with planning policy" (Objective 26).*
- *"Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments and integrating physical activity facilities for all ages" (Objective 27).*

Relevance to Royal Canal Greenway Phase 3

There are numerous NSO's mentioned in the NPF which are relevant to the Royal Canal Greenway Phase 3 scheme, showing the scheme is relevant and aligned with the framework. Additionally, the scheme will assist in overcoming the aforementioned past 'mistakes' and provide residents with feasible alternatives to the car and thus reduce car dependency. Also, the scheme is likely to increase physical activity and will help in achieving objectives outlined in Irelands relevant health and physical activity strategies.

2.2.2.2 'Climate Action and Low Carbon Development Act' & 'Climate Action Plan 2021'

Climate action is a key objective in the Royal Canal Greenway Phase 3 scheme and is rooted in robust national climate policy framework. In 2021, the 'Climate Action and Low Carbon Development (Amendment) Act' became law. The Act established is a legally binding target to reduce emissions by 50% (relative to 2018 baseline) by 2030, and to move towards net-Zero emissions by 2050. The Act provides for a system of carbon budgets to enforce these targets, budgets set a maximum level of emissions for each sector of the economy. These will gradually further decrease after 2030, to work towards net-Zero by 2050. In October 2021, the Climate Change Advisory Council (CCAC) published proposed carbon budgets for the 2021-2030 period, which outlined pathways to achieving the overall emissions. The carbon budgets were based on an average reduction of 4.7% per annum in 2021-2025 and 8.3% in 2026-2030.

In November 2021, the Department of Environment, Climate and Communications published a new Climate Action Plan, which sets out targets and actions required to give effect to the carbon budgets for 2021-2030. Overall, the Plan aims for a 51% reduction in transport emissions by 2030, with a particular focus on demand management, sustainable mobility and generating a modal-shift away from fossil fuel-powered cars to walking, cycling and public transport. Among the targets and measures outlined in the Plan are:

- Increase in daily public transport and active mode trips by 500,000 (+14%)
- Reduction in internal combustion engine vehicle kilometres by 10%.

According to the Plan, achieving these targets requires "continued and enhanced investment in walking, cycling and public transport infrastructure and services across the country...on a scale not previously seen", and a focus on "reliable" and "realistic" sustainable mobility options to enable this shift.

The Royal Canal Greenway Phase 3 scheme clearly aligns with the objectives of the Climate Action Plan and the national targets for reductions in emissions. The scheme aims to encourage a modal-shift from private cars to active modes.

Relevance to Royal Canal Greenway Phase 3

There are legally binding commitments to making climate improvements. Schemes like Royal Canal Greenway Phase 3 are crucial to cutting transport-related emissions by generating a modal-shift towards more sustainable travel and reducing car trips. It is widely recognised that significant investment into active travel infrastructure is required to ensure it is an attractive alternative to the car.

2.2.2.3 National Investment Framework for Transport Investment in Ireland (NIFTI)

The Department of Transport recently published a draft framework for prioritising future investment in the land transport network to support the delivery of National Strategic Outcomes. The aims are to target investment:

- *"To cater for rising travel demand, while decarbonising the transport sector;*
- *Invest significantly in sustainable mobility including public transport projects in cities and major investment in cycling and walking throughout the country;*
- *Deploying sustainable solutions wherever feasible; and*
- *Decarbonising the sector through electrifying public transport and providing electric vehicle infrastructure."*

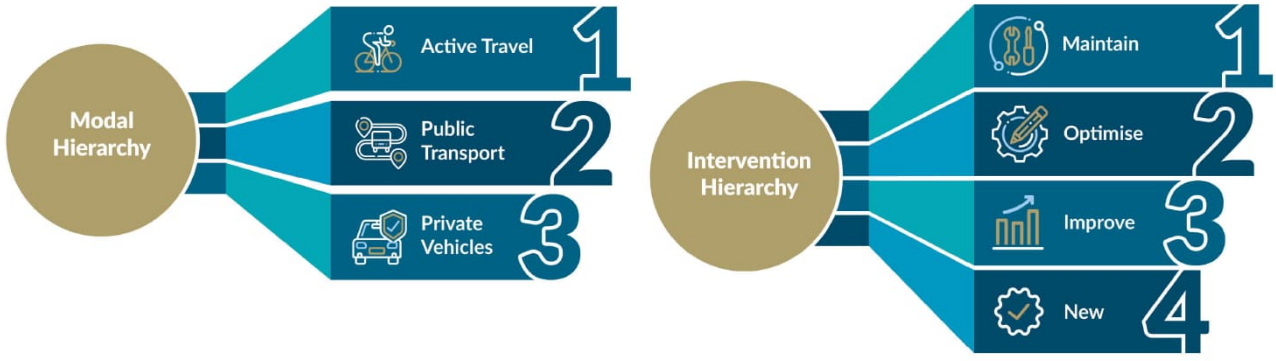
The draft framework includes two 'hierarchies' specifying the order in which transport investment should be prioritised: an 'intervention hierarchy' and 'modal hierarchy'.

The Intervention Hierarchy differentiates between the level of intervention proposed, it states that investment should firstly seek to 'maintain' the existing infrastructure; then to 'optimise' or 'improve' existing infrastructure; and finally – if it is not possible to achieve an objective through previous steps to invest in 'new' infrastructure. The aim of the Investment Hierarchy is to maximise value for money provided by previous investment, and to ensure that more affordable and efficient options for achieving an objective are considered prior to investing in large-scale transport projects or programmes.

The Modal Hierarchy differentiates between the modes of transport, and states that active travel (walking and cycling) should be prioritised, followed by public transport and lastly by private vehicles.

The NIFTI Hierarchies are shown in Figure 2.3 below.

Figure 2.3 – NIFTI Intervention and Modal Hierarchy



The Royal Canal Greenway Phase 3 scheme will respond positively to both hierarchies. Most obviously, the objectives of the scheme are closely aligned with the Modal Hierarchy of prioritising active travel users, as they seek to encourage increased levels of walking and cycling and improve safety and accessibility for vulnerable road users.

Relevance to Royal Canal Greenway Phase 3

NIFTI is focussed on decarbonising transport. They are committed to providing investment in walking and cycling infrastructure to secure this decarbonisation. Also, the modal hierarchy is very relevant to the Royal Canal Greenway scheme, as it states that investment into active mode infrastructure should be prioritised.

2.2.2.4 'A New Vision for Sustainable Mobility'

In late 2019, the then Department of Transport, Tourism and Sport launched a public consultation to inform the development of a new Sustainable Mobility Policy for Ireland, titled 'A New Version for Sustainable Mobility'. The consultation sought public and other stakeholder views on several areas, including how sustainable mobility policy plays its part in supporting the delivery of the 2019 Climate Action Plan.

The need for improved active travel options was noted in a number of background papers, although most notably in the 'Active Travel' background paper. This paper introduces a distinction between active travel for leisure/recreation and active travel for 'purposeful' journeys, and notes that enabling people to travel actively as part of their daily trips to work, school or services is necessary to encourage a large-scale modal-shift from private cars to active modes.

However, the poor perception of cycle safety was noted as being the "*biggest barrier to increasing cycling modal share*" (p.32). Within the paper, cyclists were identified as 'vulnerable road users', with traffic collisions being noted as the only significant health risk to cyclists. In 2019, 21% of fatalities and 17% of serious injuries on the National Roads were pedestrians and cyclists. The Royal Canal Greenway Phase 3 scheme has the potential to make travel for vulnerable road users safer within the study area and facilitate increased levels of active travel modes. The scheme will support the implementation of any sustainable mobility vision and Climate Action Plan.

Relevance to Royal Canal Greenway Phase 3

The need for active travel, to provide sustainable mobility options, has been outlined and this demonstrates why this scheme is important. Furthermore, the infrastructure plans for the Royal Canal Greenway ensure that the infrastructure can be used to undertake purposeful trips and therefore should net a higher usage. Also, the planned segregation from vehicular traffic and improved crossings at junctions should ensure that cyclists and pedestrians are safer when using this infrastructure.

2.2.2.5 Strategy for the Development of Future National and Regional Greenways

In 2018, the then Department of Transport, Tourism and Sport published the *Strategy for the Future Development of National and Regional Greenways* to support the development of greenways in Ireland. Recognising the potential of greenways to promote tourism and economic growth in rural areas, the Strategy establishes five core objectives for the delivery of greenways by Local Authorities and other stakeholders, including:

- *"A strategic greenway network of national and regional routes, with a number of high-capacity flagship routes that can be extended and/or link with local greenways and other cycling and walking infrastructure;*
- *Greenways of scale and appropriate standard which have significant potential to deliver an increase in activity tourism to Ireland and area regularly used by overseas visitors, domestic visitors and locals thereby contributing to a healthier society through increased physical activity;*

- *Greenways that provide a substantially segregated off-road experience linking places of interest, recreation and leisure in areas with beautiful scenery of different types with plenty to see and do;*
- *Greenways that provide opportunities for the development of local businesses and economies; and*
- *Greenways that are developed with all relevant stakeholders in line with an agreed code of practice."*

The Royal Canal Greenway Phase 3 scheme will facilitate the development of a national network of greenways

Relevance to Royal Canal Greenway Phase 3

Greenways are highlighted as an important method of potentially increasing tourism in an area and giving the local economy a boost. Capturing wider benefits such as these is an additional bonus to improving people's health, reducing carbon emissions, and improving air quality. The scheme is likely to create tourism demand by providing high-quality cycling infrastructure which connects to Dublin, other areas of Ireland as well as parts of Europe via the EuroVelo 2 route.

2.2.2.6 Fáilte Ireland Investment Strategy 2016-2022

Fáilte Ireland's 'Tourism Development & Innovation – A Strategy for Investment 2016-2022' was launched to provide a framework for tourism investment in Ireland and identify as well as prioritise tourism investment proposals. The Strategy is based on four strategic outcomes and nine more specific outcomes that Fáilte Ireland aims to achieve with its investments. The four strategic outcomes are:

- *"Increasing the number of overnights spent by overseas visitors and increasing their spend;*
- *Creating employment opportunities;*
- *Leveraging public or private sector investment into the tourism experience; and*
- *Stimulating international awareness and demand."*

Of the nine specific outcomes describing the types of interventions that will be sought or prioritised in line with the specific brand proposition, the following five are particularly relevant to the Royal Canal Greenway Phase 3 scheme:

- **Orientation & navigation –** Allowing visitors to easily find their desired destinations and discover 'hidden gems'.
- **Distribution of traffic and spend –** Ensure that more communities benefit from tourism by encouraging measures to direct visitors from the most heavily-trafficked areas towards less-visited areas.
- **Engaging with the outdoors –** Support projects which "sustainably create or improve access to" the outdoors; improving the visitor experience on state lands; and creating opportunities for outdoor active business clusters to emerge.
- **Engaging with heritage –** Increase capacity at iconic attractions; enable access to heritage and culture; and invest in maintenance and conservation of heritage sites.
- **Innovation & product development –** The development of new tourism experiences and tourism experiences in towns, villages, attractions and activities.

Relevance to Royal Canal Greenway Phase 3

The Royal Canal Greenway Phase 3 targets increased number of active mode trips across all trip purposes. As a key tourist destination, the RCG Phase 3 is to be promoted as a means of connectivity for tourists and those undertaking leisure journeys in Dublin City and beyond.

2.2.2.7 National Physical Activity Plan for Ireland

The aim of the Department of Health's *National Physical Activity Plan* is to increase physical activity levels across the whole population. The Plan sets separate targets for adults, children, and older people to reach to recommended levels of physical activity. Recognising that there are many reasons that people are unable to meet recommended levels of physical activity, the Plan contains some guiding principles to promote increase physical actively, namely by "*creating increased opportunities for people to be active in ways which fit into everyday lives and which suit individual needs, circumstances and interests [and] removing the barriers which people face to being active and encouraging people to recognise how to overcome these barriers*".

The Plan highlights walking and cycling as a way to easily incorporate physical activity in everyday life and includes several actions aimed at promoting active travel and recreating, including:

- *"Develop and promote walking and cycling strategies in each Local Authority Area;*
- *Ensure that the planning, development and design of towns, cities and schools promotes cycling and walking with the aim of delivering a network of cycle routes and footpaths;*
- *Ensure that the planning, development and design of towns and cities promotes the development of local and regional parks and recreational spaces that encourage physical activity;*
- *Prioritise the planning and development of walking and cycling and general recreation/physical activity infrastructure; and*
- *Explore opportunities to maximise physical activity and recreational amenities in the natural environment."*

Objectives set for the Royal Canal Greenway Phase 3 scheme also aim to encourage increased levels of physical activity among the local population by providing safe and attractive recreational infrastructure for walkers and cyclists, and to ensure that access to high-quality recreational infrastructure is not impeded by geographic, social, or physical circumstances.

Relevance to Royal Canal Greenway Phase 3

The scheme will achieve many of the actions listed above, such as: developing and promoting active travel strategies, ensure planning and development promotes active travel, prioritising development of active travel infrastructure and exploring opportunities to maximise physical activity. All of these actions are likely to ensure that cycling and walking become more attractive and realistic options to both secure increase physical activity and reduced car reliance.

2.2.3 Regional and Local Policy

2.2.3.1 Dublin City Development Plan 2022-2028

This Plan is adopted to set out how the city will develop in order to meet resident, workers and visitor's needs. The central aim of the plan is to "*improve the quality of life for its citizens, and make sure Dublin City is an attractive place to live, work and visit*". Within the Plan there are two areas

relevant to the Royal Canal Greenway Phase 3 scheme. These are: 'Climate Action' and 'Sustainable Movement and Transport'.

A specific Plan on climate change is in place and is discussed in the section 3.2.3.2. The Development Plan highlights the challenges Dublin City faces, the challenge most closely related to the scheme is reducing greenhouse gas emissions, in particular carbon dioxide. Additionally, the Plan highlights the importance of managing transport sustainably to achieve climate objectives. This demonstrates that the Plan is committed to reducing emissions and targets sustainable transport as a method of doing so which is why schemes like Royal Canal Greenway Phase 3 are important.

The Plan highlights that sustainable, yet efficient movement of people is crucial for success of the City. It also explains that a committed effort to move away from fossil fuel burning transport is essential to reduce the negative impacts of transport and work towards climate change commitments. The Plan also mentions that policy is focussed on supporting transport infrastructure and land-use for sustainable modes, either public transport or active travel.

Relevance to Royal Canal Greenway Phase 3

The scheme relates to both improving sustainable transport as well as climate change in Dublin. The provision of the cycle and pedestrian infrastructure provides residents with a sustainable mobility option which can be utilised instead of the car. If active travel trips replace car trips, then a reduction in transport-related carbon emissions and improved climate is likely.

2.2.3.2 Dublin City Council Climate Change Action Plan 2019-2024

A key target in this plan is cutting greenhouse gas emissions by 40% prior to 2030 and transport is one of five 'action areas' for achieving this goal.

There are numerous transport actions, mentioned in the plan, which are relevant, directly or indirectly, to the Royal Canal Greenway Phase 3. These include:

- *"Constructing segregated cycleways and footpaths;*
- *Expand bike sharing schemes;*
- *Implementing or supporting walking and cycling campaigns".*

This demonstrates that there is commitment to both providing active travel infrastructure as well as promoting the mode through campaigns and schemes.

Relevance to Royal Canal Greenway Phase 3

The scheme will address one of the main action areas for addressing climate change and cutting transport emissions. The Greenway will also address the transport actions mentioned in the plan and therefore is likely to be of significant importance for achieving the objectives outlined in the Plan.

2.2.3.3 Greater Dublin Area Transport Strategy 2022-2042

This Transport Strategy sets out the framework for transport across the Greater Dublin Area up to 2042. There are numerous proposals in the Strategy which commit to enhancing and promoting active travel and are therefore relevant to the Royal Canal Greenway Phase 3 scheme.

Changing urban planning concepts to promote active travel. The concept of the 15-minute city and 10-minute neighbourhood have gained traction in recent years, especially during and after COVID-19 restrictions. This concept encourages the notion that all residents should only live a short walk or cycle away from necessary facilities to both improve quality of life and also prevent unnecessary

car trips. This does not remove the need for typical centres which would continue to hold universities, specialist medical centres and so on but would mean that realistically one's daily requirements can be met in their own neighbourhood and thus on foot or cycle.

There are further proposals in the Strategy, which are summarised below:

- Increasing the number of homes that can easily access public transport and active mode infrastructure as to discourage private car usage.
- Providing 'filtered permeability' meaning pedestrians and cyclists can travel through areas which motorised traffic cannot, this is an important tool in making walking and cycling safer and more attractive as it provides more direct routes and journey time savings.
- Provide good walking and cycling infrastructure connecting homes to schools and commuter areas, to encourage a modal shift towards active modes.
- The Greater Dublin Area is committed to the ongoing and future roll-out of Greenways.
- Altering road user priority hierarchy to give priority to more sustainable modes and make people undertaking active travel feel safer.
- Improved urban street design can be used to encourage active mode usage by making individual's experience safer, more accessible as well as more attractive.

Relevance to Royal Canal Greenway Phase 3

The Royal Canal Greenway Phase 3 will provide infrastructure for and promote active travel in Dublin. Many of the proposals from the Strategy relate closely with the proposals for RCG, especially the commitment made to continue the roll-out of Greenways.

2.3 Sustainability Context

Setting out the sustainability context, provides a key foundation within which the scheme is integrated.

2.3.1 Our Sustainable Future – A Framework for Sustainable Development in Ireland

Sustainable development is "a continuous, guided process of economic, environmental, and social change aimed at promoting wellbeing of citizens now and in the future". This document sets out the challenges facing Ireland and how they might be addressed to ensure life quality and general wellbeing can be sustained and improved in years to come. Three pillars to sustainability are mentioned in the Framework, these are: environment, economic and social. The plan acknowledges that achieving sustainability will require a huge commitment from society as a whole and will require people to work in collaboration, this includes Government, businesses, key stakeholders, community groups and so on.

The below table demonstrates the 'principles for sustainable development' which are outlined in the Framework.

Table 2.3 – 'Principles for Sustainable Development'

Themes	Principles
Economy	Promote an innovative, competitive, and low-carbon economy with the aim of achieving smart, sustainable and inclusive growth.
Satisfaction of human needs by the efficient use of resources	Prices should reflect the real costs to society of production and consumption activities and polluters should pay for the damage they cause to human health and the environment.

Themes	Principles
Equity between generations	The needs of the current generations should be addressed without compromising the ability of future generations to meet their needs. Resources should be used within the capacity for regeneration.
Gender equity	Women have a vital role in environmental management and development and their full participation is therefore essential to advance sustainable development.
Respect for ecological integrity and biodiversity	The abundance of wildlife and extent of habitats should be maintained, improved, and restored where necessary, through sustainable management.
Social equity	Social inclusion should be promoted to ensure an improved quality of life for all.
Respect for cultural heritage and diversity	The quality of landscapes, the heritage of the man-made environment and historic and cultural resources should be maintained and improved.
Equity between countries and regions	Promote fundamental rights, by combating all forms of discrimination and contributing to the reduction of poverty. Promote coherence between local, regional, national, EU and global actions in order to increase their contribution to sustainable development.
Good decision-making	Guarantee citizens' rights of access to information and public participation procedures. Ensure access to review mechanisms. Develop adequate consultation with stakeholders, including citizens' businesses and social partners, and participatory channels for all interested parties.

Source: Our Sustainable Future - A Framework for Sustainable Development in Ireland

Within the document there are twelve key challenges listed, those relevant to the Royal Canal Greenway Phase 3 scheme include:

- Climate change and clean energy
- Sustainable transport
- Public health
- Education, communication and behaviour change (towards sustainability)
- Social inclusion, sustainable communities and spatial planning.

Additionally, there are eight priority actions, again some relate to the Royal Canal Greenway Phase 3 scheme, for example:

- An effective framework for transition into an innovative, low-carbon and resource-efficient society
- Identifying and adopting policies that can help achieve a shift towards greener growth
- Securing health, social wellbeing, and gender equity to enable full participation in society and economic development.

Generally, the provision of active mode infrastructure, especially high-quality cycle infrastructure, is listed as an important method for achieving sustainability. Therefore, the nation commits to prioritising and promoting active mode infrastructure to overcome the challenges listed above, further details on these commitments are above in section 3.2.

2.4 Policy Summary

This section contains the policy summary for the policy and strategy outlined above in section 3.2 as well as section 3.3. Relevant policy and strategy can be at European, National, Regional and Local level, they are all important to consider as they will all be influential on Dublin and its future development.

There are two relevant European policies which are relevant to the Royal Canal Greenway Phase 3 scheme. These are: RISM Directive as well as the EuroVelo 'Guidance on the Route Development Process'. The RISM Directive discusses 'Vision Zero' and aims to halve fatalities on European roads by 2030. Each member state is required to monitor and improve road safety on the network, and although this is only mandatory on major roads it should be applied to as much of the road network as possible. Generally, 'vulnerable road users', such as cyclists and pedestrians, need to be considered in planning, design and operation and where possible be segregated from motorised traffic to ensure their safety. Additionally, the RCG will form part of EuroVelo 2, which is a cycle route connecting many destinations across Europe. Due to this, EuroVelo design principles are important to consider, such principles primarily promote – safety, attractiveness, coherence and directiveness and comfort. This is necessary to make the use of these cycleways feasible and attractive.

There are numerous relevant national policies and strategies which relate to this scheme, these are briefly summarised below.

- **Project Ireland 2040** – National Planning Framework: this framework aims to avoid the 'mistakes' of previously planning, particularly relevant is avoiding and reducing car reliance. There are numerous National Strategic Outcomes which are relevant to RCG Phase 3, such as: enhanced regional accessibility, sustainable mobility, high-quality international connectivity, transition to low-carbon and a climate resilient society, access to quality childcare, education, and health services. Additionally, the framework supports health policies and aims to provided safe and convenient alternatives to the car.

- **Climate Action and Low Car Development & Climate Action Plan 2021**: there is legally binding targets to reduce emissions to net-zero by 2050. In Ireland the reductions are being controlled via budgets which set a maximum level of emissions for each sector of the economy – gradually these budgets get more stringent to ensure sufficient reductions, to achieve the targets, are being generated. Overall, transport emissions need to be reduced by 51% by 2030 and the main way highlighted to ensure this is by creating a modal-shift away from private cars and fossil-fuel burning vehicles. The policies recognised the provision of enhanced active travel infrastructure is required 'on a scale not previously seen' to make active travel 'reliable' and 'realistic' to achieve this modal-shift.

- **National Investment Framework for Transport Investment in Ireland**: this framework is focussed on decarbonising the transport sector, investing significantly in sustainable mobility as well as developing sustainable solutions where feasible. In addition to this, the framework introduces the intervention and modal hierarchies. The intervention hierarchy aims to ensure all other options are considered prior to implementing new infrastructure and the modal hierarchy aims to prioritise investment into active travel, followed by public transport and then finally car.

- **'A New Vision for Sustainable Mobility'**: this states that there is a need for improved active travel options and emphasises there is a difference in providing active travel infrastructure which suits leisure trips and infrastructure which would suit purposeful trips, e.g., commuting and accessing

school. Focus should be given to providing infrastructure which suits purposeful trips most as this is most likely to generate the larger modal-shift and reduced car usage. Additionally, the poor perception of cycle safety is listed as the 'biggest barrier' to use and therefore schemes should focus on segregation.

- **Strategy for the Development of Future National and Regional Greenways**: this strategy discusses linking local and national greenways together or linking them with other travel infrastructure to improve accessibility and attractiveness. Also, the idea that greenways can be useful to attract both domestic and international tourists is noted – this would provide a boost to local businesses and economies.

- **National Physical Activity Plan for Ireland**: this focuses on increasing activity levels across the whole population. A key method to achieve this is getting physical activity to fit into people's daily routine, e.g. walking or cycling to work, rather than being a separate additional activity. The plan to achieve increased physical activity is to develop and promote active travel, ensure planning and development promotes active travel and prioritise development of active travel infrastructure.

Furthermore, there is local policy which is relevant to the scheme. There are two Plan's relevant to Dublin alone as well as a Strategy relevant to the entire Greater Dublin Area. The Dublin City Centre Development Plan 2022-2028 has numerous aims relevant to the Royal Canal Greenway Phase 3 and active travel generally, these include: improving life quality (through improved places, air quality and health), reducing greenhouse gas emissions, reduced reliance on fossil-fuel burning vehicles. In addition to these aims, the Plan acknowledges that sustainable and efficient movement is essential for success in the city and provides policy which supports infrastructure and land-use which is sustainable. The Dublin City Council Climate Change Action Plan 2019-2024 states that in order to achieve broader environmental and air quality goals, transport emissions must be significantly reduced. The Plan commits DCC to providing active travel infrastructure and promoting its use, this will be done by providing segregated active mode infrastructure, bike sharing schemes and implementing and supporting walking and cycling campaigns. Furthermore, the Greater Dublin Area Transport Strategy 2022-2042 aims to make regular essentials accessible within people's neighbourhoods to reduce car trips, make more homes able to access active mode infrastructure as well as connect active mode infrastructure to schools and workplaces (connecting people and places is the best chance of success), allow pedestrians and cyclists into areas that motorised vehicles cannot access to increase safety and convenience, prioritise active mode users in the road user hierarchy and also improve urban street design to boost attractiveness and feelings of safety. Moreover, the plan states the Greater Dublin Area are committed to providing high-quality greenways.

The Our Sustainable Future – A Framework for Sustainable Development in Ireland is discussed to provide sustainability context and show the areas commitments to sustainability. The framework emphasises that it is going to take collaboration and a committed effort from all to achieve sustainability ambitions. There are a number of challenges which relate directly to this scheme, this includes: climate change, sustainable transport, public health, changing public behaviour towards acting more sustainability as well as providing sustainable communities. Overcoming these challenges is essential to ensure the needs of this generation and future generations are not compromised. As well, there are priorities listed in the framework which are relevant to RCG PHASE 3, such as: creating a low-carbon society, transport has a big part to play in this, shifting towards greener growth and making health improvements in the population which can improve livelihoods and boost the economy.

2.5 Drivers for Change

The Royal Canal Greenway Phase 3 scheme will provide high-quality pedestrian and cycle infrastructure along the banks of the canal, between North Strand Road and Phibsborough Road.

The case for change identified in the Royal Canal Greenway Phase 3 is multi-faceted. Several key issues have been identified which support the case for change along the study corridor as follows:

- Transport demand is increasing at a rapid pace in the Greater Dublin Area, and is forecast to continue to grow through to 2040, under the forecasts of Project Ireland 2040. Project Ireland 2040: National Planning Framework forecasts a 25% increase in the population and a 30% increase in jobs in the Dublin areas by 2040.
- There is an increasing number of people travelling by sustainable and active modes. Cycling specifically is experiencing an increasing demand, and there is a need for suitable facilities to safely cater for this demand
- In 2019, more people entered the city centre by bus (30%) than any other mode, and in the same year most people entered the city centre by public transport, walking and cycling (71%). There has been an enormous growth in the popularity of cycling over the last 10 years, and now 6% of people enter the city centre by bicycle, while the corresponding increase on pedestrians is 11%. Since 2010, the total cyclists across the canal cordon have increased by 121% from 5,952 (representing a 2% mode share) to 13,131 (6% mode share) in 2019. The corresponding increase on pedestrians was 64% from 15,092 in 2010 to 24,691 in 2019
- Analysis of Road Safety Authority's online database of road collisions, which indicates that collisions involving cyclists in Dublin increased from 219 in 2010, to 594 in 2016 (the latest year for which statistics are provided). This highlights a need to ensure adequate provision of appropriate cycling infrastructure to sustain the current level of growth in a safe manner
- Bus journey times are unreliable across the day, with particular variability observed in the AM peak. To increase patronage on buses, proposals for the scheme seek to improve their passage along the corridor in a timely manner. This requires both improvements to bus facilities along the corridor, in addition to increasing segregation of buses from cycles and general traffic
- In line with Project Ireland 2040 and the Climate Action Plan (among other documents, national and international commitments), there is an urgent need to decrease the energy-intensity and carbon emissions from transport. Achieving these goals require more people to travel using sustainable modes, such as cycling. Priority should therefore be afforded to cycling along the route, and bus services too. Private vehicle use should be discouraged from the corridor where alternatives exist

The impact of the Royal Canal Greenway Phase 3 on each CAF criterion is listed below:

- Safety – significantly reduce collision injuries
- Physical activity – facilitate the increasing number of people traveling by active modes
- Accessibility – improve accessibility to employment, education and health care for active mode users
- Integration – deliver on policy/strategy objectives
- Traffic reduction – promote walking and cycling to encourage a modal-shift and reduce private car usage
- Journey time savings – more through routes for pedestrians and cyclists to reduce journey times/distances.
- Journey time reliability – more consistent journey times – this could be for active modes and people who need to use the road network as lower congestion
- Noise and air quality – reduced noise pollution and improved air quality in populated areas

- Economic stimulus – investment in construction will bring employment and economic stimulus.

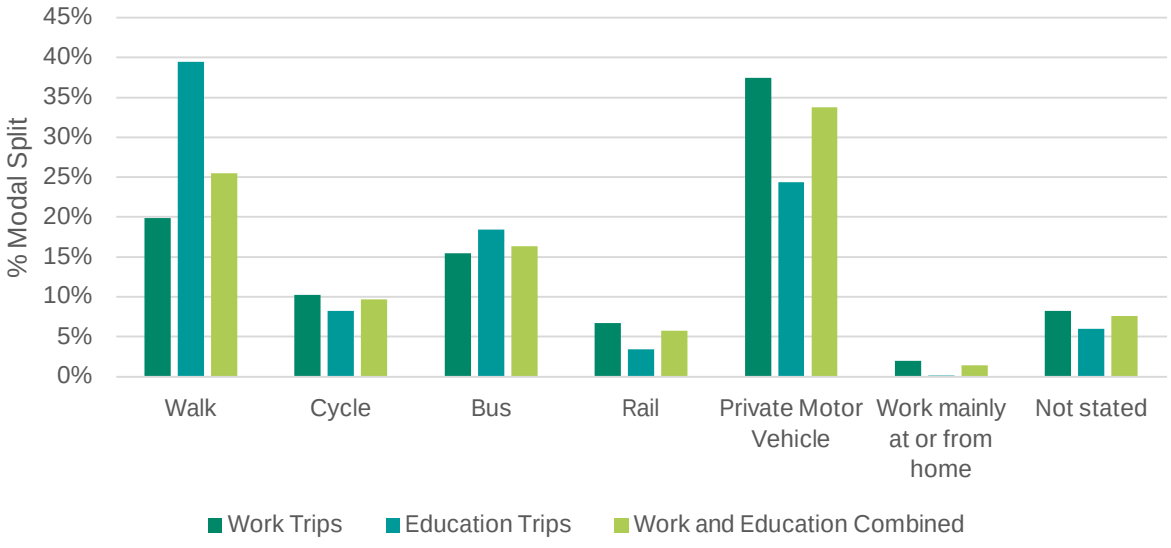
2.6 Problem Identification

Dublin City and the wider area continues to grow, with the realisation of development and the bringing forward of housing and development sites, leading to increasing numbers being reliant on the city for residential and work purposes. Furthermore, the city is a strong attractor for leisure and tourism, further increasing the number of users and contributing to more complex trip patterns. Significant housing development is expected to align with RCG Phase 4; with these users requiring the Phase 3 section to access the city.

It is acknowledged that whilst Covid-19 has impacted demand for travel over the last two years, the indication is for a return to strong growth. Whilst economically advantageous, the impact of growth on the transport network must be addressed and sustainable solutions brought forward. The continuity of the RCG into Phase 3 is a key demonstrator of this, providing high quality infrastructure for active mode users; attracting existing users to a more pleasant route, and providing a safe space, more likely to encourage new users due to the level of segregation offered.

Considering mode share, there remains a reliance on motorised transport for work purposes, and whilst walking is the dominant mode for education trips, use of motor vehicles remains high. The figures below show how walking and cycling are currently used for both work and education trips. There is propensity to achieve mode change through the introduction of new infrastructure and the encouragement of active mode update. Success has been demonstrated elsewhere in the city. Establishing travel behaviour towards active modes at a younger age has strong links to increased use in adulthood. The RCG Phase 3 provides further continuity of an off-road route which will be attractive for both work and education trips, and notably safer due to the levels of segregation provided.

Figure 2.4 – Census Mode Share (2016)

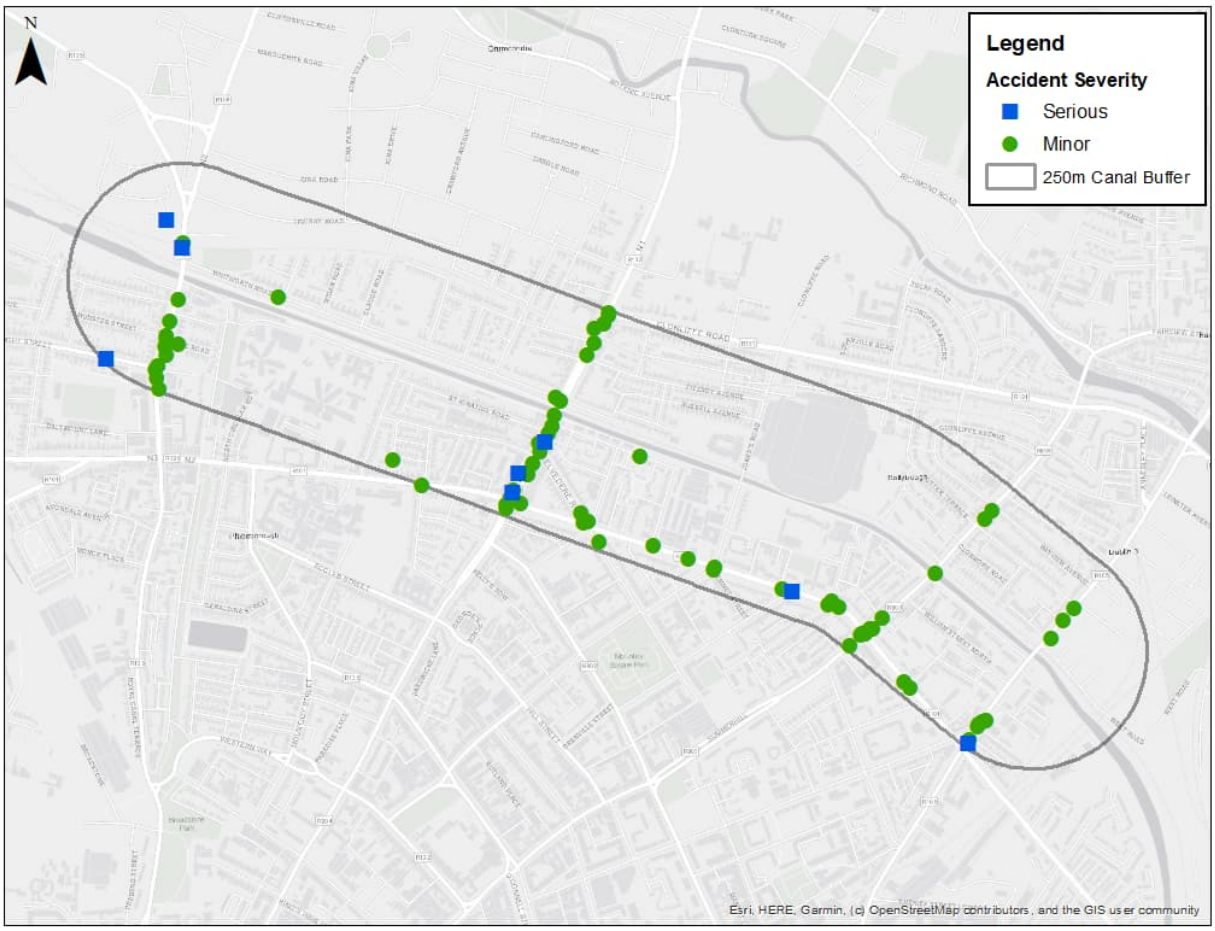


There has been strong growth in the number of cyclists in recent years, however this has also brought an increase in the number of recorded accidents involving cyclists. The Royal Canal Greenway will provide an attractive route for commuter and recreational cyclists as well as an attractive, safe and segregated environment for pedestrians. By nature, this will remove pedestrians and cyclists from potential conflict with other traffic and will provide an overall safety benefit to the area.

RSA collision data has been analysed in order to understand the location of collisions that involve pedestrians and cyclists. This data is shown in Figure 2.5 and Figure 2.6. The analysis shows that these collisions are typically on main routes and at junctions. The Royal Canal Greenway will

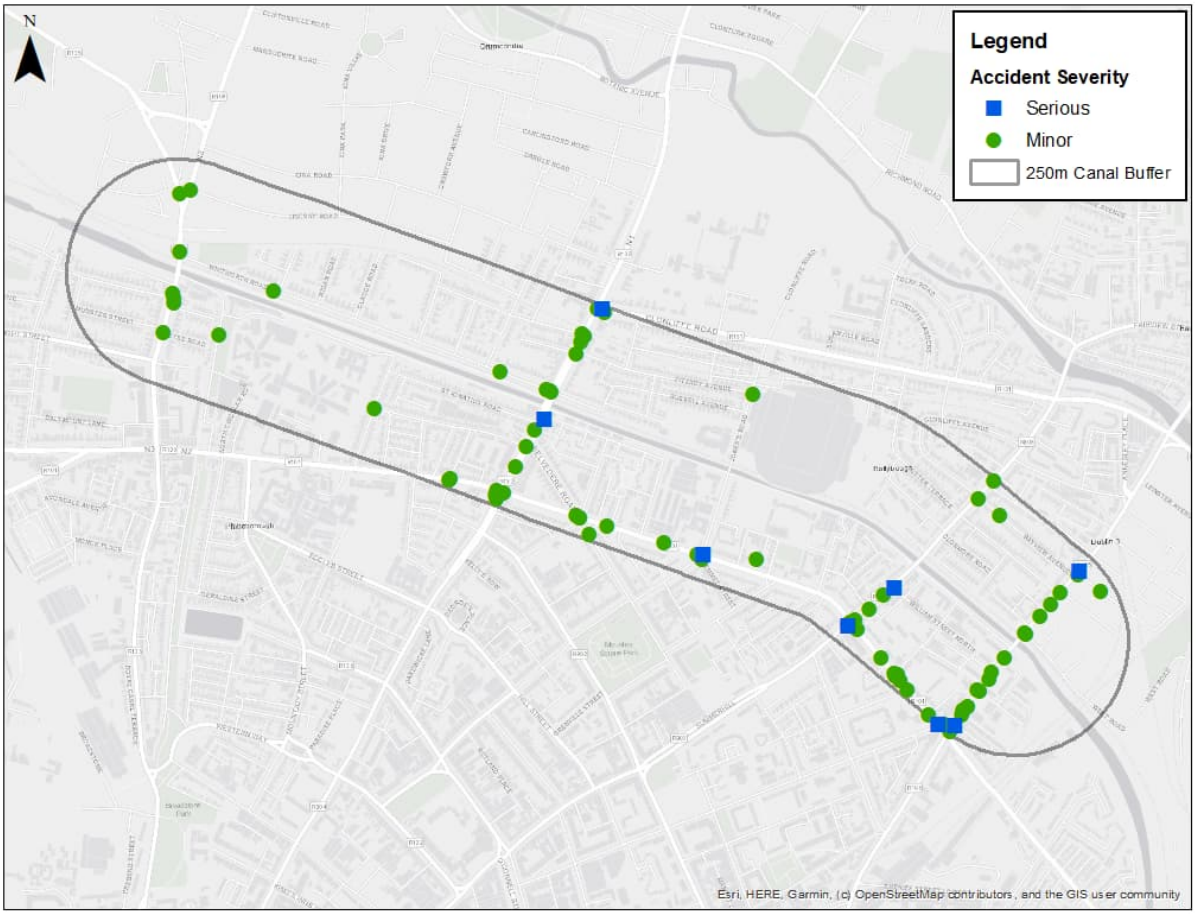
minimise the current risk to active modes by providing an attractive alternative main route for users. The scheme also includes three at grade crossings to further improve safety.

Figure 2.5 – Collisions Involving Pedestrians (2008 – 2016)



Source: RSA

Figure 2.6 – Collisions Involving Cyclists (2008 – 2016)



Source: RSA

2.7 Long Term Impact of COVID-19

Government restrictions to control the spread of COVID-19 have suppressed travel demand by requiring employees to work from home where possible, reducing public transport capacity, introducing remote learning, and restricting travel to local areas for non-essential trips. This has significantly reduced the number of people travelling into the city centre or across the urban region, but it is important to acknowledge that these are likely temporary impacts which have already started to shift again as the pandemic restrictions are eased.

In the long-term, as mentioned above, it is likely that travel demand will return to similar trends observed prior to the pandemic because demand has been artificially suppressed by Government restrictions and public health issues. COVID-19 also does not alter the requirement to encourage and enable modal shift from the private car and the need to address carbon emissions

However, it is important to acknowledge the pandemic has created some more permanent changes to travel behaviour, such as accelerate acceptance of home working, teleconferencing for services and home delivery of retail goods. All these could cause fluctuation in both trip volumes and what is considered the peak time. Whilst these changes may affect the demand profile across different times of day and areas across the city, it is unlikely that they will substantially reduce overall demand for sustainable transport, particularly as the Irish economy is expected to return to growth quickly after the complete easing of restrictions. For this reason, investment into the RCG Phase 3 is justified to improve conditions for existing pedestrians and cyclists and to increase the appeal of walking and cycling to attract a modal-shift away from the private car in order to achieve sustainability policy goals in the years following the pandemic.

3. Objectives

3.1 Objective Setting Process

All schemes should have a clear statement of objectives, which describes what the sponsoring agency hopes to achieve from the proposed intervention. When setting objectives for schemes, the Public Spending Code requires that objectives are SMART. This means objectives need to be 'specific', 'measurable', 'attributable', 'realistic' and 'time-bound'.

In defining objectives for the Royal Canal Greenway Phase 3 and ensuring they are SMART, a four-stage process was used as summarised in the graphic below.

In light of an issue or opportunity, objectives describe the outcome that the sponsoring agency aims to achieve through the intervention. Sub-objectives represent more specific design or planning objectives necessary to achieve the high-level objective, while indicators present metrics that could be used to assess the performance of option(s). Indicators are split into ex-ante objectives, which will be used during the appraisal stages to assess the likely impacts of the scheme; and ex-post indicators, which will be used during the evaluation stage to measure the success of the intervention.

3.2 Scheme Objectives

The scheme objectives are set out in Table 3.1 below.

Table 3.1 – Scheme Objectives

Objective	Sub-Objective	Indicator	Issue / Opportunity (CAF)
To increase the contribution to the local economy from tourism	To provide a recognised route for tourists in order to promote active travel amongst visitors	Ex-post Number of tourists using active modes Number of visitors using Royal Canal Greenway	Tourism (Economy)
To improve safety and security for vulnerable users	To provide fully segregated or signalised crossing facilities for crossing over key roads To instil personal safety in users along the route	Ex-ante Number of road crossing points on the route Length of fully segregated cycle facilities Ex-post Number of new pedestrians and cyclists Reduction in / low collision rate for cyclists along corridor	Safety
To enhance connectivity along the Royal Canal and to onward destinations, including key housing sites	To integrate the route with the wider local infrastructure	Ex-post Demonstration of improved connectivity through scheme outputs	Integration
To establish mode shift away from private car use	To reduce transport related carbon emissions and contribute to achieving climate objectives	Ex-ante Number of private cars in the vicinity Level of emissions in the vicinity Ex-post Reduction in car use within the urban area Reduction in transport related carbon emissions	Climate (Environment)
To provide an attractive east-west route to facilitate all trip purposes	To provide connectivity to key locations in order to provide real choice in mode	Ex-post Use of the Royal Canal Greenway amongst all trip purposes Demonstration of connectivity to key locations through scheme outputs	Accessibility and Social Inclusion
To increase participation in leisure / physical activity along the corridor among users of all ages and abilities	To provide a high-quality segregated route	Ex-ante and Ex-post Amount of physical activity undertaken amongst the population (walking or cycling)	Physical Activity

4. Alternatives and Options to Address the Problem

4.1 Alternatives

As part of the business case, it is important to demonstrate that alternatives to the preferred option have been considered in the context of other modes, or interventions, that would also result in the objectives being achieved.

The evidence documented within the business case identifies the increasing population and attractiveness of the city, which notably impacts on transport demand. As with many localities, spatial constraints and a policy agenda which is moving away from road building in urban areas, necessitates that active travel and public transport modes are proposed as transport solutions, with additional highway capacity no longer being a favourable solution. Furthermore, highway solutions would not achieve the objectives in relation to modal shift away from the private car and increasing opportunities for physical activity.

Whilst public transport solutions could be a consideration, there are still limitations in terms of the geographic coverage, where the objectives particularly look to the provision of east-west connectivity and increasing opportunities for physical activity. It is considered that public transport alternatives would not provide the flexibility to users afforded by an active mode solution. Numerous public transport schemes such as BusConnects Dublin and DART+ will be complementary to the proposed RCG scheme.

Considering the scope of an active mode solution, the Canal towpath provides an ideal opportunity for segregation and the associated safety benefit this brings. Reallocation of road space from motorised vehicles for active modes, becomes less favourable in terms of public acceptability and the potential for increased congestion, again demonstrating that the use of the Canal towpath corridor is favourable. The provision of active modes along the route of the Royal Canal is advantageous in terms of journey quality and attractiveness for tourists, encouraging further investment from the tourism economy. Given the quality of active mode provision as part of the RCG Phase 3 delivery, this offers the best option for vulnerable users, and differing ages and abilities.

The RCG Phase 3 is considered to the retain the flexibility for users in terms of their travel times and origin destination movements, as opposed to interventions such as demand management techniques. As a method of control and behaviour change, demand management would likely need to be proposed across a wider geographic area, which is beyond the scope of the RCG Phase 3.

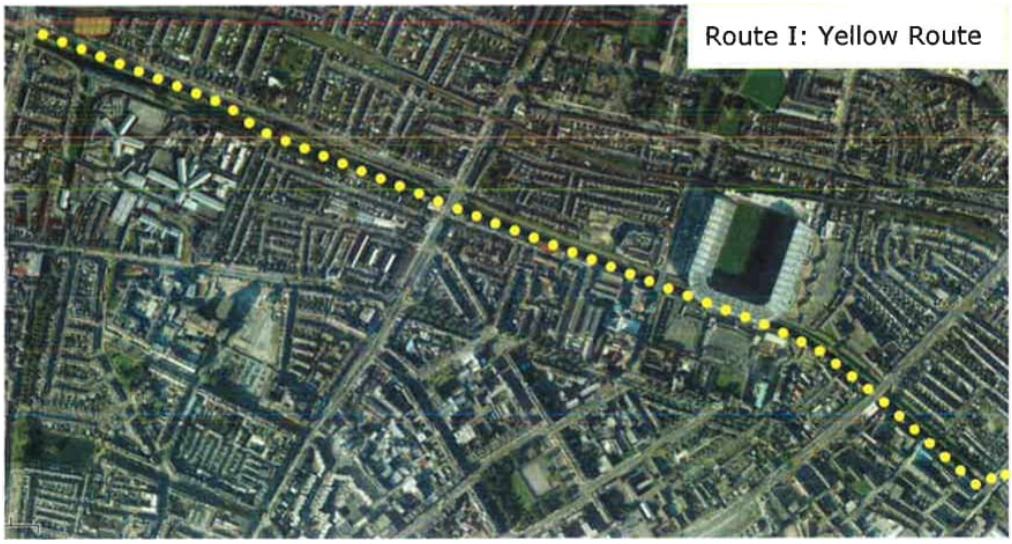
The Royal Canal offers an opportunity as a transport route. The construction of Phase 2 of the RCG has demonstrated how successful this type of intervention can be, and locationally, there is an opportunity to deliver further routing along the canal as part of Phase 3.

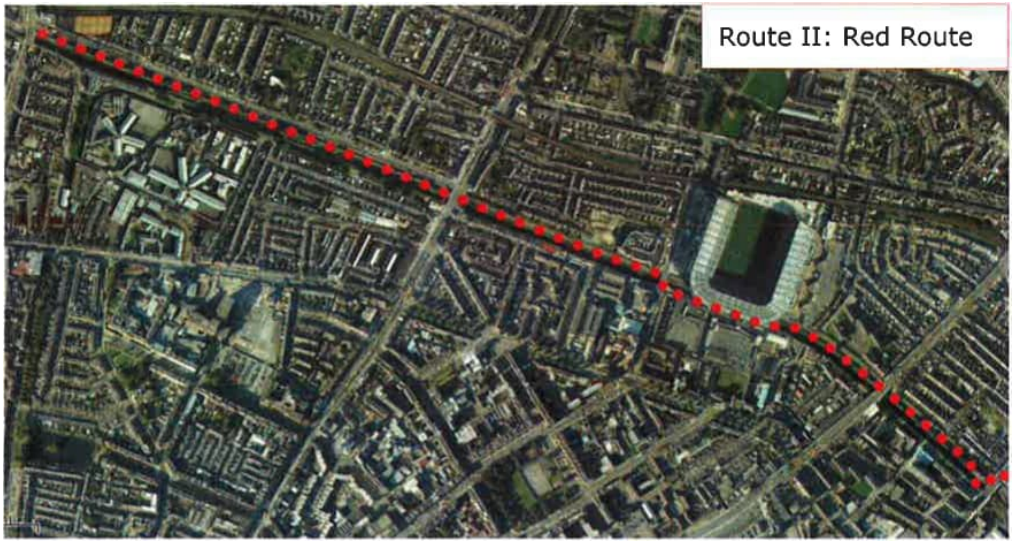
4.2 Options

The canal towpath provides an ideal opportunity to integrate active modes along the route. Whilst provision of cycling and walking infrastructure can be provided throughout the city through the use of existing road space, the ability to utilise the canal space makes for an attractive and safer route due to the level of segregation available.

Consultants were appointed by DCC to bring forward Preliminary Design proposals for the development of a Royal Canal Premium Cycle Route. The DCC brief to the consultants was to bring forward a number of design options for the provision of the cycle route. These options were to consider providing the cycle route on either of the canal banks or on a combination of both banks with suitable crossing points between the individual banks. The draft Preliminary Report for the Royal Canal Premium Cycle Route was issued on the 22nd March 2013.

In accordance with the design brief the consultants prepared three separate route options, as shown in Figure 4.1. The three route options are detailed in Table 4.1 and show provision on both the north and south side of the canal. Table 4.2 provides detail on the start and end point of each zone.





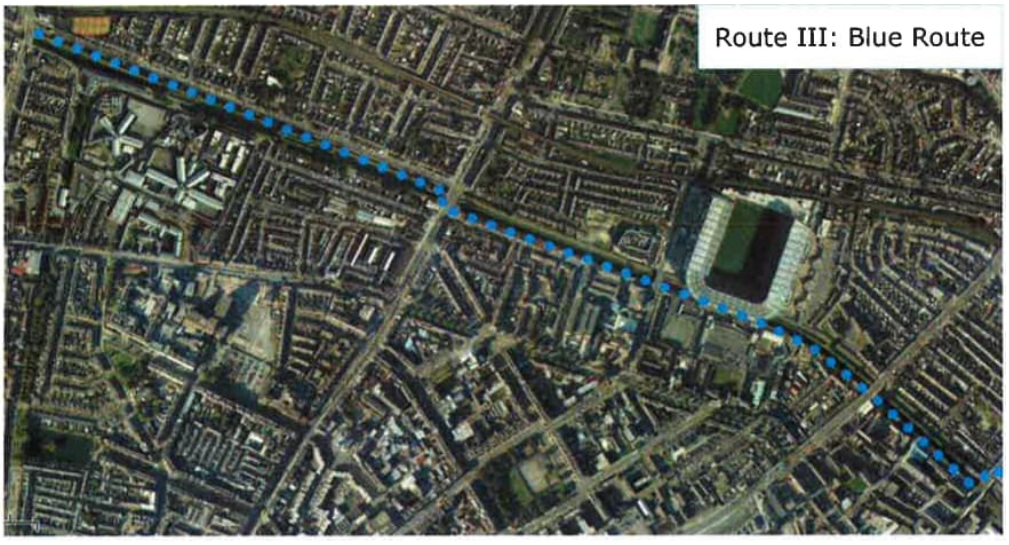


Figure 4.1 – Preliminary Design Options (O'Connor Sutton Cronin & Associates, 2013)

Table 4.1 – General Route Alignment Description - Royal Canal Cycle Route: North Strand to Phibsborough

Route No.	Zone & Location of Route N/S of Canal			
	I	II	III	IV
I (Yellow)	S	S	S	S/N
II (Red)	S/N	N/S	N	N
III (Blue)	S	S	S	N

Table 4.2 – Zone Start and End Points

Zone	Start Point	End Point
I	North Strand Road	Ballybough
II	Ballybough	Russell Street
III	Russell Street	Drumcondra
IV	Drumcondra	Phibsborough

Each of the three routes were analysed in terms of a multicriteria analysis as a decision-making tool, with consideration given to the following heading based on evidence gathered within the reporting:

- Level of Service
- Suitability by Cyclist Type (Commuter, Tourist, Family)
- Buildability
- Ecology Impact
- Heritage Impact
- Archaeology Impact
- Utilities
- Land Acquisition
- Canal Navigation
- Cost

Based on a multi-criteria route assessment, the yellow route was selected as the emerging preferred route. Further detail has then been provided regarding structures (existing and proposed), network impact and integration. In addition to outlining option development the report also sets out stakeholder consultation that was undertaken to support the option development and provides a narrative regarding stakeholder responses.

Following the preliminary design and option development process, further refinement has been undertaken to the determine the design of the route, and the level of detail required for business case development.

5. Demand Analysis

Demand analysis was carried out to forecast the likely usage of the RCG Phase 3 scheme by pedestrians and cyclists. Available data on cyclists and pedestrians was collated. The data was sourced from previous route assessments and cyclist and pedestrian user demand data, such as site surveys, the canal cordon count and permanent counters. Further details are presented in the following section.

5.1 Cycle Demand

5.1.1 Forecast of new potential cyclists

An estimate of the additional cycle demand that will be generated as a result of the RCG Phase 3 scheme is presented in this section. The analysis of the new cyclists' data was based on an analysis of previous schemes, studies and development plans as shown in Table 5.1.

Table 5.1 – Percentage increase of number of new cyclists

Recourse	Increase in new cyclists
Dublin City Council Development Plan 2022-2028	117% increase in cyclists based on current and targeted cycle mode shares
DCC counter – Charleville Mall	81% increase in cyclists due to the RCG Phase 2 in July 2020
DCC counter – Guild Street	22% increase in cyclists due to the RCG Phase 2 in July 2020
DLR COVID-19 Mobility review	32% increase in cyclists due to the cycle development on the Blackrock Main Street

Based on the above analysis, the central scenario for the number of new cyclists as a result of the RCG Phase 3 was set at 81%, while the low and high scenarios were set at 27% and 100% respectively. To reflect the likely heightened initial response to the scheme the growth in new cyclists will start increasing on the first year of the scheme operation, reaching its peak value on the second and third year after the scheme opening before declining and stabilising five years after the scheme opening year.

5.1.2 Forecast of total cyclist demand

The total cycle demand represents a combination of existing background growth in cyclists related to population growth and the growth in new cyclists as a direct result of the RCG Phase 3 scheme. The cycle demand regarding the new users was defined on the previous section. The demand projection of the existing cyclists, not related to the new cycle scheme, was based on historical trends of growth on the corridor as presented in section 1.4.2.1.

The existing cyclists' growth factor was set at 4% per annum and after the opening of the RCG Phase 3. Figure 5.1 presents the trendline of the existing cycle demand without the RCG Phase 3 scheme in place and the three additional trendlines allowing for the growth in new cyclists.

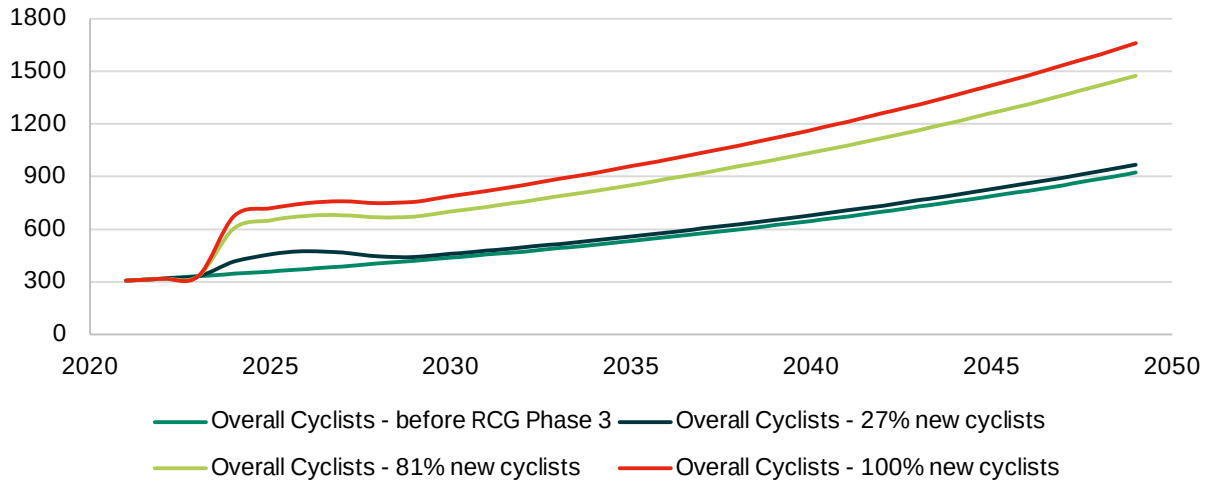


Figure 5.1 – Annual average daily cycle demand for the three growth scenarios

5.2 Pedestrian Demand

5.2.1 Forecast of new potential pedestrians

The forecast of the new pedestrians walking along the proposed scheme followed a similar process as outlined in the cycle forecast in section 5.1.1. The analysis used the recent trends in cycling growth of the Charleville Mall DCC counter and the mode share for cycling and walking in order to calculate the current number of pedestrians. The data on new pedestrians was based in previous schemes, studies and development plans as shown in Table 5.2

Table 5.2 – Percentage increase of number of pedestrians

Recourse	Increase in pedestrians
Dublin City Council Development Plan 2022-2028	18% increase in pedestrians based on current and targeted mode shares
DLR COVID-19 Mobility review	32% increase in pedestrians due to the development on the Blackrock Main Street

The central scenario for the number of new pedestrians was set at 18%, while the low and high scenarios were set at 15% and 25% respectively. The walking demand won't present a significant increase compared to cycling, since pedestrian route choice is not affected to the same extent as cyclists by improved surfacing and the infrastructure.

5.2.2 Forecast of total pedestrian demand

The total demand represents a combination of existing and new pedestrians. The new pedestrians' demand was presented in detail on the previous section. The demand projection of the existing pedestrians not related to the RCG Phase 3 was based on historical trends of growth on the corridor as presented in section 1.4.2.1. Figure 5.2 presents the trendline of the existing pedestrian demand without the RCG Phase 3 scheme in place and the three additional trendlines allowing for the growth in new pedestrians.

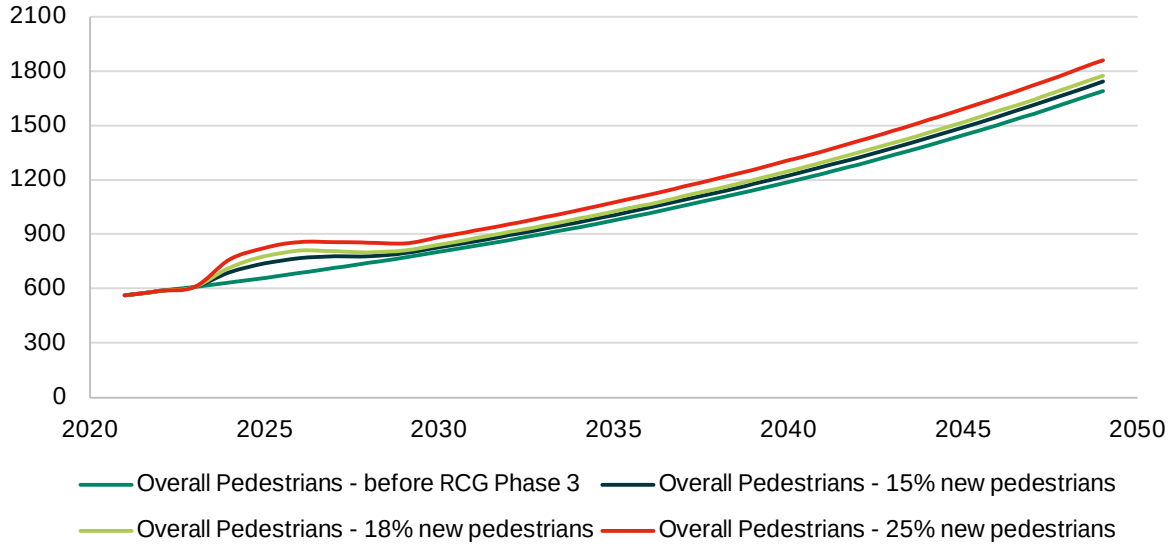


Figure 5.2 – Annual average daily pedestrian demand for the three growth scenarios

6. Costs

6.1 Introduction

ChandlerKBS were commissioned to prepare a Total Scheme Cost Estimate for delivery of the Royal Canal Phase 3 (RCP3) scheme in 2022. This followed a pause in the progression of the scheme in 2021, after an initial tendering process was undertaken. Indicative tender costs in May 2021 were valued between €10 million and €14 million. Due to delays in contract award and additions to the scheme scope, Dublin City Council (DCC) decided to re-tender the scheme. This tendering exercise was undertaken in Spring 2022

The Total Scheme Cost Estimate consists of costs incurred to date (provided by Dublin City Council) and forecast costs to complete, including operational and capital costs (with main contracting costs from the preferred contractor). Adjustments have been made to future scheme costs to account for risk and contingency.

6.2 Capital Costs

6.2.1 Main Contract Costs

The Main Contract costs are based on those tendered by a preferred bidder in the Q2 2022 tender process. The tender competition includes provision for traffic management under the contract sum. The total sum of the main contract is €16,935,041 excluding VAT. The costs below and in the subsequent appraisal have been updated in July 2022 to reflect these tendered costs.

6.2.2 Preparation and Administration

Pre-Construction Phase

The Pre-Construction Phase Preparation and Administration Costs indicates that €1,189,749 has been spent to date. A breakdown has been provided in Table 6.1 below:

Table 6.1 – Pre-Construction Phase Costs

	Costs (Including VAT)
DCC Costs	€272,335
All Other Costs (Including Design)	€917,415
Total:	**€1,189,749**

Construction & Implementation Phase and Close Out & Review Phase

DCC has indicated that Site Staff Costs are €2,042,796 which allow for all future costs. ChandlerKBS noted that no separate allowances were made for either the Close Out & Review Phase or for DCC staff. In consideration of this, they have made the following assumptions:

- €200,000 of the €2,042,796 relates to consultant costs for the Close Out & Review Phase
- €300,000 provision for DCC costs for the Construction & Implementation Phase and €50,000 provision for the Close Out & Review Phase.

ChandlerKBS also noted that the €2,042,796 did not make provision for adding additional scope to the scheme or the re-tender costs. A further €100,000 was therefore included to cover these costs.

Table 6.2 – Future Preparation & Supervision Costs

	Cost
OCSC Site Staff	€1,842,796
DCC Site Staff	€300,000.00
OCSC/DCC Retender/Additional Scope	€100,000.00
OCSC – Close Out and Review	€200,000.00
DCC – Close Out and Review	€50,000.00
Total:	**€2,492,796**

6.2.3 Land and Property Costs

No land and property costs will be incurred to deliver RCP Phase 3.

6.3 Risk and Contingency

6.3.1 Risk

The risk register produced during a risk workshop that was conducted on 27th January 2022 was subjected to a Quantitative Risk Assessment (QRA) by carrying out a Monte-Carlo simulation using @Risk software. The risk register and associated QRA value has been updated on 8th July 2022 to reflect the project stage. At this stage, the main update to the risk register has been the addition of a risk item associated with inflation; whilst the main contract costs are known, current market conditions give rise to the possibility of emergency relief or ex-gratia payments.

ChandlerKBS assumed a 50th percentile confidence level to calculate risk at this stage in the process. From the Quantitative Risk Assessment, it generated a value of €4,926,081 which was included in the Total Scheme Cost Estimate.

6.3.2 Contingency

O'Connor Sutton Cronin (OCSC), as scheme designers, completed the contingency assessment involved in the Contingency Calculator, which produced a contingency percentage of 10.7%. The contingency value has been retained following the Spring 2022 tendering exercise, which results in the total contingency value adding an additional €2,078,778.

6.4 Inflation

In 2021 price escalation was at unprecedented levels for various reasons. It has been widely reported that during 2021, Tender Prices increased by more than 10% and while prices have stabilised in the later part of 2021 and early part of 2022, it still appears that Tender Prices will continue to increase by at least 5% this year.

ChandlerKBS applied 5% inflation to construction and supervision costs prior to the Spring 2022 tender exercise. In this latest iteration of the business case inflation has been removed as a cost item, given that risk allowances will have been made by the preferred tenderer to cover associated cost increases. It is considered that this risk is now largely passed to the Contractor.

6.5 Maintenance Costs

Dublin City Council will be required to meet the ongoing cost of operating and maintaining the greenway. Annual O&M costs primarily relate to general maintenance of pavements, kerbings, footways, traffic signs, road markings, road lighting, landscaping and ecology. These costs were

estimated at approximately €13,073 per annum, based on O&M costs for similar schemes. These costs will likely increase in line with the general rate of inflation.

6.6 Summary

The Total Scheme Cost Estimate, including VAT amounts to €30,854,331. A detailed breakdown is included in the table below.

Table 6.3 – Total Scheme Cost Estimate

	Cost
Enabling Works Costs	€0.00
Main Contract(s) Costs	€16,935,041
Preparation and Administration	€3,682,544
Land & Property	€0.00
Inflation	€0.00
Risk	€4,926,081
Contingency	€2,078,778
Total (Excluding VAT):	**€27,622,445**
VAT	€3,231,887
Total (Including VAT):	**€30,854,331**

7. Scheme Impacts

This chapter focuses on the benefits that the scheme will provide, outlining the benefits to the city and specifically for cyclists, pedestrians, businesses, visitors, the environment and other road users.

7.1 Impact on Users

Safety, health, socio-economic and journey time benefits were identified and quantified using data and findings gained from the previous demand forecasting stages. These factors were applied to a bespoke spreadsheet model with parameters based on DoT CAF and TII PAG (Unit 13: Walking and Cycling Facilities). The following benefits are included in the appraisal:

- Safety improvements due to the separation of cyclists from the pedestrians and general traffic lanes
- Health benefits due to the increasing number of users along the corridor, leading to the reductions of the overall health- related risks. In addition, the reduction in congestion will reduce users' exposure to harmful greenhouse gases and particulates
- Socio-Economic benefits presented as improved journey quality, ambience and recreation, decreasing absenteeism due to improved active mode trip quality as a result of the proposed infrastructure
- Travel time reductions due to improvements in the level of service of the facility type
- Mode shift benefits from people shifting to cycling due to the active mode facility

In terms of appraising the impacts, all general parameters such as values of time, value of time growth rates, discount rates, shadow pricing factors etc, were applied from TII PAG (Unit 6.11 – National Parameters Value Sheet) and the DoT CAF.

Collision reduction

The proposed infrastructure aims to reduce the risk of minor/serious injuries or fatalities due to collisions, by eliminating the interaction between cyclists, pedestrians and general traffic. The collision reduction benefit is estimated from the number of incidents related to insurance, damage to property, Garda costs, and the number of casualties (including severity of injury). Combining these estimates with values for the prevention of casualties and incidents, yields a monetary estimate of the incident-related costs or benefits of proposed transport interventions.

The development of RCG Phase 3 will enhance safety for the existing users and attract new ones. The number of historic collisions along the North Circular Road were also considered in the collision analysis, since the proposed scheme will provide a safer alternative for the cyclists. The collisions on the perpendicular roads were not considered in this specific analysis, since people on these routes are unlikely to be significantly affected by the scheme. Figure 7.1 presents the collisions included in the collision benefit analysis. The benefit related to the reduction of collision risk was assessed for both the new and the existing users.

Figure 7.1 – RSA Cycle collisions considered in the collision benefit analysis

Health

Physical activity has a significant impact on health benefits, thus regular cycling or walking could help to reduce the risk of various illnesses, such as diabetes, cardiovascular diseases, and depression. Daily cycling was found to reduce the risk of premature death by 41% (Netherlands Institute for Transport Policy Analysis, 2018). Conversely, physical inactivity contributes to numerous chronic diseases and high obesity levels. The significant contribution of walking and cycling to health improvements could attract new users to shift to active modes. This benefit is attributable to new cyclists only.

Socio-Economic

Journey Quality

Journey quality (or ambience) is a measure of the real and perceived physical and social environment experienced while travelling. The benefits are as a result of the users' perception of reduced danger (a reduced fear of potential collisions/incidents) and improved quality of journey.

The proposed scheme aims to improve the current infrastructure and the quality of the walking and cycling, making it more appealing in attracting new users. A significant intervention for enhancing the travel experience and ambience for the user would be achieved through the separation of cyclists and pedestrians' movements along the corridor, making cycling a more attractive travel option.

However, each user will experience danger and environmental quality in a different level, making the ambience benefit challenging to measure. It is considered that the benefits would be significant, especially for cyclists because surveys suggest that existing and potential cyclist users attach great importance to the perceived safety and quality benefits of improved facilities (in particular facilities segregated from motorised traffic).

Assessing the journey quality benefit is challenging, as different users will have different sensitivities to danger and environmental quality. However, the benefit is potentially large, especially for cyclists, because surveys suggest that existing and potential cyclist users attach great importance to the perceived safety and quality benefits of improved facilities.

Work Absenteeism

As explained in the health benefit section, introducing cycling and walking to the everyday behaviour of people will result into improving users' health, thus reducing the short-term absence from work. (Transport Infrastructure Ireland, 2016). The number of working people affected by the proposed scheme is calculated from the number of new users who are expected to use the facility, so the absenteeism is only attributable to new commuting users.

Recreation

Similarly, to journey quality, the recreation benefit is a result of the cyclists' perception on a high-quality active travel infrastructure. The proposed scheme aims to provide a high-quality infrastructure for pedestrians and cyclists in order to attract more users and therefore enhance the active travel.

Not all users' have the same perception on a provided active travel infrastructure in regards of its quality. However, research has shown that the majority of existing and new active travel users consider the perceived quality benefits as an important factor for improved facilities.

Journey time savings

Journey time savings are highly dependent on the type of infrastructure provided and the speed of the users. The average cyclists' speed varies based on the type of cycle facility too. The current infrastructure provides a shared route for pedestrians and cyclists, delaying the users' time to cross the study area. The proposed scheme aims to separate their movements; therefore, eliminating the interaction between cyclists and pedestrians and reducing the journey time for all the users.

Mode shift

Mode shift benefits are referring to benefits for individuals and society from the reduction in car use. The five benefits analysed under the mode shift are the following.

- Vehicle operating & ownership costs
- Carbon
- Air quality
- Noise
- Congestion

The above benefits measure the reduction on the cost for users to own and operate a car and the traffic levels, due to people shifting to active modes. The reduction on different types of emissions and noise are also considered in the benefit. The proposed scheme aims to attract more cyclists and pedestrians, moving people into active modes for their daily commute, thus enhancing the reduction of the above benefits.

7.2 Impact on demand for walking and cycling

As set out in Chapter 6 the proposed scheme will lead to:

- **An increase in cycle patronage** – representing an additional 330 cyclists per day by 2030, equivalent to an 81% increase in cyclist numbers in the central scenario
- **An increase in pedestrian patronage** - the proposed scheme will result in an 18% uplift in pedestrians along the corridor in the central scenario

- **Cycle journey time savings** - due to improvements in the level of service provided by the improved cycle facilities and separation from the pedestrians. This will result in an average time saving of approximately 1.5 minutes for cyclists travelling along the route
- **A modal shift towards sustainable travel, which will reduce reliance on private car** - by 2040 the scheme will encourage ~500 new cyclists, which in the absence of the scheme would potentially represent ~400 cars or the need for 5-6 additional buses

8. Financial Appraisal

8.1 Introduction

The financial appraisal considers only the financial costs and benefits of a scheme to an organisation, whereas economic costs and benefits are considered in the economic appraisal. While these broader objectives are important in determining a scheme's value for money, the financial appraisal is necessary for determining whether the scheme is affordable for Dublin City Council.

In line with the Public Spending Code, a number of financial metrics are presented in this section. These focus on affordability and financial impact of the Royal Canal Greenway. These metrics include:

- General Financial Analysis – identifying the financial impact to the Sponsoring Agency
- Exchequer Cash Flow Analysis – identifying the financial impact to the Government / Exchequer
- Sources of Funding Analysis – identifying the nominal costs and sources of funding for a scheme.

It is important to note that as this scheme will earn no revenue, many of these metrics will be negative.

8.2 Assumptions

Table 8.1 shows the core assumptions that underpin the financial and economic appraisals. Additional assumptions are outlined where applicable.

Table 8.1 – Financial and economic appraisal assumptions

Assumption	Description	Value
Appraisal Period	The period over which financial and economic appraisal is carried out.	30 years + 10-year residual
Base Year	The year in which values for costs and benefits are expressed.	2022
Inflation	Annual change in the Consumer Price Index (CPI)	2021: 5.5% 2022: 4.6% 2023: 2.5%
Financial Discount Rate	Rate to account for the time value of money, as per the Public Spending Code. This differs from the Economic Discount Rate and is set by the National Development Finance Agency each quarter.	1.75%
Shadow Price of Labour	Applied to labour spending to account for the additional benefit to the exchequer as a result of reduced unemployment. Given that Dublin is close to full employment, this has been set at 1 (i.e. no additional benefit from labour expenditure).	100%
Shadow Cost of Public Funds	Applied to all costs to account for the distortionary effects of taxation.	130%
Tender Date	The year in which the tender for construction works was awarded	2022

Assumption	Description	Value
Construction Period	The estimated length of the construction period.	24 months
Average effective income tax rate	The average effective rate of income tax on gross income, as estimated by the Revenue Commissioners' annual income tax returns. Applied to the labour component of spending to estimate the income tax generated as a result of the scheme.	15.5%

The financial appraisal is based on cashflow outputs, as described in the costs in Section 7. A discounted cash flow shows outflows over and above those set out in the do minimum investment counterfactual. An assessment of affordability or sources of funding for the investment is included.

8.3 Key Financial Metrics

8.3.1 General Financial Analysis

A General Financial Analysis is mandatory for all business cases. The purpose of General Financial Analysis is to estimate the present value of cash flows over the course of the construction and operational phases (i.e. in real terms) for the Sponsoring Agency, and to return a 'Financial Net Present Value' (FNPV). FNPV is a measurement of net financial flows calculated by subtracting the present values of financial outflows from the present values of financial inflows over the appraisal period. As the Royal Canal Greenway Scheme - Phase 3 is not revenue-generating scheme, the FNPV is effectively the net present financial cost of the final option.

Both financial outflows are presented in present values, which were calculated by adjusting future costs or benefits by a discount rate. Discount rates are intended to reflect the time value of money, meaning that people are generally more responsive to costs/benefits the closer in time they occur. The National Development Finance Agency (NDFA) discount rate of 1.75% was used for the financial appraisal, as per the supplementary Department of Public Expenditure Reform's guidance on the Public Spending Code. Present values also exclude inflation over the appraisal period, meaning that the FNPV is expressed in base 2022 values.

Table 8.2 presents the results of the general financial analysis, showing both the financial and economic Present Value of Costs (PVC). Overall, this shows the FNPV / financial PVC to be -€30million over the scheme lifecycle, including both capital and current costs.

Table 8.2 – General Financial Analysis

	Financial	Economic
Present Value of Costs	-€29,630,779	-€21,431,412

It should be noted that this differs from the PVC used in the economic appraisal. To convert the financial PVC to economic PVC:

- VAT and other transfer payments are removed, as these payments are not a net economic cost and ultimately return to the Government.
- All costs are converted to 2011 prices using the Consumer Price Index (CPI), and only excess inflation is included. Excess inflation refers to inflation that occurs at a faster rate than the general CPI.

- Costs are adjusted using shadow prices. In public appraisal, two main types of shadow prices are specified: the Shadow Price of Labour (SPL) and Shadow Price of Public Funds (SPPF). The SPL accounts for any unemployment displaced by construction of the scheme but is generally only applied in areas/sectors where unemployment is high. As the scheme is in Dublin, this is not applied. The SPPF accounts for the economic cost of raising funds through taxation and is applied to the publicly-funded proportion of any public expenditure. As the scheme is fully funded by the Exchequer, the full shadow price (130%) is applied to the economic PVC.
- Future costs are then discounted to a 2011 base year, using the economic discount rate of 4% as specified in the PSC.

8.3.2 Exchequer Cashflow Analysis

The exchequer cash flow analysis is specified in the Public Spending Code for the appraisal of publicly-funded schemes. It identifies and quantifies the financial flows that impact the Exchequer as a result of a proposed scheme.

As the RCP Phase 3 is publicly funded, the main exchequer outflow will ultimately be the cost of developing and maintaining the route. The FNPV from the previous section – which represents the sum of discounted cash flows – has been classed as a net exchequer outflow in this analysis.

Table 8.3 – Results of the Exchequer Cash Flow Analysis

	NDFA Discount Rate (1.75%)
Net Exchequer Cash Flow	-€26,153,897

8.4 Affordability and Funding

The purpose of 'Sources of Funding' or 'Affordability' Analysis is to identify the sources of funding for a scheme and to quantify how much funding is required. This analysis takes into account both capital and current costs over the appraisal period. It is assumed that NTA will fund the capital cost of this scheme, while DCC will the ongoing operation and maintenance costs.

9. Economic Appraisal

9.1 Introduction

The key purpose of appraisal is to ensure public funds are allocated in an economically advantageous manner for the State and its residents, by establishing the merits of a proposal using a consistent and comprehensive framework – the CAF.

The economic appraisal of the RCG Phase 3 scheme is explained in detail in this section, forming a key element of the business case. The scheme is considered a continuation of the RCG Phase 2 scheme opened in 2020 and has already been assessed as having a positive economic impact.

Economic appraisal is a decision-making analysis for a scheme, and it considers a wide range of costs and benefits, provided in monetary terms or where a monetary equivalent can be estimated. In the transport sector, economic appraisal is expressed in the form of a CBA and serves several functions at the individual scheme level and for comparing across a variety of schemes and State-wide locations:

- On a scheme level, the CBA defines the economic viability of the scheme and can provide a comparison of alternative options, as well as to taking account of sensitivity testing
- At a national level, the economic appraisal compares and identifies the schemes that would provide positive return on investment.

In general terms, where a scheme has a Benefit to Cost Ratio (BCR) of over 1, the scheme provides a positive return to the economy. The net present value (NPV) and BCR are key indicators of worth but do not provide information on benefits and costs that are not monetizable, e.g. wider economic benefits (WEB). Therefore, although an important input, the economic analysis should not be used as the sole basis for decision making. This is particularly true for this scheme: while CBA tries to measure the incremental benefits of a proposal, this section will ultimately form part of a wider Royal Canal and Dublin-Galway Greenway, and many of the benefit will only be realised on completion of the route as a whole.

A summary of the appraisal undertaken for the RCG Phase 3 is presented on the below sections. The appraisal has been undertaken in compliance with CAF.

9.2 Appraisal Framework and Assumptions

The assumptions that support this assessment are based on are the following:

- The appraisal period for cyclists and pedestrians is 30-years (plus a 10-year residual period), reflecting their lifecycle
- The estimate of the new users, who will begin cycling and walking as a result of the proposed scheme will be calculated based on outputs from applicable research and literature review undertaken
- The cycle and walking facilities are along the canal, offline and segregated with no interaction with the road network except at junctions, which will result in a 50% reduction in incidents (compared to historical rates) along the length of the proposed scheme
- All parameter values for the calculation of economic benefits are referenced from PAG Unit 6.11: National Parameter Values Sheet and PAG Unit 13: Pedestrian and Cyclist Facilities
- Benefits will be calculated for an average day representing the full year

9.3 Results

This section outlines the monetary benefits associated with the delivery of the RCG Phase 3. As previously presented, the costs for the journey quality and the collision reduction benefits were calculated for both the existing and new users, since both groups will benefit from the new scheme, while the costs for the remaining benefits will consider only the new users.

The breakdown of the benefits for the cyclists and pedestrians is presented in Figure 9.1. The results are referring to a 30-year appraisal period (plus a10 years residual value) for the central scenario with a cyclist growth rate of 81% as a result of the implementation of the scheme and pedestrian growth rate of 18%.

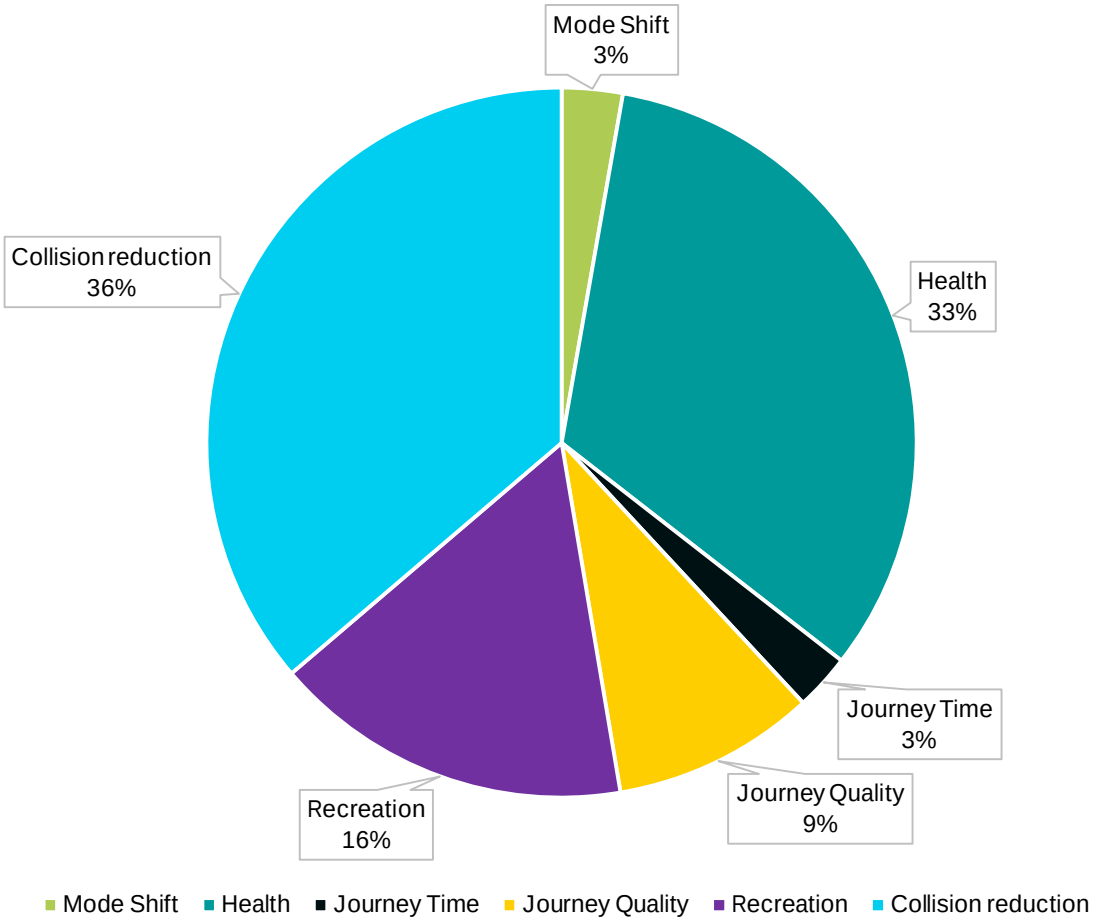


Figure 9.1 – Breakdown of Walking and Cycling Benefits - Central Scenario

A series of sensitivity tests in relation to modelling assumptions, economic variables and costs have been undertaken and are set out below:

- Demand sensitivity, with allow and a high growth rate scenario for the number of new cyclists and pedestrians due to the development of the proposed scheme
- Benefits Sensitivity with changes between -20% to 20%
- Cost sensitivity with changes on the cost between -20% to 20%.
- Removal of some benefits such as journey quality

The results of these sensitivity tests are presented in the following sections.

9.4 Detailed Analysis of Appraisal Results

Table 9.1 provides a summary of the overall economic appraisal, in the form of:

- Present Value of Benefits (PVB)
- Present Value of Costs (PVC)
- Benefit- Cost Ratio (BCR)

The PVC is a combination of investment costs, maintenance costs, changes in operator revenues and allows for shadow pricing of funds and labour. The cost estimate is re-based to 2011 in order to be compatible with the calculated benefits, and then factored to include shadow pricing. The operation and maintenance costs are also added, and brought back to 2011 values and prices. The PVB refers to the overall benefits from travel time impacts across all modes and impacts on cyclists in the form of health, collision reduction, journey quality/ambience and absenteeism benefits.

Table 9.1 – CBA summary – Central Scenario (including 10-year residual value)

Type of benefit	Benefit values (€) – Central Scenario
Mode Shift	€1,059,486
Health	€12,480,945
Journey Time	€972,067
Journey Quality	€3,528,917
Recreation	€6,256,687
Collision reduction	€13,812,733
Present Value of Benefits (PVB)	**€38,110,835**
Present Value of Costs (PVC)	**€21,431,412**
Benefit to Cost Ratio (BCR)	**1.78**

9.4.1 Demand Sensitivity

The demand related to new cyclists and pedestrians was calculated in Section 5. The sections presented the lower and higher growth rates that were set for the new users, allowing for a sensitivity analysis to be carried out for estimating the impact that the growth rates would have on the economic assessment. A summary of the CBAs under the two growth rate sensitivities are provided in Table 9.2 for the new cyclists. The results of the sensitivity assessment indicate that the proposed scheme would generate a BCR of 1.14 if the low growth rate scenario eventuated, and 2.06 if the high growth rate scenario eventuated.

Table 9.2 – CBA summary – low & high growth rate scenarios

CBA breakdown	Benefit values (€)		
Type of benefit	Low Scenario	Central Scenario	High Scenario
Mode Shift	€330,999	€1,059,486	€1,369,668
Health	€4,174,612	€12,480,945	€16,309,559
Journey Time	€778,062	€972,067	€1,042,522
Journey Quality	€1,764,648	€3,528,917	€4,169,625
Recreation	€3,537,252	€6,256,687	€7,356,654
Collision reduction	€13,812,733	€13,812,733	€13,812,733
Present Value of Benefits (PVB)	**€24,398,306**	**€38,110,835**	**€44,060,760**
Present Value of Costs (PVC)	**€21,431,412**	**€21,431,412**	**€21,431,412**
Benefit-Cost Ratio (BCR)	**1.14**	**1.78**	**2.06**

9.4.2 Benefit Sensitivity

The benefit sensitivity analysis presents the changes on the PVB values for the central scenario. The results of this cost sensitivity analysis are presented in Table 9.3.

Table 9.3 – CBA summary – Present Value of Benefits (PVB) changes

CBA breakdown	Benefit values (€)				
Type of benefit	-20%	-10%	Central Scenario	+10%	+20%
Mode Shift	€847,589	€953,537	€1,059,486	€1,165,435	€1,271,383
Health	€9,984,756	€11,232,851	€12,480,945	€13,729,040	€14,977,134
Journey Time	€777,654	€874,860	€972,067	€1,069,274	€1,166,480
Journey Quality	€2,823,134	€3,176,025	€3,528,917	€3,881,809	€4,234,700
Recreation	€5,005,350	€5,631,018	€6,256,687	€6,882,356	€7,508,024
Collision reduction	€13,812,733	€13,812,733	€13,812,733	€13,812,733	€13,812,733
Present Value of Benefits (PVB)	**€30,488,668**	**€34,299,752**	**€38,110,835**	**€41,921,919**	**€45,733,002**
Present Value of Costs (PVC)	**€21,431,412**	**€21,431,412**	**€21,431,412**	**€21,431,412**	**€21,431,412**
Benefit-Cost Ratio (BCR)	**1.42**	**1.60**	**1.78**	**1.96**	**2.13**

9.4.3 Cost Sensitivity

A number of cost sensitivities have been assessed for the scheme, including a scenario where PVC changes between -20% to 20%. The results of this sensitivity analysis are presented in Table 9.4.

Table 9.4 – CBA summary – Present Value of Costs (PVC) changes

CBA breakdown	Chance in costs (€)				
Type of benefit	-20%	-10%	Central Scenario	+10%	+20%
Mode Shift	€1,059,486	€1,059,486	€1,059,486	€1,059,486	€1,059,486
Health	€12,480,945	€12,480,945	€12,480,945	€12,480,945	€12,480,945
Journey Time	€972,067	€972,067	€972,067	€972,067	€972,067
Journey Quality	€3,528,917	€3,528,917	€3,528,917	€3,528,917	€3,528,917
Recreation	€6,256,687	€6,256,687	€6,256,687	€6,256,687	€6,256,687
Collision reduction	€13,812,733	€13,812,733	€13,812,733	€13,812,733	€13,812,733
Present Value of Benefits (PVB)	**€38,110,835**	**€38,110,835**	**€38,110,835**	**€38,110,835**	**€38,110,835**
Present Value of Costs (PVC)	**€17,145,129**	**€19,288,270**	**€21,431,412**	**€23,574,553**	**€25,717,694**
Benefit-Cost Ratio (BCR)	**2.22**	**1.98**	**1.78**	**1.62**	**1.48**

9.4.4 Reduced Benefits Sensitivity

A sensitivity with the journey quality benefits removed has been presented to further stress test the scheme.

Table 9.5 – CBA summary – Central Scenario (including 10-year residual value)

Type of benefit	Benefit values (€) – Central Scenario
Mode Shift	€1,059,486
Health	€12,480,945
Journey Time	€972,067
Journey Quality	€0

Type of benefit	Benefit values (€) – Central Scenario
Recreation	€6,256,687
Collision reduction	€13,812,733
Present Value of Benefits (PVB)	**€34,581,918**
Present Value of Costs (PVC)	**€21,431,412**
Benefit to Cost Ratio (BCR)	**1.61**

10. Scheme Appraisal Balance Sheet

The scheme appraisal balance sheet (PABS) is based on the CBA outcomes and anticipated scheme impacts. A range of criteria and elements are appraised, as outlined in CAF and PAG (Unit 7.1 – Scheme Appraisal Balance Sheet). The evaluation of the scheme is based on the six multi-criteria appraisal headings presented below

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

The six criteria were qualitatively evaluated and present some anticipated benefits of the Royal Canal Greenway Phase 3.

Table 10.1 – Scheme Appraisal Balance Sheet

Scheme appraisal balance sheet			
Criteria		**Scoring**	**Qualitative assessment**
Economy	Transport efficiency & effectiveness	Highly positive	The RCG Phase 3 will have a significant impact on the transport efficiency and effectiveness. The increase of new cyclists and pedestrians along the route will provide a more efficient use of road space, that could potentially increase the public transport usage. The scheme will attract more car user to shift into cycling, walking and public transport, leading to more efficient use of them. Cycling is a very effective means of transport. The 500 new cyclists in 2046 would equal ~400 cars or the need for 5-6 additional buses if the proposed scheme was not in place.
	Benefit -Cost Ratio (BCR)	Highly positive	The economic appraisal of the proposed scheme results in a positive return on investment and presents a strong economic case for the scheme.
	Wider Impacts	Moderate positive	The RCG Phase 3 will trigger numerous wider impacts, especially for residential and commercial areas in close proximity of the study area, related to utility, infrastructure and economy.
Environment	Air quality & climate	Highly positive	The modal shift towards cycling and walking will positively affect air quality and climate due to the reduction in congestion and associated vehicle emissions
	Noise & vibration	Moderate positive	The RCG Phase 3 will result in an increase in public transport use and cycling and a reduction in car use, that would reduce traffic and relatively reduce noise and vibration.
Safety	Collision reduction	Highly positive	The proposed scheme aims to significantly improve the cycling and walking facilities, providing a safer route for people to use for their daily commute or for leisure. The improved infrastructure will reduce collisions by keeping the cyclists and pedestrians protected. This impact has been quantified and monetised as part of this business case. The RCG Phase 3 will lead to a modal shift from private cars to active modes and public transport. This will decrease road traffic, thus reducing the number and severity of injury incidents overall. The impact has NOT been quantified nor monetised as part of this business case.
	Security	Moderate positive	The RCG Phase 3 will positively affect the security of cyclists and pedestrians by the installation of adequate lighting along the route, providing a safely accessible environment for the users.

Physical Activity	Journey Quality / Ambience	Highly positive	Cycle and walk tracks dedicated to cyclists and pedestrians respectively provide a safer and more enjoyable cycling environment, leading to a modal shift into active modes due to the provide high quality facilities. Journey quality (ambience) is a measure of the real and perceived physical and social environment experienced while travelling. The proposed scheme will improve the existing offline cycle and pedestrian facilities by providing a high-quality route that will separate the cycling and walking movements. Therefore, the users' perception of danger related to potential collisions will be reduced and their journey quality will be improved. Track segregation is an essential factor contributing to achieving high journey quality for cyclists and pedestrians, because of the conflict reduction between cyclists or pedestrians and other types of road users. The travel experience is then significantly improved, making cycling and walking as two attractive travel options.
	Absenteeism	Highly positive	The RCG Phase 3 will encourage people to cycle and walk along the scheme without the cyclists interrupting the pedestrian movements and vice versa. So, the scheme will have a positive effect on citizens' health and physical activity and by choosing cycling and walking for their everyday commute, absenteeism will be reduced.
	Reduced health risk	Highly positive	As previously mentioned, the proposed infrastructure will attract more people to cycle and walk. Cycling and walking will significantly increase the users' physical activity, thus affecting positively their health and wellbeing and finally reducing multiple health risks.
Accessibility	Vulnerable groups	Highly positive	It is essential to provide a safe and resilient transport network, segregated from the motorised network, to socially deprived people, who do not own a car or afford to use public transport. The dedicated network for active modes will enhance their accessibility to employment, social networks, education and healthcare centres.
Integration	Transport integration	Highly positive	The RCG Phase 3 will be complementary to the Royal Canal Greenway Phase 2 and other schemes outlined in the Project Ireland 2040: National Planning Framework such as BusConnects Dublin.
	Other	Moderate positive	The proposed scheme will contribute on the enhancement of active and public transport at local, regional and national levels by improving cycle facilities and bus journey times and reliability throughout the city. The proposed scheme will achieve the objectives of the many policies Project Ireland 2040: National Planning Framework, the GDA Transport Strategy 2022 – 2042 and the Dublin City County Development Plan 2022-2028 to generally improve quality of life and improve accessibility to work, education and other activities. The design has been future-proofed to allow for increases in the use of Cargo Bikes, eBikes etc.

11. Governance Plan

11.1 Scheme Governance Structure

11.1.1 Sponsoring Agency

Dublin City Council (DCC) is the Sponsoring Agency for the Royal scheme. DCC has overall responsibility for planning, appraisal and delivery of the scheme, as well as its future operation and maintenance. The Sponsoring Agency's functions include:

- Nominating and appointing a Scheme Manager
- Managing the overall planning and delivery of the scheme
- Completing the required appraisal deliverables according to the PSC, CAF, and NTA PAG and securing approval from the Approving Authority at each gateway
- Appointing a Scheme Supervisor Design Process (PSDP) and Scheme Supervisor Construction Stage (PSCS) as required under Health and Safety legislation
- Obtaining approval from the Approving Authority for the Scheme proposals and for any changes to Scope
- Acting as the Contracting Authority to procure the planning, design and construction/implementation of the Scheme
- Assuming the role of Contracting Authority for Public Works Contracts and PPP Schemes

11.1.2 Approving Authority

NTA is the approving authority for this scheme. Its role includes:

- Evaluating the appraisal deliverables and scheme proposals against strategic objectives
- Determining the requirement for a Scheme Steering Group, if required, clearly defining and communicating its role, composition, level of delegated authority, responsibilities and structure. Note there is a Steering Group in place for this scheme
- Considering requests for changes in the Scope from the Sponsoring Agency
- Monitoring the progress of scheme with emphasis on cost, programme, quality and impacts
- Assessing Scheme reviews
- Making and informing of decisions in relation to scheme reviews in a timely manner

11.1.3 Scheme Steering Committee

A Scheme Steering Committee is in place and is accountable for the scheme's success by directing the scheme, making key decisions, and exercising overall control and oversight. While day-to-day management of the scheme is delegated to the Scheme Manager, the Steering Committee is responsible for its overall success and key decisions. Its responsibilities include:

- Reviewing and approving scope, cost plan and delivery plan for the scheme
- Monitoring and approving changes to scheme scope/cost/programme
- Ongoing review of scheme progress and provide ongoing support to Scheme manager
- Reviewing and forwarding relevant appraisal deliverables for approval

- Monitor communication with key stakeholders
- Ensuring that health and safety best practices are adhered to
- Taking decisions to terminate or suspend the scheme if deemed necessary

11.1.4 Scheme Manager

The Scheme Manager oversees the day-to-day delivery of the scheme on behalf of the Scheme Steering Committee. Their responsibilities include:

- Day-to-day management and delivery of the scheme programme with respect to safety, time, cost, quality, scope, risks and outputs
- Develop and submit relevant appraisal, planning and regular progress reports to the Scheme Steering Committee, Corporate Scheme Support Office, or Corporate Scheme Governance Board as necessary
- Managing the procurement and appointment of technical advisors, service providers and contractors as required
- Monitor and report scheme progress to the Scheme Steering Committee

11.2 Scheme phases and approval points

The Royal Canal Phase 3 scheme is being delivered in accordance with the NTA *Scheme Approval Guidelines* (PAG) and DCC's *Capital Scheme Governance Guidelines*.

12. Risk Management

All schemes face risks, and as a complex scheme in a busy urban environment, the Royal Canal Phase 3 scheme faces many potential internal and external risks that must be addressed by DCC. This section of the business case sets out the potential risks and highlights how these may impact on its delivery or success. DCC have put a risk register in place and have developed strategies for avoiding or managing these risks as the scheme progresses.

12.1 Identification of risks

Table 12.1 summarises potential political, economic, social, technical, legal and environmental risks to the Royal Canal Phase 3 scheme, along with their potential impacts. These form the basis of the risk register, which is maintained and updated by DCC as the scheme progresses.

Table 12.1 – Identification of risks

Category	Risk	Description of potential impacts on Royal Canal Phase 3 scheme
Political	Political opposition to proposed option(s)	This could cause redesigns that impact the scope of quality the scheme; as well as cost and programme. It could also lead to failure to secure approval and halt of the scheme.
	Misinformation and lack of stakeholder buy-in during consultation phases	Misinformation during consultation phases could exacerbate any potential opposition, and increase the risk of political opposition or legal challenges. Low risk given status of scheme.
Economic	Reduction in exchequer funding due to budgetary constraints	This could delay or halt approval of the scheme, and cause the scheme to be downgraded in scope or quality. This would negatively impact the achievement of objectives.
	High levels of construction inflation due to material/labour cost increases	Significant cost escalations could lead to rejection of the scheme, delays, or the need to reduce its scope or quality.
	Insufficient resources due to competing infrastructure schemes	This could lead to delays to the scheme.
	Disruption to traffic, deliveries or public transport during construction or operation.	This could negatively impact transport and the economy of Dublin, and increase the risk of opposition and delays.
Social	Long-term change in travel patterns due to COVID-19 and remote working	Long-term reductions in commuting demand could reduce the effectiveness of the scheme in terms of meeting climate and transport objectives.
	Anti-social behaviour and security concerns on new infrastructure / public realm space	Security concerns along new infrastructure or boardwalks could discourage their use, and reduce the scheme's effectiveness in achieving its objectives.
Technical	Unforeseen structural conditions of Canal	This could require additional reinforcements and result in cost escalations or delays.

Category	Risk	Description of potential impacts on Royal Canal Phase 3 scheme
	Presence of sewerage, surface water and electricity infrastructure	This could require redesigns, delays and cost escalations. The level of investment required could also impact the viability of the scheme.
	Presence of watermains or replacement required	This could require redesigns, delays and cost escalations. The level of investment required could also impact the viability of the scheme.
Legal	Legal challenges / judicial review of proposed option(s)	This would add to the timeline and introduce uncertainty. If challenges are successful, it would require a redesign.
Environment	Impact on ecology of Canal	As well as having a negative environmental impact, this could result in planning refusal or redesigns; impacting the cost and programme.
	Impact on heritage	As well as having a negative heritage impact, this could result in planning refusal or redesigns; impacting the cost and programme.
	Carbon impacts of construction	This would reduce the scheme's effectiveness in achieving its climate objectives.
Internal & Governance	Conflicting inter-departmental or inter-agency objectives	This could delay or reduce the resources available to the scheme. It could also result in opposition to the proposed design/route and require redesign.
	Delay in achieving milestone sign-off to proceed to next stage	This would delay the programme and create uncertainty.

The formulation of a risk register and resultant QRA value is a demonstration of the risk approach to the project. The risk register has been updated as part of this submission and includes project risks, alongside proposed mitigation to reduce the level of risk. The items within the risk register with the highest risk rating are:

- Statutory undertakers works not being undertaken in accordance with the programme. The currently proposed mitigation is through early engagement and commitment to specified dates.
- Scope creep/additions during the construction phase. This is mitigated through early and continued stakeholder liaison.
- Portland Place Park; there is provision within the contract for replacement, but not to the extent that would be acceptable by DCC Parks.
- Unprecedented inflation. Whilst inflation at this point is largely a contractor risk, there is a residual risk regarding emergency relief or ex-gratia payments.

Enhanced site supervision, with suitably qualified personnel will reduce the instance of risks materialising on site and ensure risks which do arise are dealt with safely and in a timely manner.

13. Delivery and Procurement Approach

13.1 Procurement strategy

The following sections identify key procurement options for the scheme.

13.2 Procurement Options

There are two main procurement options that could were considered:

13.2.1 Design and Build

Under the Design and Build procurement option, the design risks are transferred to the contractor, who in conjunction with their appointed designer and wider supply chain are best placed to manage the associated risks in an economical manner. Several principal forms of contract are available for consideration:

- Public Works Contract for Civil Engineering Works Designed by the Contractor
- Bespoke FIDIC based Form of Contract previously utilised by TII on Major Works Contracts
- NEC 3 Target Cost type contracts

Current Government policy dictates the use of the Public Works Contracts for public procurement in Ireland. The bespoke FIDIC based Form of Contract has been utilised to deliver major transport schemes in Ireland and thus has a good track record. Consideration of the use of the NEC 3 Target Cost forms of contract could be justified for particularly complex schemes. This form promotes early collaboration between the Contractors and the Employer, principally to manage and quantify risks. The agreement for a Target Cost Form type contract is likely to introduce greater cost outcome certainty.

13.2.2 Employer Design

In the past this was the preferred method for the procurement of major construction schemes. Currently, this method would utilise the Public Works Contract for Civil Engineering Works Designed by the Employer. Under this form of contract, the employer retains the Design risk. Typically, risk relating to ground conditions, utilities, quantities and existing conditions largely remain with the Employer. The use of this form of contract proved to be unsatisfactory for major civil engineering schemes and has not been used on major transport schemes for many years.

For a scheme of the scale and complexity of the proposed development, the risks outlined above are best managed by the Contractor. Leveraging the expertise of the Contractor and their supply chain is the most efficient way for design risks to be managed. By transferring design responsibility to the Contractor, it is feasible for innovation and cost-effective solutions to be developed to deal with issues that arise.

13.3 Preferred Procurement Option

Given the nature and extent of this proposed scheme, the scheme will be procured as an Employer Designed scheme using the Public Works Contract CF3 form of contract for Civil Engineering Works designed by the Employer. The procurement process shall be in accordance with European Union Directive 2014/24/EU. The scheme will be procured using an Open procedure for works

Contracts Tender with a Suitability Assessment Questionnaire. It will be openly advertised on E-tenders with an Ojeu notice. A tender assessment process will identify the Most Economically Advantageous Tender.

This process has been followed during Spring 2022, with a preferred contractor identified.

14. Monitoring and Evaluation

14.1 Monitoring and Evaluation Requirements

DCC and NTA continuously monitor cyclist demand through fixed cyclist counters and annual canal cordon multi-modal surveys. Post-construction surveys/counts will also be undertaken to assess the impact of the scheme on cycling levels. These surveys will place particular emphasis on identifying whether the scheme has been successful in encouraging under-represented groups to take up cycling, such as women, children and the elderly.

14.2 Logic Path Model

A Logic Path Model is a tool to demonstrate the coherency of a proposal in achieving certain outcomes or objectives. The Model shows the relationship between an issue or objective that Dublin City Council seeks to address, the actions it carries out, and the results of these actions.

Table 14.1 displays the Logic Path Model for this scheme. Beginning with an issue or constraint that Dublin City Council aims to address, it shows the inputs Dublin City Council will put into the scheme; the activities it will carry out; the outputs these activities will produce; the direct outcome of these outputs; and the wider impacts for the economy, society or the environment. It also provides examples of indicators that can be used to measure and track the success/failure of the scheme towards these objectives.

Table 14.1 – Potential Key Performance Indicators (KPIs) for the Royal Canal Greenway Phase 3

Objective	Example of indicators	Relevance
To increase the contribution to the local economy from tourism	Ex-post Number of tourists using active modes Number of visitors using Royal Canal Greenway	Increasing active travel amongst visitors can result in increased spending in local businesses such as cafés, shops and restaurants. This can be verified post-construction through surveys of users and local businesses.
To improve safety and security for vulnerable users	Ex-ante Number of road crossing points on the route Length of fully segregated cycle facilities Ex-post Number of new pedestrians and cyclists Reduction in / low collision rate for cyclists along corridor	The RSA provides data on pedestrian and cyclist collisions, a measured reduction in collisions can demonstrate an improvement in safety along the route. In the absence of this data shortly after completion, indicators such as route segregation and the number of crossing points or conflicts can provide an early indication of the relative risk involved in the route. Post-construction, user surveys can assess how many new users were attracted due to improved safety.
To enhance connectivity along the Royal Canal and to onward	Ex-post	Integration of the route with the wider local infrastructure

Objective	Example of indicators	Relevance
destinations, including key housing sites	Demonstration of improved connectivity through scheme outputs	can encourage use of the route to reach a wider range of destinations. This can be verified post-construction through surveys.
To establish mode shift away from private car use	Ex-ante Number of private cars in the vicinity Level of emissions in the vicinity Ex-post Reduction in car use within the urban area Reduction in transport related carbon emissions	To encourage a shift away from car-orientated travel it is important that the infrastructure in place can accommodate this. This can be verified post-construction through user surveys
To provide an attractive east-west route to facilitate all trip purposes	Ex-post Use of the Royal Canal Greenway amongst all trip purposes Demonstration of connectivity to key locations through scheme outputs	Enhancing connectivity to key locations can provide real choice in modal use. The reduction in journey times along the route can be measured post-construction to verify this.
To increase participation in leisure / physical activity along the corridor among users of all ages and abilities	Ex-ante and Ex-post Amount of physical activity undertaken amongst the population (walking, wheeling or cycling)	A high-quality segregated route can result in increased participation in leisure and physical activity along the route. This can be verified post-construction through user surveys

14.3 Benefit Realisation Plan

The Logic Path Model has been used to derive an outline benefit realisation plan as shown in Table 14.2. The benefit realisation plan uses the scheme objectives as a foundation, setting out how each indicator can be measured in relation to data source, type and collection frequency. Importantly, the benefit realisation plan outlines the relevant measures of success, using metrics from the proposed scheme design and resultant appraisal to set a series of proposed scheme benefits.

Table 14.2 – Outline Benefit Realisation Setting for the Royal Canal Greenway Phase 3

Objective/Benefit	Example of indicators	Data Source	Type	Collection Frequency	Benefit Metric
Increased contribution to the local economy from tourism	Number of tourists using active modes	User surveys	Quantitative	Post Opening	
	Number of visitors using Royal Canal Greenway	User surveys	Quantitative	Post Opening	
Improved safety and security for vulnerable users	Number of road crossing points on the route	Achieved through the design process and a key project output	Design / construction drawings	Scheme Completion	4 no. new and 1 no. improved
	Length of fully segregated cycle facilities	Achieved through the design process and a key project output	Design / construction drawings	Scheme Completion	Scheme length 2.1km
	Number of new pedestrians and cyclists	Number of users determined though permanent counters and additional surveys as necessary (as a demonstration of inclusivity)	Quantitative/Qualitative	Pre and post opening	81% increase in cyclist numbers 18% increase in pedestrians
	Reduction in / low collision rate for cyclists along corridor	RSA data combined with the number of users to demonstrate collision rate	Quantitative	Pre and post opening	50% reduction
Enhanced connectivity along the Royal Canal and to onward destinations, including key housing sites	Demonstration of improved connectivity through scheme outputs	Achieved through the design process and a key project output	Design / construction drawings	Scheme Completion	Delivered scheme

Objective/Benefit	Example of indicators	Data Source	Type	Collection Frequency	Benefit Metric
Mode shift away from private car use	Number of private cars in the vicinity	Parking capacity	Quantitative	Pre and post opening	
	Level of emissions in the vicinity	AQ monitoring data/proxy calculations	Quantitative	Pre and post opening	
	Reduction in car use within the urban area	ATC data	Quantitative	Pre and post opening	
	Reduction in transport related carbon emissions	Carbon monitoring/proxy calculations	Quantitative	Pre and post opening	
An attractive east-west route to facilitate all trip purposes	Use of the Royal Canal Greenway amongst all trip purposes	User surveys/interviews to capture trip purpose and user satisfaction	Quantitative/Qualitative	Post opening	50% recreational/50% non-recreational
	Demonstration of connectivity to key locations through scheme outputs	Achieved through the design process and a key project output	Design / construction drawings	Scheme opening	Delivered scheme
Increased participation in leisure / physical activity along the corridor among users of all ages and abilities	Amount of physical activity undertaken amongst the population (walking, wheeling or cycling, in the context of inclusivity for all ages and abilities)	User surveys/interviews	Quantitative/Qualitative	Pre and post opening	

14.4 Evaluation Plan

The Department of Public Expenditure and Reform (DPER) and the Department of Transport (DoT) require a Post Scheme Review to be carried out for all schemes in excess of €20m. Guidance on the requirements and preparation of a Post Scheme Review are provided in *PAG Unit 9.0 – Post Scheme Review.*

The Post Scheme Review for the proposed scheme will be undertaken 5 years after opening to allow sufficient time for the scheme impacts to be evaluated. The Post Scheme Review will evaluate the following four stages of the scheme:

- Scheme Conception;
- Scheme Planning;
- Scheme Implementation; and
- Scheme Operational Performance.

The outline benefits realisation plan sets out how each of the scheme benefits can be monitored, and where appropriate sets an indicative metric at this stage of the process. Importantly, the benefits realisation plan identifies the data sources that can be used as part of the evaluation, combining a series of primary and secondary data sources. Setting out the required data collection at this stage, with associated timescales, will mean that the necessary steps have been taken to ensure that a suitable evaluation can be undertaken, and appropriate baseline data is captured prior to the commencement of construction.

The following evaluation questions have been set which will be used, against which the scheme will be measured. The questions are designed to establish the degree of success, covering process, delivery and determination of scheme benefits:

- To determine whether the project was delivered effectively
- To assess the causal effect of the project on the anticipated outcomes and impacts:
  - The provision of connectivity to the existing network
  - A growth in the number of cyclists for all trip purposes
  - The delivery of safer walking and cycling facilities
  - The optimisation of placemaking opportunities

15. Conclusion

The business case for the Royal Canal Greenway Phase 3 scheme included analysis aiming to assess the reasonable impacts expected of the scheme. The scheme proposes the delivery of a greenway which cycle route that improves cycling accessibility along the canal between North Strand Road and Phibsborough Road and promotes the use of active travel.

The scheme will meet all the objectives set and lead to a significant increase in pedestrian and cycling demand in the area. This will result in:

- **An increase in cycle patronage** – representing an additional 330 cyclists per day by 2030, equivalent to an 81% increase in cyclist numbers in the central scenario
- **An increase in pedestrian patronage** - the proposed scheme will result in an 18% uplift in pedestrians along the corridor in the central scenario
- **Cycle journey time savings** - due to improvements in the level of service provided by the improved cycle facilities and separation from the pedestrians. This will result in an average time saving of approximately 1.5 minutes for cyclists travelling along the route
- **A modal shift towards sustainable travel, which will reduce reliance on private car** - by 2040 the scheme will encourage ~500 new cyclists, which in the absence of the scheme would potentially represent ~400 cars or the need for 5-6 additional buses
- **Journey time savings of circa €1 million** (2011 value) - over the appraisal period
- Significant **safety benefit savings of circa €14 million** (2011 value)
- **Health benefits savings of circa €12 million** (2011 value)
- **Mode shift savings of circa €1 million** (2011 value)
- **Journey Quality improvements of circa €3.5 million** (2011 value)
- **Recreation benefits of circa €6 million (2011 value)**

As part of the economic appraisal, a CBA was conducted as a requirement for all transport schemes with estimated lifetime costs in excess of €20 million. The assessment was undertaken in accordance with TII PAG and DoT CAF.

The central assessment results were expressed in BCR over a 30-year appraisal period (plus a residual period of 10 years). The economic appraisal forecasts a BCR of 1.78 for the central scenario, with a PVB of over €38 million. Thus, the economic appraisal presents a strong case for investment in the RCG Phase 3, enhancing provision for active modes.

A number of sensitivity analyses were also developed for assessing the impact of the following scenarios:

- Demand sensitivity, with allow and a high growth rate scenario for the number of new cyclists and pedestrians due to the development of the proposed scheme;
- Benefits Sensitivity with changes between -20% to 20%; and
- Cost sensitivity with changes on the cost between -20% to 20%.

All sensitivity tests retained a BCR above 1, or indeed increasing the BCR to 2.22 in the case of the reduced cost sensitivity. The lowest BCR is reflected in the low growth scenario where BCR falls to 1.14.

RCG Phase 3 is an essential enabler for Project Ireland's goals of future Enhanced regional accessibility, Sustainable Mobility, High-quality international connectivity and Transition to a Low

Carbon Economy. This Business Case has shown that RCG Phase 3 will meet the aims and objectives set for the project and that it will provide a strong return on investment. The benefits of RCG Phase 3 for society, the economy and the environment greatly exceed the cost. Investment in RCG Phase 3 represents a good use of public funds.

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