

KILBEGGAN TO MULLINGAR GREENWAY

Cost Benefit Analysis

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Cost Benefit Analysis

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1 INTRODUCTION

1.1 Overview

This report outlines the methods used to carry out a Cost Benefits Analysis (CBA), which will form part of the detailed appraisal of the two shortlisted Route Corridor Options (RCO) and will be used to inform the selection of an emerging preferred route corridor option (EPRCO).

1.2 Cost Benefit Analysis

The CBA identifies and monetises certain social and economic benefits of the project. The CBA is combined with the results of a qualitative appraisal in the form of Transport and Accessibility Appraisal (TAA) carried out in Phase 2 to inform the decision-making process required to select an EPRCO. The CBA and TAA are carried out as required and as per the guidance within the TII Publication; PE-PAG-02036 - Project Appraisal Guidelines for National Roads Unit 13.0 - Appraisal of Active Modes (February 2024). The TAA appraises non-monetisable impacts, and the CBA monetises impacts across the different greenway RCOs. The benefits and costs of the scheme are assessed using predicted user data to assess if the benefits of the scheme outweigh the cost of construction and future maintenance. For active modes such as greenways, TII have developed the Tool for Economic Appraisal of Active Modes (TEAM) which estimates the economic benefits from increased walking and cycling.

1.3 Scheme Description

The Kilbeggan to Mullingar Greenway will be a recreational trail, providing tourists, commuters and leisure users (collectively Non-Motorised Users - NMU) with a dedicated corridor linking Kilbeggan town to Mullingar town. The project will be a purposeful recreational facility for use by cyclists, walkers and other designated users.

This project will also aim to provide a strategic level connection between the Royal Canal Greenway/Old Rail Trail in Mullingar and the Grand Canal Greenway (via the Kilbeggan Branch of the Grand Canal). The Grand Canal Greenway follows the route of the Grand Canal and links Dublin and the River Shannon via Tullamore and a number of other towns and villages on the route. In Offaly, the Grand Canal runs from Shannon Harbour in the west to Edenderry in the east. There is an existing section of greenway between Tullamore and Kilbeggan Harbour via the Grand Canal Greenway at Ballycommon (east of Tullamore). The Kilbeggan to Mullingar Greenway will complete a greenway/ cycleway between the Royal Canal and Old Rail Trails in Mullingar and Tullamore via the Grand Canal (Kilbeggan Branch) and Grand Canal Greenway.

1.3.1 Scheme Development

This scheme is currently in Phase 2 - Option Selection. During Phase 1 - Concept and Feasibility, two feasible RCOs were identified from a longlist of nine options. Both RCOs start in Kilbeggan Harbour and terminate at a connection point to the Old Rail Trail south of Mullingar Town. One RCO takes a route to the west of Lough Ennell and the other RCO takes a route east of Lough Ennell. Examination of both RCOs identified that they have five “nodes” in common. Using these nodes the two RCOs have been split into four sections. These four sections are assessed individually as part of the TAA and CBA processes. The aim of this is to allow for appraisal of each section of RCO in detail with the selection of the best performing sections between the five nodes. This helps maximise the greenway’s potential to be developed along a RCO that gives the greatest benefit to the user. The four sections within each of the two shortlisted RCOs are shown in **Figure 1.1** and **Appendix A** of this Report.

Cost Benefit Analysis

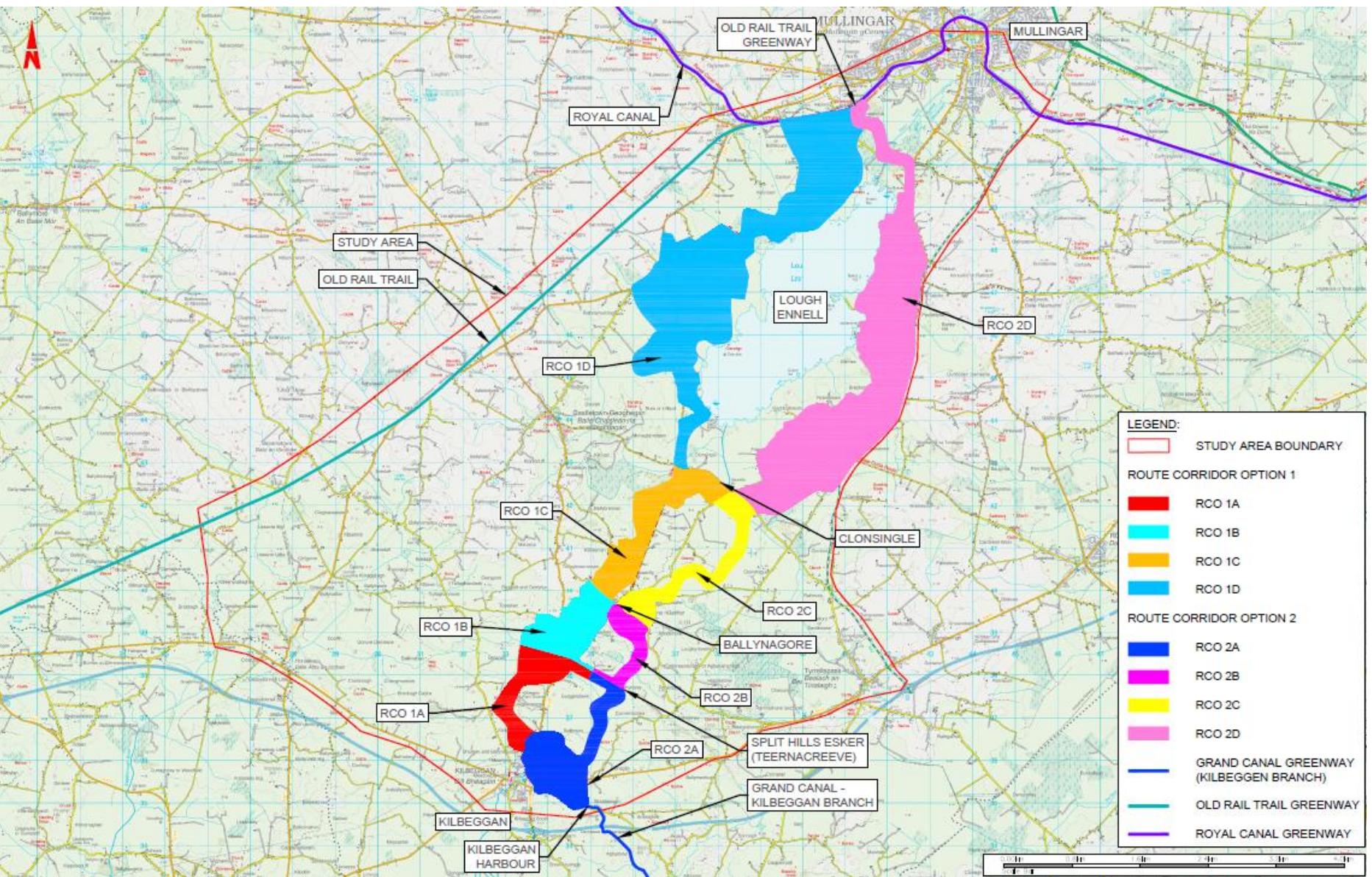


Figure 1.1 Route Corridor Option Sections

2 SOFTWARE SPECIFICATION

2.1 Tool for Economic Appraisal of Active Modes

The Tool for Economic Appraisal of Active Modes (TEAM) as outlined in the TII Publication; PE-PAG-02036 - Project Appraisal Guidelines Unit 13.0 - Appraisal of Active Modes (February 2024) was used to complete the CBA for each section of each of the RCOs shown in **Figure 1.1**. The TEAM estimates the benefits associated with increased levels of walking and cycling that will be provided by the project. The TEAM was developed by TII for greenway and active travel projects as a quantitative assessment tool that does not require input from complex transport modelling. The TEAM calculates the present value of mode shift, health, journey time, journey quality, and recreation.

The summary of the CBA as calculated with the TEAM is included in **Appendix B** of this Report.

3 DATA COLLECTION

3.1 Guidelines

The estimation of user demand for the TEAM tool was completed in accordance with TII Publication; PE-PAG-02036 - Project Appraisal Guidelines for National Roads Unit 13.0 - Appraisal of Active Modes (February 2024) as per the following methods.

- Case Studies and Benchmarking compared to routes with similar characteristics can be used as an estimate for levels of demand. This method is commonly used for larger recreational or tourism focused greenways.
- The Place of Work, School, College or Childcare - Census of Anonymised Records (POWSCCAR) is used to estimate journeys for commuting and educational trips between different areas and includes transport mode type. The data can be used to estimate current trips in the study area and how many are by active modes.
- Population Catchments and standard trip rates provided in Table 13.0.18 of the Project Appraisal Guidelines Unit 13 can be used where no baseline data is available. This method is most appropriate for small projects outside large urban areas less than 20km in length.

As the Kilbeggan to Mullingar Greenway is a new infrastructure project that will be at a scale and quality to attract domestic and international visitors with a length of circa 30km, the most appropriate method of estimating user demand is by case studies and benchmarking.

3.2 Benchmarking

There is no existing infrastructure between Kilbeggan and Mullingar however, there is an established local greenway which would provide a good benchmark to estimate the potential users between Kilbeggan and Mullingar. This infrastructure is the Old Rail Trail Greenway from Athlone to Mullingar. User trip data was collected over a 12-month period from 1st January 2023 to 31st December 2023 and provided by Westmeath County Council. Three counter locations were used as a benchmark, Moate, Garthy and Stableford.

The counter at Moate is situated in an urban setting and provides a good benchmark for the urban area at Kilbeggan. The counter located at Garthy provides data for sections in a rural area. The counter located at Stableford is close to the tie in point of the Kilbeggan to Mullingar Greenway to the Old Rail Trail, this provides a good benchmark for the greenway close to Mullingar town. Counter locations are shown in **Figure 3.1**.

Cost Benefit Analysis

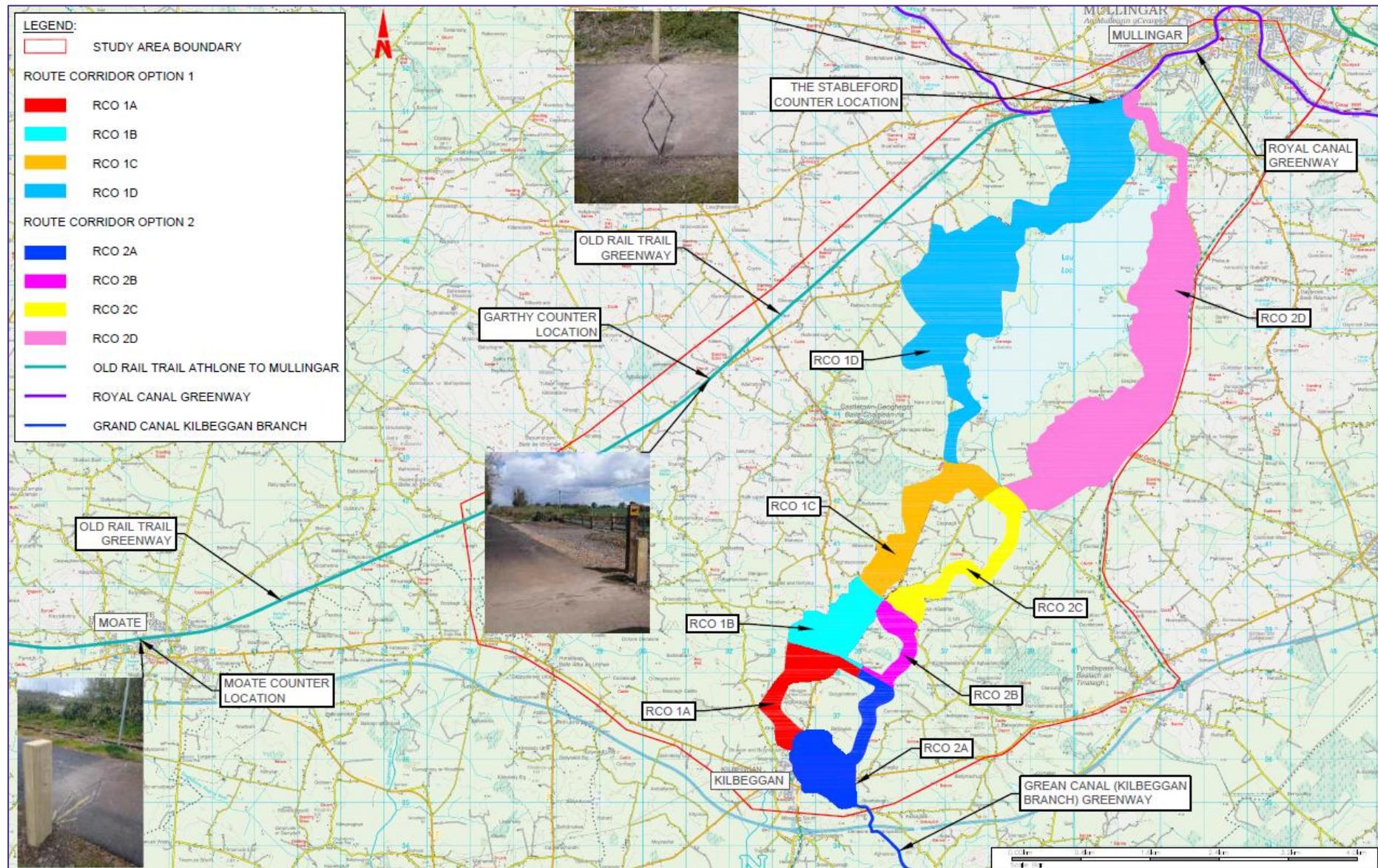


Figure 3.1 User Survey Locations

Cost Benefit Analysis

The total recorded annual trips for each location are shown in **Table 3.1**. The counter locations were used for the RCO's as follows:

- RCO1a and RCO2a: Moate on the Old Rail Trail
- RCO1b and RCO2b: Garthy on the Old Rail Trail
- RCO1c and RCO2c: Garthy on the Old Rail Trail
- RCO1d and RCO2d: The Stableford on the Old Rail Trail

The Annual User data for these locations are shown in **Table 3.1**.

Table 3.1 Old Rail Trail User Data

Route Corridor Option	Trip Type	Total Annual Trip
Moate	Walking	54,124
	Cycling	33,841
Garthy	Walking	9,751
	Cycling	17,989
The Stableford	Walking	40,515
	Cycling	32,433

3.3 Demand Scenarios

The counter data described above was used for the Central Scenario input to TEAM. For the High Demand scenario an increase of 10% was applied to the counter data as providing a more scenic tourist facility when compared to the Old Rail Trail should increase tourism in the area. This is based on the TII MOVE intercept survey data which shows an average of 11% of visitors across the 5 greenways surveyed was tourism related, compared to the 1% shown for the Old Rail Trail which does not focus on connectivity to 'things to see and do' along its route. For the low scenario an estimate of -10% was used to account for potential split in local users between the greenways in the area. The annual user demand inputs for the low, central and high demand scenarios are shown in **Table 3.2**.

Table 3.2 Annual User Demand Scenarios

Route Corridor Option	Low Scenario		Central Scenario		High Scenario	
	Cycling	Walking	Cycling	Walking	Cycling	Walking
Moate	30,457	48,712	33,841	54,124	37,225	59,537
Garthy	16,190	8,776	17,989	9,751	19,788	10,726
Stableford	29,190	36,464	32,433	40,515	35,676	44,567

3.3.1 Attractions

Local attractions in the area have the potential to increase the levels of demand for a tourism-focused greenway project. There are a number of attractions in the area that currently attract visitors. These attractions have the potential to attract visitors to use the greenway. This is most notable within RCO1d and RCO2d. Within RCO1d these attractions include:

- Lilliput Adventure Centre,
- Ladestown Shore,
- Better Together Riding Centre and
- Little Buds Farm

Within RCO2d, these attractions include;

- Belvedere House, Gardens and Park,
- Bloomfields House Hotel,
- Mollie Moo's Pet Farm,
- Carrickwood and the
- Sauna Society

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The visitor numbers to these attractions were provided by WCC for the purposes of generating a demand scenario that was inclusive of these attractions. It is recognised that not all visitors to these attractions will use the greenway either for access or continued recreation. To develop trip numbers using this data, information was taken from the TII CRUSE tool for Westmeath. The baseline, climate action plan and Go Dutch percentages were used to estimate the number of visitors to these attractions that would use the greenway.

It was estimated that 10% of visitors would use the greenway based on the baseline modal split for active travel. This was added to the low demand scenario.

For the central scenario, 20% of the visitor numbers was used based on target climate action plan modal split.

For the high demand scenario, 30% of visitor numbers was used based on the Go Dutch modal split targets.

The additional demand for these attractions within RCO1d and RCO2d is shown in **Table 3.3**.

Table 3.3 Attraction Demand Scenarios

Route Corridor Option	Total Visits to Attractions	Low Scenario	Central Scenario	High Scenario
RCO1d	70,168	7,017	14,034	21,050
RCO2d	264,689	26,469	52,938	79,407

Table 3.4 shows the additional demand estimated to be generated from attractions for each active mode. An estimate of 70% walking and 30% cycling for the demand scenario was used based on the assumption that the vast majority of people would likely drive to the attractions and walk.

Table 3.4 Attraction Demand for each Active mode

Route Corridor Option	Low Scenario		Central Scenario		High Scenario	
	Cycling	Walking	Cycling	Walking	Cycling	Walking
RCO1d	2,105	4,912	4,210	9,824	6,315	14,735
RCO2d	7,941	18,528	15,881	37,056	23,822	55,585

3.4 Demand Summary

Table 3.5 shows the total estimated user demand for the Low, Central and High Scenarios across all sections of the greenway based on benchmarking using trip counter data from the Old Rail Trail (ORT) and estimated demand generated from the local attractions listed in Section 3.3.1.

Table 3.5 Annual Demand Scenarios for each RCO

Route Corridor Option	Source of Benchmarking Data	Low Scenario		Central Scenario		High Scenario	
		Cycling	Walking	Cycling	Walking	Cycling	Walking
RCO1a, RCO2a	ORT Moate Counter	30,457	48,712	33,841	54,124	37,225	59,537
ROC1b, RCO2b, RCO1c, RCO2c	ORT Garthy Counter	16,190	8,776	17,989	9,751	19,788	10,726
RCO1d	ORT Stableford Counter	31,295	41,375	36,643	50,339	41,991	59,302
RCO2d	ORT Stableford Counter	37,130	54,992	48,314	77,571	59,498	100,151

The input data is described in **Section 4**.

3.5 Options Comparison Estimate

The TII Option Comparison Estimate (OCE) spreadsheet has been prepared using the TII published Schedule of Rates (TII, 2023), Code of Best Practice National and Regional Greenways - Greenway Sustainability Payments (December 2021) and templates for cost comparison estimates available on the TII

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Publications website (www.tiipublications.ie). A OCE has been developed for each section of the two RCOs to inform the cost inputs required for the CBA. A potential route, within the RCOs has been identified for comparative costing. These routes follow existing landowner boundaries to avoid severance of lands where possible and use state owned land where available. The potential routes have informed the development of the OCE and scheme input details for the TEAM. These routes are for comparative costing only and do not represent a chosen route through the RCO. The process of developing a route through the EPRCO is to be undertaken in Phase 3 of the project.

4 CBA INPUT ASSUMPTIONS

4.1 Scheme Inputs

4.1.1 Section A: Scheme and Infrastructure Details

4.1.1.1 Scheme Area Type

A scheme area type is required to be input into the TEAM. Based on guidance given in TII Publication; PE-PAG-02036 - Project Appraisal Guidelines Unit 13 - Appraisal of Active Modes (February 2024) the scheme area type is considered to be “other towns / urban districts” for RCO1a, RCO2a (both at Kilbeggan), and RCO1d and RCO 2d (both linked to Mullingar) as they are within urban areas (i.e. >1,500 population). RCO1b, RCO1c, RCO2b and RCO2c have been defined as Rural.

4.1.1.2 Demand Patterns

The demand patterns for different sections are set to “No”, this is considered appropriate as each section of RCO between the five nodes is being assessed as a section of the overall RCO and the individual sections do not require further breakdown.

4.1.1.3 Existing Infrastructure

As this is a new greenway, there is no data to be entered into existing infrastructure.

4.1.1.4 RCO Section Lengths

A reasonable cost estimate cannot be carried out on the RCO's as the areas are too broad. In order to provide a cost estimate a draft route within each corridor was developed solely for the purposed of carrying out cost estimates to inform the CBA. A route was developed that was considered to be reasonable from an engineering perspective but did not take into account landowner sentiment with regards land acquisitions. The full development of a route, with reference to the CoP will be carried out in Phase 3 of this project.

A breakdown of lengths for each section of the two RCOs is shown in **Table 4.1**.

Table 4.1 Scheme Measurements

Section	Segregated (km)	Adjacent to Road (with Separation) (km)	Shared (km)	Total Length (km)
RCO1a	7.1	0.6	0.3	8
RCO1b	1.9	0	0	1.9
RCO1c	4.5	0	0	4.5
RCO1d	12.5	0	1.6	14.1
RCO2a	3.8	0.2	0	4
RCO2b	2.6	0	0	2.6
RCO2c	5.1	0	0	5.1
RCO2d	13.7	0.95	2.45	16.1

4.1.1.5 Journey Time Savings

Journey savings times were set to “No” as each RCO section does not eliminate any detours and this greenway will be predominantly used as a recreational facility rather than commuter infrastructure.

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4.1.2 Section B Demand Scenarios

4.1.2.1 Average Daily Users

As per the TEAM recommendation, pre-existing demand is set at “0” for new infrastructure. This greenway will be new infrastructure.

Potential user demand following completion of the greenway for low, central and high scenarios is described in **Section 3** for each route corridor option.

4.1.2.2 Usage Type

Based on the TII Move intercept survey data the average percentage of people using the 5 greenways surveyed for recreation and exercise (non-utility purposes) was 92% as per **Figure 4.1**. Non-utility purposes include: domestic tourism, international tourism, leisure/exercise, personal wellbeing and social. The remaining 8% of greenway users travelled for utility purposes that are listed as shopping, school and work.

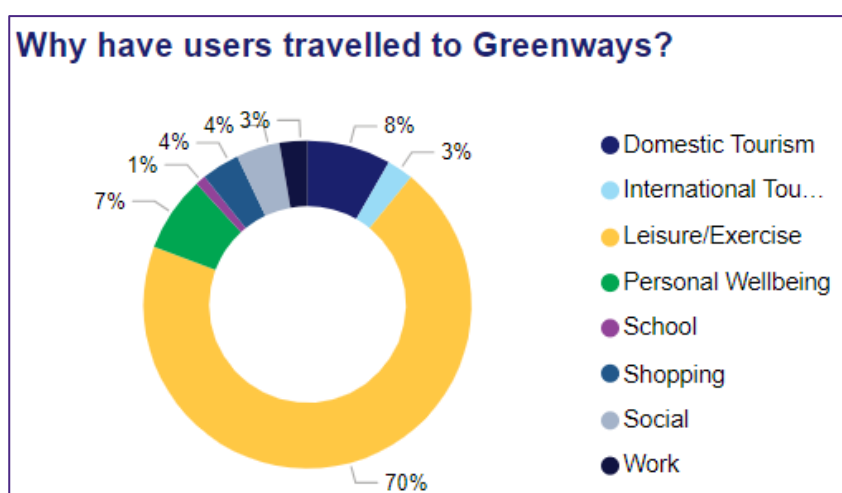


Figure 4.1 MOVE Intercept Survey Data

4.1.2.3 International Visitors

As this is a segregated greenway connecting to attractions and other greenway facilities, it is likely that the infrastructure will be used by international visitors. Based on the TII Move intercept survey data the average percentage of international users to the greenways surveyed was 3%. This 3% has been applied for this greenway.

4.1.2.4 Annualisation

An annualisation factor of 365 days was adopted as the counter data used for the Old Rail Trail was an average over the full year 2023.

4.2 Option Comparison Estimate

A OCE has been completed for each RCO section. **Table 4.2** provides details of the cost estimates required for the TEAM tool. This includes Operation and Maintenance Costs and Refurbishments Costs which were estimated separately from the OCE. These Operation and Maintenance Costs were estimated for verge cutting, hedge cutting and fencing replacement costs calculated at a 30-year lifespan. A summary of the OCE is included in **Appendix C**.

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Table 4.2 Scheme Costs

Item	RCO1a	RCO1b	RCO1c	RCO1d	RCO2a	RCO2b	RCO2c	RCO2d
Main Contract Construction	€5,465,188	€1,300,249	€2,493,016	€13,505,362	€3,209,893	€1,958,022	€3,019,649	€14,128,909
Main Contract Supervision	€385,211	€91,648	€175,719	€951,920	€226,248	€138,010	€212,839	€995,870
Archaeology	€361,136	€85,920	€164,737	€892,425	€212,107	€129,385	€199,536	€933,628
Advance Works and Other Contracts	€240,757	€57,280	€109,824	€594,950	€141,405	€86,256	€133,024	€622,436
Land & Property	€779,658	€192,383	€283,512	€810,035	€405,017	€263,261	€486,021	€972,041
Residual Network	€0	€0	€0	€0	€0	€0	€0	€0
Planning & Design	€385,211	€91,648	€175,719	€951,920	€226,248	€138,010	€212,839	€995,870
TII Programme Risk	€380,858	€90,956	€170,126	€855,331	€221,046	€135,647	€213,195	€932,437
Operation and Maintenance (Annual)	€26,137	€6,208	€14,702	€46,067	€13,069	€8,495	€16,662	€52,601
Resurfacing Costs (20 Years)	€686,688	€163,088	€386,262	€1,210,287	€343,344	€223,174	€437,763	€1,381,959
Reconstruction Costs (40 Years)	€1,156,466	€274,661	€650,512	€2,038,272	€578,233	€375,852	€737,247	€2,327,389

4.3 Default Assumptions

The TEAM details the “Default Assumptions in the assessment. After reviewing these figures, three changes were made to the default assumptions as follows:

Section A – Journey Length and Duration; The “Average recreational walking trip length (mins)” was increased from 45 to 60 based on the TII Move intercept survey data.

Section B - Diversion Rates; As this is primarily a recreational facility, diversion to bus is not considered to be likely, therefore, the rates assigned to bus was transferred to either walking or cycling.

Section C – International Visitors Assumptions; The percentage of “International Visitors engaging in Greenways (% of Greenway overall demand) was increased from 2% to 3% based on the TII Move intercept survey data.

4.4 Data Validation

The TEAM “Data Validations” is used to check for errors and highlight changes to the default values. No errors were recorded. One warning was detected for input of reconstruction costs. To address this warning the residual value consideration was changed to “Yes” and relevant data included. Updating the residual value consideration to “Yes” removed the data warning. Any changes to the TEAM default assumptions are also highlighted on this tab.

5 COST BENEFIT ANALYSIS RESULTS

5.1 Cost Benefit Analysis Central Scenario Results

Table 5.1 shows the results for the CBA central scenario from the TEAM. These include:

- the Present Value of Benefits (PVB) for monetised economic benefits over a project's appraisal period,
- the Present Value of Costs (PVC) for the total sum of capital and operating costs over the project's appraisal period,
- the Net Present Value (NPV) which is the PVB minus the PVC

The outcome of the CBA is a Benefit to Cost Ratio (BCR). A BCR is the ratio of economic benefits to economic costs. A BCR of less than 1 means the costs outweigh the benefits but does not mean the project is not worthwhile, there are other additional benefits that are not reflected in the CBA.

The BCR for each section will be used along with the results of the TAA to inform the selection of the EPRCO. It is noted that this exercise has been carried out for the purpose of selecting an EPRCO. A full CBA is required to be carried out on the EPRCO to ensure that the whole project benefits are greater than the costs.

Table 5.1 Cost Benefit Analysis Results

Corridor	PVB	PVC	NPV	BCR
RCO1a	€9,682,217	€6,030,017	€3,652,200	1.61
RCO1b	€1,391,215	€1,439,057	-€47,842	0.97
RCO1c	€2,470,949	€2,784,483	-€313,534	0.89
RCO1d	€9,971,638	€13,556,235	-€3,584,596	0.74
RCO2a	€7,355,313	€3,436,650	€3,918,664	2.14
RCO2b	€1,831,276	€2,123,205	-€291,929	0.86
RCO2c	€2,669,367	€3,436,478	-€767,111	0.78
RCO2d	€14,065,768	€14,420,896	-€355,127	0.98

The detailed breakdown of the results of the CBA as calculated using the TEAM is included in **Appendix B**.

5.2 Discounted Annual Economic Flows

This section of the tool calculated and reports the annual present value of costs and benefits over the 30-year appraisal period.

5.3 Sensitivity Analysis

The sensitivity analysis demonstrates how changes in demand, benefits or costs would affect the overall CBA results.

5.4 Other Economic Indicators

Other economic indicators provided by the tool are:

- Costs – Estimated present value of cost per kilometre;
- Carbon – Estimated tonnes of CO₂ avoided;
- Mode Shift – Estimated driving kilometres shifted to walking/cycling; and
- Benefit Per Kilometre – Benefits for users and society for each kilometre walked or cycled.

Table 5.2 shows the estimated value for costs, carbon, mode shift and benefits per kilometre for each section of RCO.

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Table 5.2 Other Economic Indicators

Corridor	Cost Per Km	Carbon Cost Avoided	Mode Shift Cost Avoided	Benefit Pedestrian	Benefit Cyclist
RCO1a	€753,752	€29,969	€463	€1.38	€1.47
RCO1b	€757,398	€21,133	€249	€2.63	€1.69
RCO1c	€618,774	€40,892	€483	€1.56	€1.54
RCO1d	€961,435	€66,185	€1,010	€1.38	€0.89
RCO2a	€859,162	€17,080	€264	€1.73	€1.53
RCO2b	€816,617	€31,181	€368	€2.62	€1.61
RCO2c	€673,819	€50,467	€596	€1.41	€1.52
RCO2d	895,214	€50,214	€776	€1.37	€0.79

5.5 Emerging Preferred Route Corridor Option

The results of the combined CBA and TAA scores (MCA) show that the best scoring RCO sections are RCO2a, RCO2b, RCO1c and RCO2d. This will result in a circa 1.5km link being required at the end of RCO1c to link into RCO2d. A separate TEAM calculation was completed on RCO1c with the added length and costs, the results show a BCR of 0.81 for the updated RCO1c which does not impact the result of the MCA.

The results of the CBA above show some sections with a BCR of less than 1, this does not reflect the BCR for the entire greenway. The breakdown of the CBA above into the sections was completed to determine the best route between the two route corridor options. The results of the Emerging Preferred Route Corridor Option EPRCO are shown in **Table 5.3**.

Table 5.3 EPRCO CBA Result

Corridor	PVB	PVC	NPV	BCR
EPRCO	€27,736,017	€23,590,876	€4,145,141	1.18

6 CONCLUSIONS

6.1 Conclusions

A Cost Benefit Analysis CBA has been completed using the Tool for Economic Appraisal of Active Modes (TEAM) produced by TII and in accordance with TII Publication; PE-PAG-02036 - Project Appraisal Guidelines for National Roads Unit 13.0 - Appraisal of Active Modes (February 2024) for each section of the two RCOs. This was carried out for the purposes of informing the option selection process. Following the selection of the Emerging Preferred Route Corridor EPRCO, an CBA was completed for the entire route to appraise the cost benefit of constructing the entire greenway route.

The CBA demonstrated a Benefit to Cost Ratio (BCR) of 1.18 over a 30-year appraisal. As this BCR is greater than 1.0, it is representative of the benefits of this project outweighing the costs of its construction. It is recommended that the Kilbeggan to Mullingar Greenway project proceed to Phase 3, where a final route can be developed and a further CBA analysis carried out on this route.

7 POTENTIAL LINK TO LILLIPUT

Lilliput Adventure Centre is a notable state-owned asset and attraction within RCO1d, that is in close proximity to RCO1c, and RCO1d which have formed part of the EPRCO. Lilliput Adventure Centre is owned by WCC and is currently leased to a private company who operates the centre. Lilliput Adventure Centre has an estimated potential annual visitor number of 55,000. This large visitor number and its proximity to the EPRCO has, through discussions with WCC, warranted an analysis to assess if its inclusion to the EPRCO is appropriate. A potential route was developed for the purposed of estimating a construction cost. This working route has a length of 2.9km. The working route is not the most direct route as it follows land boundaries, existing paths and state-owned lands. This section assesses how including a link to Lilliput will impact the overall CBA for the project.

7.1 Annual User Demand Scenarios

The annual visitor numbers to Lilliput Adventure Centre were estimated at 55,000. As described in **Section 3.3**, it is estimated for the low scenario that 10% of visitors would use the greenway based on the baseline modal split for active travel. For the central scenario 20% of the visitor numbers and for the high demand scenario 30% of visitor numbers was used. An estimate of 70% walking and 30% cycling was used as a majority of people would likely drive to the attractions and walk. **Table 7.1** shows the total estimated annual demand for the EPRCO including the additional for link to Lilliput Adventure Centre.

Table 7.1 Estimated Annual User Demand Scenario

Route Corridor Option	Low Scenario		Central Scenario		High Scenario	
	Cycling	Walking	Cycling	Walking	Cycling	Walking
EPRCO + Lilliput	85,427	116,329	103,444	149,146	121,461	181,964

7.1.1 Cost Estimate

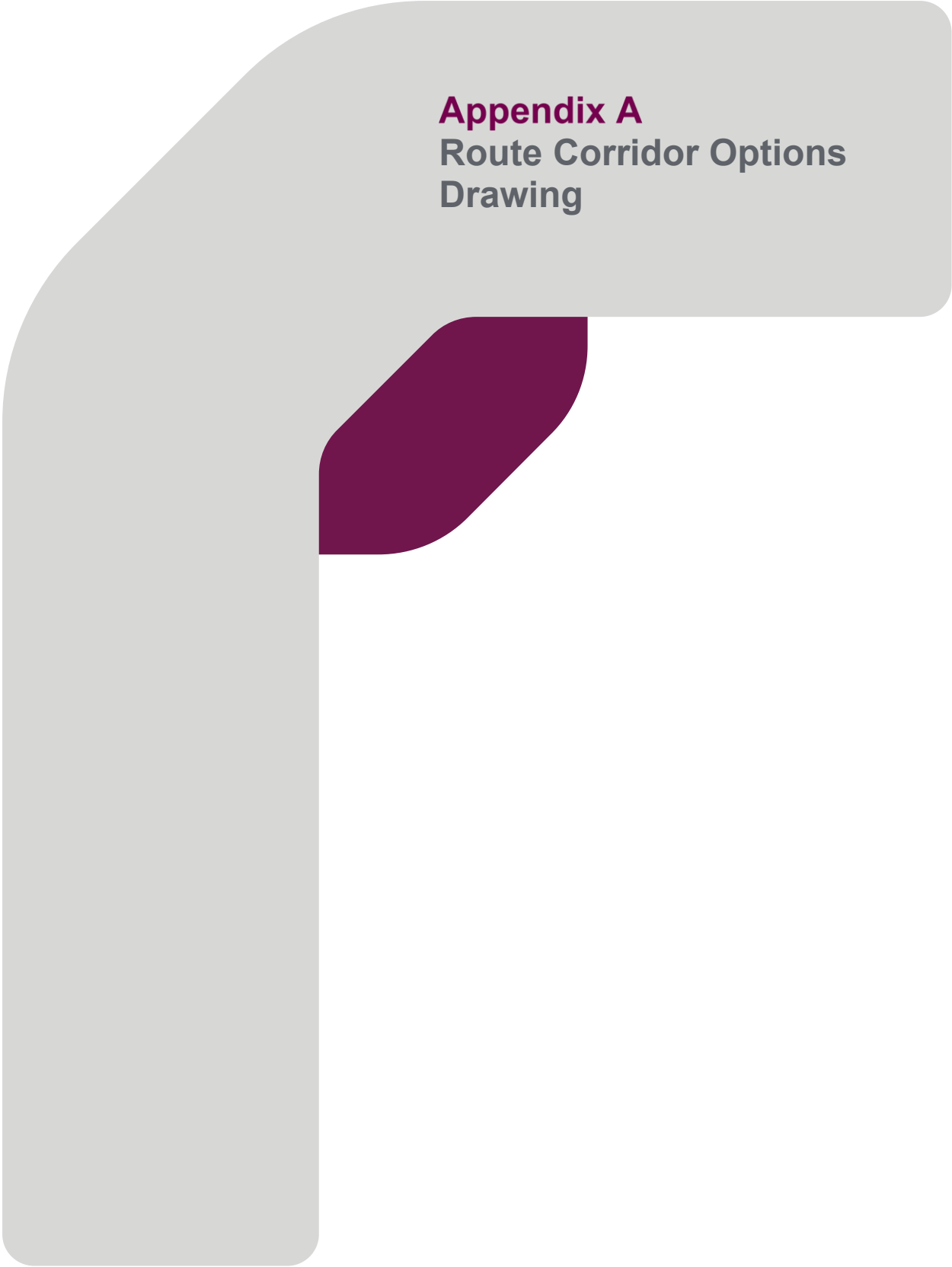
A construction and maintenance cost of the potential link to Lilliput Adventure Centre was prepared. The total costs of the EPRCO including the link to Lilliput Adventure Centre is shown in **Table 7.2**.

Table 7.2 Estimated Costs of EPRCO with link to Lilliput Adventure Centre

Item	EPRCO with link to Lilliput
Main Contract Construction	€24,302,126
Main Contract Supervision	€1,712,926
Archaeology	€1,605,867
Advance Works and Other Contracts	€1,070,578
Land & Property	€2,025,086
Residual Network	€0
Planning & Design	€1,712,926
TII Programme Risk	€1,621,475
Operation and Maintenance (Annual)	€104,222
Resurfacing Costs (20 Years)	€2,738,167
Reconstruction Costs (40 Years)	€4,611,410

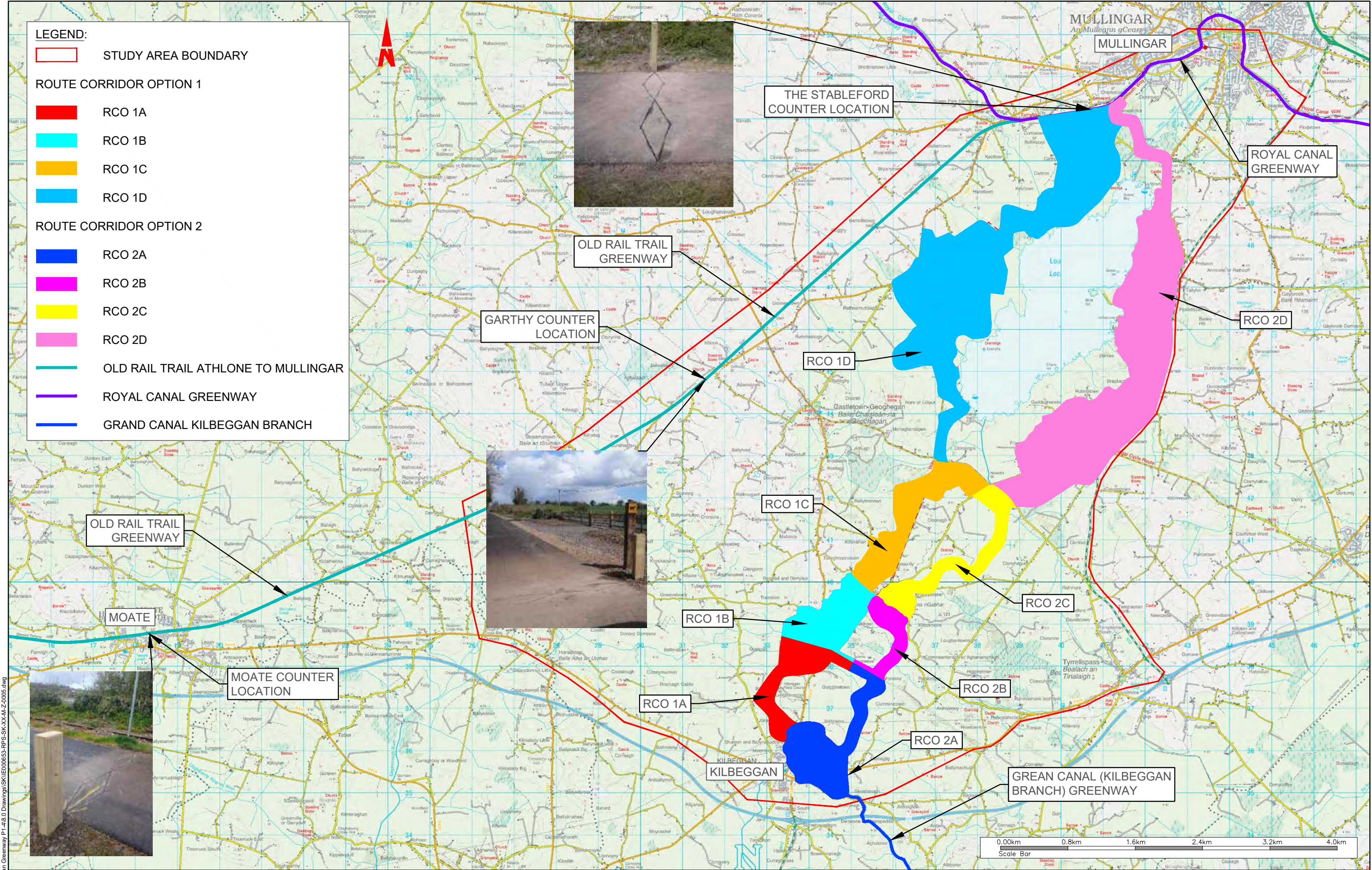
7.1.2 Result

The CBA for the full EPRCO including a link to Lilliput Adventure Centre demonstrated a Benefit to Cost Ratio (BCR) of 1.13 over a 30-year appraisal. As this BCR is greater than 1.0, it is representative of the benefits of this project outweighing the costs of its construction. A link to Lilliput Adventure Centre would be feasible from a cost benefit perspective as calculated using TEAM.

A large, light grey abstract shape with rounded corners and a diagonal cutout. The cutout is filled with a maroon color. The text 'Appendix A Route Corridor Options Drawing' is positioned within the grey area.

Appendix A

Route Corridor Options Drawing



T:\IE000653 - Mullingar Kilbeggan Greenway P1 418.0 Drawings\SK\IE000653-RPS-SK-XX-M-Z-0005.dwg

Client



Bonneagair Iompair Éireann
Transport Infrastructure Ireland



WESTMEATH COUNTY COUNCIL
Comhairle Chontae na hIarmhí

General Notes

(i) Hard copies, dwf and pdf will form a controlled issue of the drawing. All other formats (dwg etc.) are deemed to be an uncontrolled issue and any work carried out based on these files is at the recipients own risk. RPS will not accept any responsibility for any errors from the use of these files, either by human error by the recipient, listing of the un-dimensioned measurements, compatibility with the recipients software, and any errors arising when these files are used to aid the recipients drawing production, or setting out on site.

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(iv) Information including topographical survey, geotechnical investigation and utility detail used in the design have been provided by others.

(v) All Levels refer to Ordnance Survey Datum, Malin Head.

Rev	Date	By	App	Amendment / Issue
P02	26.11.24	Mc		FOR INFORMATION
P01	13.09.24	Mc		FOR INFORMATION



A TETRA TECH COMPANY

Model File Identifier
IE000653-RPS-SK-XX-M-Z-0005

Scale
1:40,000 @ A1
1:80,000 @ A3

Project
KILBEGGAN TO MULLINGAR
GREENWAY

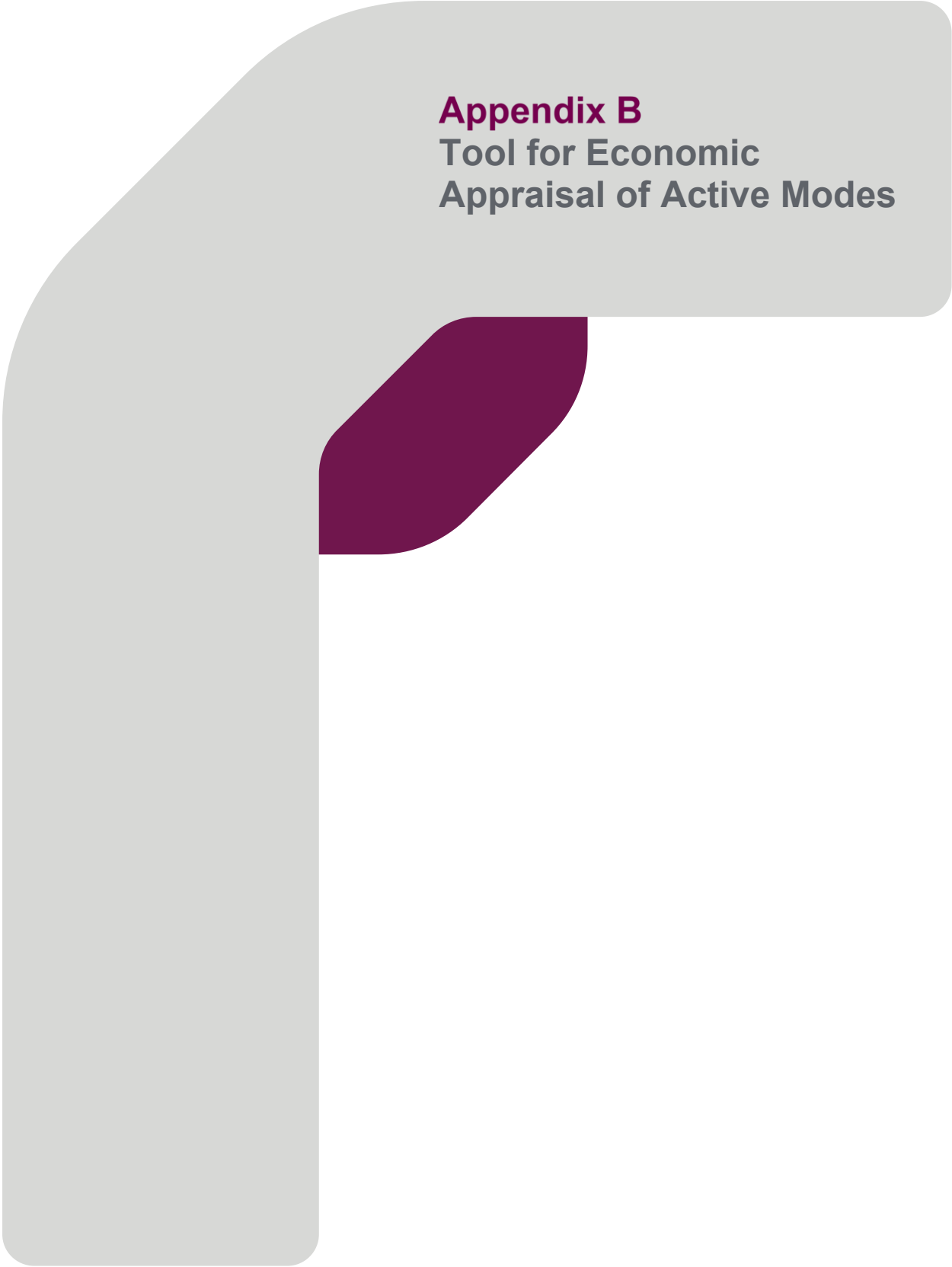
Title
ROUTE CORRIDOR OPTIONS
USER DATA LOCATIONS

Sheets
01 of 01

File Identifier
IE000653-RPS-SK-XX-M-Z-0005

Status
S2

Rev
P02



Appendix B

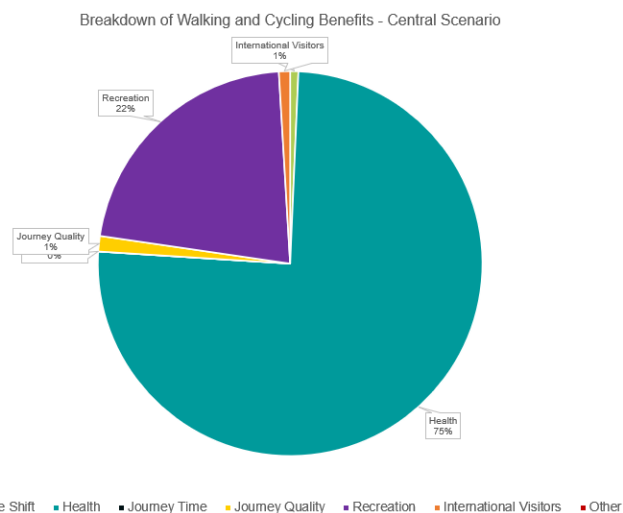
Tool for Economic Appraisal of Active Modes

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 1A SUMMARY

A. Cost Benefit Analysis

Tick to include:		Present Value
☒	Mode Shift	€66,694
☒	Vehicle Operating & Ownership Costs	€18,359
☒	Carbon	€33,436
☒	Air Quality	€1,742
☒	Noise	€1,138
☒	Congestion	€12,019
Health		€7,292,358
☒	Reduced Mortality	€7,137,212
☒	Workplace Absenteeism	€155,146
☒	Journey Time	€0
☒	Journey Quality	€125,627
☒	Recreation	€2,106,448
☒	International Visitors	€91,090
Other		
Present Value of Benefits (PVB)		€9,682,217
Present Value of Costs (PVC)		€6,030,017
Net Present Value (NPV)		€3,652,200
Benefit-to-Cost Ratio (BCR)		1.61



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€18.4
Carbon	€33.4
Air Quality	€1.7
Noise	€1.1
Congestion	€12.0
Reduced Mortality	€7,137.2
Workplace Absenteeism	€155.1
Journey Time	-
Journey Quality	€125.6
Recreation	€2,106.4
International Visitors	€91.1
Present Value of Benefits (€000s)	€9,682.2
Present Value of Costs	-€6,030.0
Economic Net Present Value	€3,652.2

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity

Low

Central

High

Present Value of Benefits

€8,669,366

€9,682,217

€10,640,142

Benefits Sensitivity

-20%

-10%

+0%

+10%

+20%

Present Value of Benefits

€7,745,773

€8,713,995

€9,682,217

€10,650,438

€11,618,660

Costs Sensitivity

-20%

-10%

+0%

+10%

+20%

Present Value of Costs

€4,824,013

€5,427,015

€6,030,017

€6,633,018

€7,236,020

C. Sensitivity Analysis - Combined BCRs

Demand Sensitivity

Low

Central

High

-20%

-10%

+0%

+10%

+20%

1.80

2.01

2.21

1.60

1.78

1.96

1.44

1.61

1.76

1.31

1.46

1.60

1.20

1.34

1.47

Benefit Sensitivity

-20%

-10%

+0%

+10%

+20%

1.03

1.16

1.28

1.41

1.54

1.16

1.30

1.45

1.59

1.73

1.28

1.45

1.61

1.77

1.93

1.41

1.59

1.77

1.94

2.12

1.54

1.73

1.93

2.12

2.31

D. Other Economic Indicators

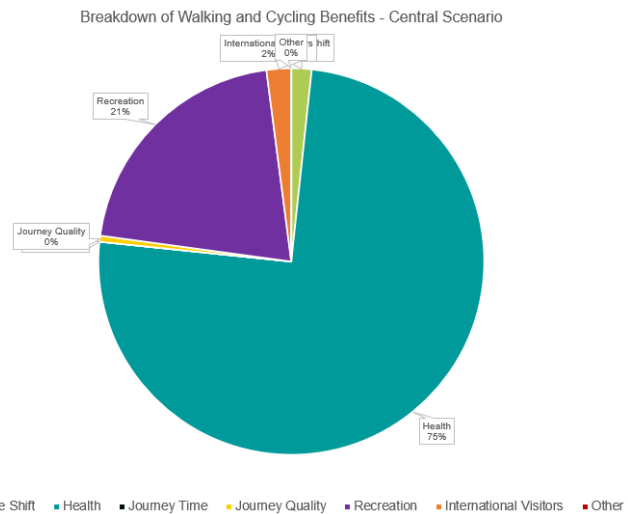
D. Other Economic Indicators	
Costs	
Cost per new user	€25,021
Cost per user	€25,021
Cost per scheme km	€753,752
Carbon	
Total tonnes of CO2 avoided	201
Cost per tonne of CO2 avoided	€29,969
Mode Shift	
Annual vehicle kilometres avoided	13,036
Cost per driving kilometre avoided	€462.55
Benefit per km travelled	
Pedestrians	€1.38
Cyclists	€1.47

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 1B SUMMARY

A. Cost Benefit Analysis

Task to include:		Present Value
☒	Mode Shift	€23,569
☒	Vehicle Operating & Ownership Costs	€8,078
☒	Carbon	€11,315
☒	Air Quality	€413
☒	Noise	€268
☒	Congestion	€3,496
Health		€1,042,658
☒	Reduced Mortality	€1,009,657
☒	Workplace Absenteeism	€33,001
Journey Time		€0
☒	Journey Quality	€7,035
☒	Recreation	€289,228
☒	International Visitors	€28,725
Other		€0
Present Value of Benefits (PVB)		€1,391,215
Present Value of Costs (PVC)		€1,439,057
Net Present Value (NPV)		-€47,842
Benefit-to-Cost Ratio (BCR)		0.97



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€8.1
Carbon	€11.3
Air Quality	€0.4
Noise	€0.3
Congestion	€3.5
Reduced Mortality	€1,009.7
Workplace Absenteeism	€33.0
Journey Time	-
Journey Quality	€7.0
Recreation	€289.2
International Visitors	€28.7
Present Value of Benefits (€000s)	€1,391.2
Present Value of Costs	-€1,439.1
Economic Net Present Value	-€47.8

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity

	Low	Central	High
Present Value of Benefits	€1,243,530	€1,391,215	€1,515,527

Benefits Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Benefits	€1,112,972	€1,252,094	€1,391,215	€1,530,337	€1,669,458

Costs Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Costs	€1,151,246	€1,295,151	€1,439,057	€1,582,963	€1,726,868

C. Sensitivity Analysis - Combined BCRs

Demand Sensitivity

	Low	Central	High
-20%	1.08	1.21	1.32
-10%	0.96	1.07	1.17
+0%	0.86	0.97	1.05
+10%	0.79	0.88	0.96
+20%	0.72	0.81	0.88

Benefit Sensitivity

	-20%	-10%	+0%	+10%	+20%
-20%	0.62	0.70	0.77	0.85	0.93
-10%	0.70	0.78	0.87	0.96	1.04
+0%	0.77	0.87	0.97	1.06	1.16
+10%	0.85	0.96	1.06	1.17	1.28
+20%	0.93	1.04	1.16	1.28	1.39

D. Other Economic Indicators

D. Other Economic Indicators	
Costs	
Cost per new user	€18,935
Cost per user	€18,935
Cost per scheme km	€757,398
Carbon	
Total tonnes of CO2 avoided	68
Cost per tonne of CO2 avoided	€21,133
Mode Shift	
Annual vehicle kilometres avoided	5,770
Cost per driving kilometre avoided	€249.39
Benefit per km travelled	
Pedestrians	€2.63
Cyclists	€1.69

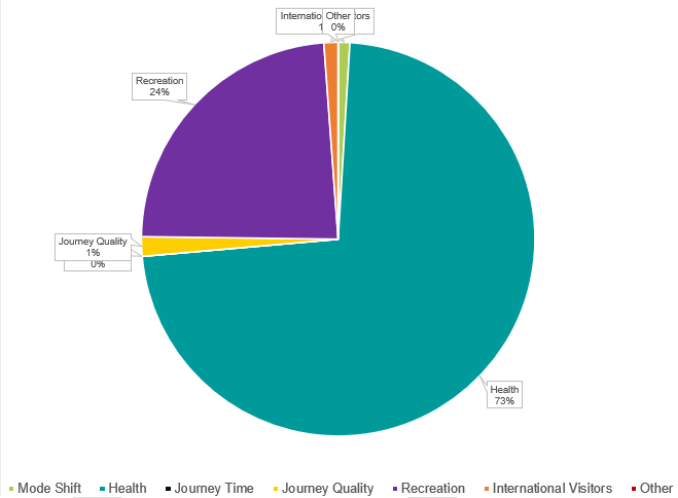
Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 1C SUMMARY

A. Cost Benefit Analysis

Tick to include:	Present Value
☒ Mode Shift	€23,569
☒ Vehicle Operating & Ownership Costs	€8,078
☒ Carbon	€11,315
☒ Air Quality	€413
☒ Noise	€268
☒ Congestion	€3,496
Health	€1,795,260
☒ Reduced Mortality	€1,746,335
☒ Workplace Absenteeism	€48,926
Journey Time	€0
☒ Journey Quality	€39,460
☒ Recreation	€583,934
☒ International Visitors	€28,725
Other	€0
Present Value of Benefits (PVB)	€2,470,949
Present Value of Costs (PVC)	€2,784,483
Net Present Value (NPV)	-€313,534
Benefit-to-Cost Ratio (BCR)	0.89

Breakdown of Walking and Cycling Benefits - Central Scenario



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€8.1
Carbon	€11.3
Air Quality	€0.4
Noise	€0.3
Congestion	€3.5
Reduced Mortality	€1,746.3
Workplace Absenteeism	€48.9
Journey Time	-
Journey Quality	€39.5
Recreation	€583.9
International Visitors	€28.7
Present Value of Benefits (€000s)	€2,470.9
Present Value of Costs	-€2,784.5
Economic Net Present Value	-€313.5

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs					
Demand Sensitivity		<i>Low</i>	<i>Central</i>	<i>High</i>	
Present Value of Benefits		€2,211,090	€2,470,949	€2,699,279	
Benefits Sensitivity		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Present Value of Benefits		€1,976,759	€2,223,854	€2,470,949	€2,718,044
Costs Sensitivity		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Present Value of Costs		€2,227,586	€2,506,035	€2,784,483	€3,062,931
Costs Sensitivity		<i>+20%</i>			
Present Value of Costs					€3,341,379
C. Sensitivity Analysis - Combined BCRs					
		Demand Sensitivity			
		<i>Low</i>	<i>Central</i>	<i>High</i>	
Cost Sensitivity	<i>-20%</i>	0.99	1.11	1.21	
	<i>-10%</i>	0.88	0.99	1.08	
	<i>+0%</i>	0.79	0.89	0.97	
	<i>+10%</i>	0.72	0.81	0.88	
	<i>+20%</i>	0.66	0.74	0.81	
		Benefit Sensitivity			
		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Cost Sensitivity	<i>-20%</i>	0.57	0.64	0.71	0.78
	<i>-10%</i>	0.64	0.72	0.80	0.88
	<i>+0%</i>	0.71	0.80	0.89	0.98
	<i>+10%</i>	0.78	0.88	0.98	1.07
	<i>+20%</i>	0.85	0.96	1.06	1.17

D. Other Economic Indicators

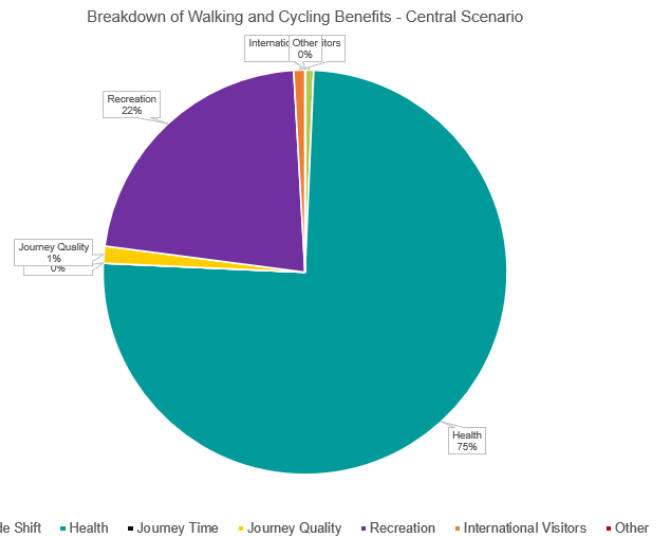
D. Other Economic Indicators	
Costs	
Cost per new user	€36,638
Cost per user	€36,638
Cost per scheme km	€618,774
Carbon	
Total tonnes of CO2 avoided	68
Cost per tonne of CO2 avoided	€40,892
Mode Shift	
Annual vehicle kilometres avoided	5,770
Cost per driving kilometre avoided	€482.56
Benefit per km travelled	
Pedestrians	€1.56
Cyclists	€1.54

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 1D SUMMARY

A. Cost Benefit Analysis

Tick to include:		Present Value
☒	Mode Shift	€68,295
☒	Vehicle Operating & Ownership Costs	€18,911
☒	Carbon	€34,037
☒	Air Quality	€1,794
☒	Noise	€1,172
☒	Congestion	€12,380
☒	Health	€7,481,584
☒	Reduced Mortality	€7,328,369
☒	Workplace Absenteeism	€153,215
☒	Journey Time	€0
☒	Journey Quality	€134,970
☒	Recreation	€2,196,834
☒	International Visitors	€89,956
	Other	€0
Present Value of Benefits (PVB)		€9,971,638
Present Value of Costs (PVC)		€13,556,235
Net Present Value (NPV)		-€3,584,596
Benefit-to-Cost Ratio (BCR)		0.74



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€18.9
Carbon	€34.0
Air Quality	€1.8
Noise	€1.2
Congestion	€12.4
Reduced Mortality	€7,328.4
Workplace Absenteeism	€153.2
Journey Time	-
Journey Quality	€135.0
Recreation	€2,196.8
International Visitors	€90.0
Present Value of Benefits (€000s)	€9,971.6
Present Value of Costs	-€13,556.2
Economic Net Present Value	-€3,584.6

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity

	Low	Central	High
Present Value of Benefits	€8,400,092	€9,971,638	€11,569,356

Benefits Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Benefits	€7,977,311	€8,974,474	€9,971,638	€10,968,802	€11,965,966

Costs Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Costs	€10,844,988	€12,200,611	€13,556,235	€14,911,858	€16,267,482

C. Sensitivity Analysis - Combined BCRs

Demand Sensitivity

	Low	Central	High
-20%	0.77	0.92	1.07
-10%	0.69	0.82	0.95
+0%	0.62	0.74	0.85
+10%	0.56	0.67	0.78
+20%	0.52	0.61	0.71

Benefit Sensitivity

	-20%	-10%	+0%	+10%	+20%
-20%	0.47	0.53	0.59	0.65	0.71
-10%	0.53	0.60	0.66	0.73	0.79
+0%	0.59	0.66	0.74	0.81	0.88
+10%	0.65	0.73	0.81	0.89	0.97
+20%	0.71	0.79	0.88	0.97	1.06

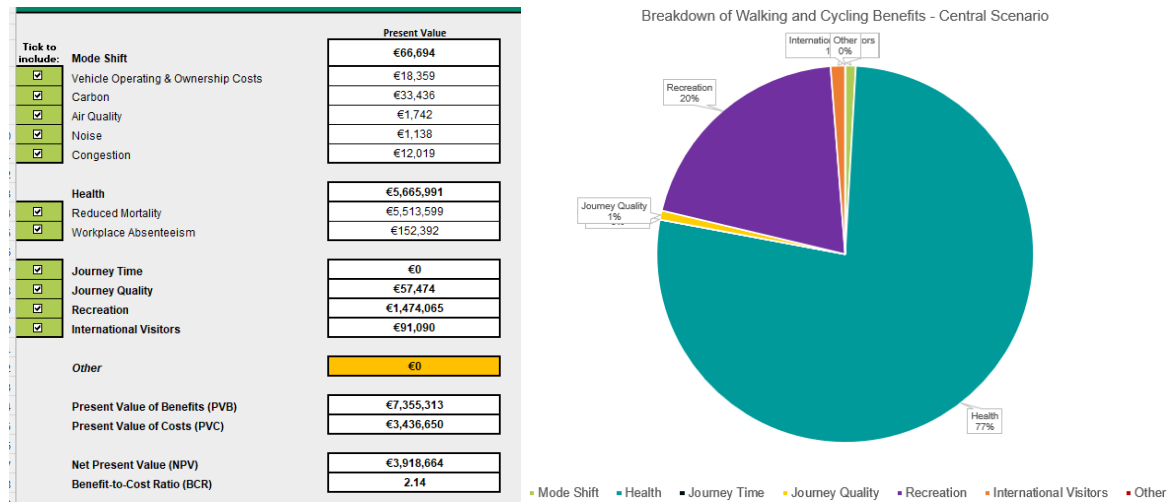
D. Other Economic Indicators

D. Other Economic Indicators	
Costs	
Cost per new user	€56,959
Cost per user	€56,959
Cost per scheme km	€961,435
Carbon	
Total tonnes of CO2 avoided	205
Cost per tonne of CO2 avoided	€66,185
Mode Shift	
Annual vehicle kilometres avoided	13,429
Cost per driving kilometre avoided	€1,009.51
Benefit per km travelled	
Pedestrians	€1.38
Cyclists	€0.89

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 2A SUMMARY

A. Cost Benefit Analysis



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€18.4
Carbon	€33.4
Air Quality	€1.7
Noise	€1.1
Congestion	€12.0
Reduced Mortality	€5,513.6
Workplace Absenteeism	€152.4
Journey Time	-
Journey Quality	€57.5
Recreation	€1,474.1
International Visitors	€91.1
Present Value of Benefits (€000s)	€7,355.3
Present Value of Costs	-€3,436.6
Economic Net Present Value	€3,918.7

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity		Low	Central	High		
Present Value of Benefits		€6,592,968	€7,355,313	€8,088,278		
Benefits Sensitivity		-20%	-10%	+0%	+10%	+20%
Present Value of Benefits		€5,884,250	€6,619,782	€7,355,313	€8,090,844	€8,826,376
Costs Sensitivity		-20%	-10%	+0%	+10%	+20%
Present Value of Costs		€2,749,320	€3,092,985	€3,436,650	€3,780,314	€4,123,979

C. Sensitivity Analysis - Combined BCRs

		Demand Sensitivity				
		Low	Central	High		
Cost Sensitivity	-20%	2.40	2.68	2.94		
	-10%	2.13	2.38	2.62		
	+0%	1.92	2.14	2.35		
	+10%	1.74	1.95	2.14		
	+20%	1.60	1.78	1.96		
		Benefit Sensitivity				
		-20%	-10%	+0%	+10%	+20%
Cost Sensitivity	-20%	1.37	1.54	1.71	1.88	2.05
	-10%	1.54	1.73	1.93	2.12	2.31
	+0%	1.71	1.93	2.14	2.35	2.57
	+10%	1.88	2.12	2.35	2.59	2.83
	+20%	2.05	2.31	2.57	2.83	3.08

D. Other Economic Indicators

D. Other Economic Indicators

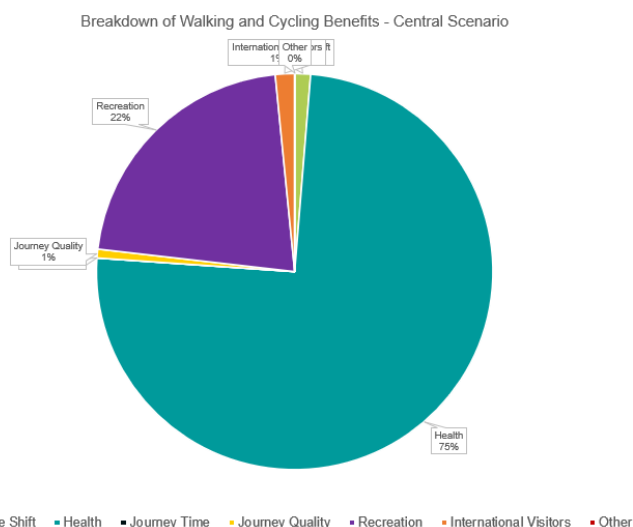
Costs	
Cost per new user	€14,260
Cost per user	€14,260
Cost per scheme km	€859,162
Carbon	
Total tonnes of CO2 avoided	201
Cost per tonne of CO2 avoided	€17,080
Mode Shift	
Annual vehicle kilometres avoided	13,036
Cost per driving kilometre avoided	€263.62
Benefit per km travelled	
Pedestrians	€1.73
Cyclists	€1.53

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 2B SUMMARY

A. Cost Benefit Analysis

		Present Value
Tick to include:	Mode Shift	€23,569
☒	Vehicle Operating & Ownership Costs	€8,078
☒	Carbon	€11,315
☒	Air Quality	€413
☒	Noise	€268
☒	Congestion	€3,496
☒	Health	€1,370,023
☒	Reduced Mortality	€1,332,198
☒	Workplace Absenteeism	€37,825
☒	Journey Time	€0
☒	Journey Quality	€13,173
☒	Recreation	€395,786
☒	International Visitors	€28,725
Other		€0
Present Value of Benefits (PVB)		€1,831,276
Present Value of Costs (PVC)		€2,123,205
Net Present Value (NPV)		-€291,929
Benefit-to-Cost Ratio (BCR)		0.86



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€8.1
Carbon	€11.3
Air Quality	€0.4
Noise	€0.3
Congestion	€3.5
Reduced Mortality	€1,332.2
Workplace Absenteeism	€37.8
Journey Time	-
Journey Quality	€13.2
Recreation	€395.8
International Visitors	€28.7
Present Value of Benefits (€000s)	€1,831.3
Present Value of Costs	-€2,123.2
Economic Net Present Value	-€291.9

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs					
Demand Sensitivity		<i>Low</i>	<i>Central</i>	<i>High</i>	
Present Value of Benefits		€1,636,776	€1,831,276	€1,994,599	
Benefits Sensitivity		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Present Value of Benefits		€1,465,021	€1,648,148	€1,831,276	€2,014,404
Costs Sensitivity		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Present Value of Costs		€1,698,564	€1,910,884	€2,123,205	€2,335,525
Costs Sensitivity		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Present Value of Costs		€1,698,564	€1,910,884	€2,123,205	€2,335,525

C. Sensitivity Analysis - Combined BCRs					
		Demand Sensitivity			
		<i>Low</i>	<i>Central</i>	<i>High</i>	
Cost Sensitivity	<i>-20%</i>	0.96	1.08	1.17	
	<i>-10%</i>	0.86	0.96	1.04	
	<i>+0%</i>	0.77	0.86	0.94	
	<i>+10%</i>	0.70	0.78	0.85	
	<i>+20%</i>	0.64	0.72	0.78	
		Benefit Sensitivity			
		<i>-20%</i>	<i>-10%</i>	<i>+0%</i>	<i>+10%</i>
Cost Sensitivity	<i>-20%</i>	0.55	0.62	0.69	0.76
	<i>-10%</i>	0.62	0.70	0.78	0.85
	<i>+0%</i>	0.69	0.78	0.86	0.95
	<i>+10%</i>	0.76	0.85	0.95	1.04
	<i>+20%</i>	0.83	0.93	1.04	1.14

D. Other Economic Indicators

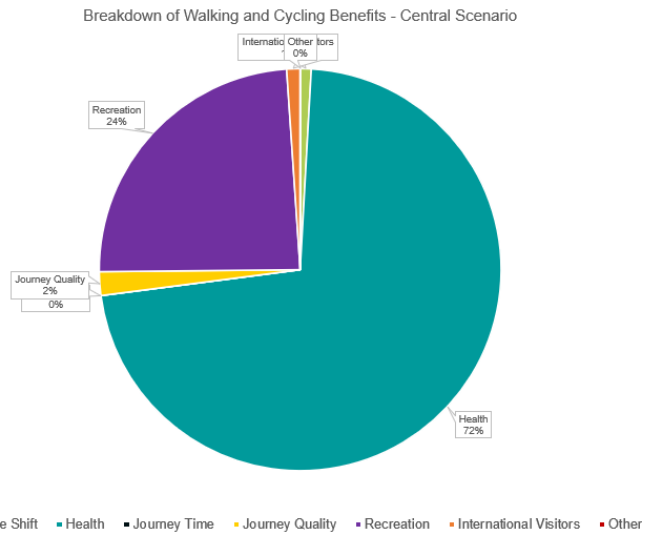
D. Other Economic Indicators	
Costs	
Cost per new user	€27,937
Cost per user	€27,937
Cost per scheme km	€816,617
Carbon	
Total tonnes of CO2 avoided	68
Cost per tonne of CO2 avoided	€31,181
Mode Shift	
Annual vehicle kilometres avoided	5,770
Cost per driving kilometre avoided	€367.96
Benefit per km travelled	
Pedestrians	€2.62
Cyclists	€1.61

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 2C SUMMARY

A. Cost Benefit Analysis

		Present Value
Tick to include:	Mode Shift	€23,569
☒	Vehicle Operating & Ownership Costs	€8,078
☒	Carbon	€11,315
☒	Air Quality	€413
☒	Noise	€268
☒	Congestion	€3,496
Health		€1,923,578
☒	Reduced Mortality	€1,874,652
☒	Workplace Absenteeism	€48,926
Journey Time		€0
☒	Journey Quality	€50,684
☒	Recreation	€642,810
☒	International Visitors	€28,725
Other		€0
Present Value of Benefits (PVB)		€2,669,367
Present Value of Costs (PVC)		€3,436,478
Net Present Value (NPV)		-€767,111
Benefit-to-Cost Ratio (BCR)		0.78



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal	
Vehicle Operating & Ownership Costs	€8.1
Carbon	€11.3
Air Quality	€0.4
Noise	€0.3
Congestion	€3.5
Reduced Mortality	€1,874.7
Workplace Absenteeism	€48.9
Journey Time	-
Journey Quality	€50.7
Recreation	€642.8
International Visitors	€28.7
Present Value of Benefits (€000s)	€2,669.4
Present Value of Costs	-€3,436.5
Economic Net Present Value	-€767.1

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity		Low	Central	High
Present Value of Benefits		€2,389,261	€2,669,367	€2,917,943

Benefits Sensitivity		-20%	-10%	+0%	+10%	+20%
Present Value of Benefits		€2,135,493	€2,402,430	€2,669,367	€2,936,303	€3,203,240

Costs Sensitivity		-20%	-10%	+0%	+10%	+20%
Present Value of Costs		€2,749,182	€3,092,830	€3,436,478	€3,780,126	€4,123,774

C. Sensitivity Analysis - Combined BCRs

		Demand Sensitivity				
		Low	Central	High		
Cost Sensitivity	-20%	0.87	0.97	1.06		
	-10%	0.77	0.86	0.94		
	+0%	0.70	0.78	0.85		
	+10%	0.63	0.71	0.77		
	+20%	0.58	0.65	0.71		
		Benefit Sensitivity				
		-20%	-10%	+0%	+10%	+20%
Cost Sensitivity	-20%	0.50	0.56	0.62	0.68	0.75
	-10%	0.56	0.63	0.70	0.77	0.84
	+0%	0.62	0.70	0.78	0.85	0.93
	+10%	0.68	0.77	0.85	0.94	1.03
	+20%	0.75	0.84	0.93	1.03	1.12

D. Other Economic Indicators

D. Other Economic Indicators

Costs	
Cost per new user	€45,217
Cost per user	€45,217
Cost per scheme km	€673,819
Carbon	
Total tonnes of CO2 avoided	68
Cost per tonne of CO2 avoided	€50,467
Mode Shift	
Annual vehicle kilometres avoided	5,770
Cost per driving kilometre avoided	€595.56
Benefit per km travelled	
Pedestrians	€1.41
Cyclists	€1.52

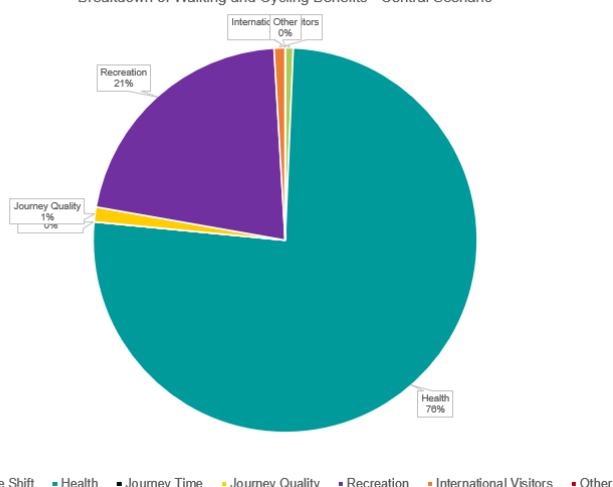
Summary of Outputs from the Tool for Economic Appraisal of Active Modes

ROUTE CORRIDOR OPTION 2D SUMMARY

A. Cost Benefit Analysis

Tick to include:		Present Value
Mode Shift		€95,137
☒	Vehicle Operating & Ownership Costs	€26,173
☒	Carbon	€47,724
☒	Air Quality	€2,483
☒	Noise	€1,623
☒	Congestion	€17,134
Health		€10,668,483
☒	Reduced Mortality	€10,446,385
☒	Workplace Absenteeism	€222,097
Journey Time		€0
☒	Journey Quality	€174,272
☒	Recreation	€2,997,479
☒	International Visitors	€130,398
Other		€0
Present Value of Benefits (PVB)		€14,065,768
Present Value of Costs (PVC)		€14,420,896
Net Present Value (NPV)		-€355,127
Benefit-to-Cost Ratio (BCR)		0.98

Breakdown of Walking and Cycling Benefits - Central Scenario



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€26.2
Carbon	€47.7
Air Quality	€2.5
Noise	€1.6
Congestion	€17.1
Reduced Mortality	€10,446.4
Workplace Absenteeism	€222.1
Journey Time	-
Journey Quality	€174.3
Recreation	€2,997.5
International Visitors	€130.4
Present Value of Benefits (€000s)	€14,065.8
Present Value of Costs	-€14,420.9
Economic Net Present Value	-€355.1

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity

	Low	Central	High
Present Value of Benefits	€10,451,571	€14,065,768	€17,706,249

Benefits Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Benefits	€11,252,615	€12,659,191	€14,065,768	€15,472,345	€16,878,922

Costs Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Costs	€11,536,717	€12,978,806	€14,420,896	€15,862,985	€17,305,075

C. Sensitivity Analysis - Combined BCRs

Demand Sensitivity

	Low	Central	High
-20%	0.91	1.22	1.53
-10%	0.81	1.08	1.36
+0%	0.72	0.98	1.23
+10%	0.66	0.89	1.12
+20%	0.60	0.81	1.02

Benefit Sensitivity

	-20%	-10%	+0%	+10%	+20%
-20%	0.62	0.70	0.78	0.86	0.94
-10%	0.70	0.79	0.88	0.97	1.05
+0%	0.78	0.88	0.98	1.07	1.17
+10%	0.86	0.97	1.07	1.18	1.29
+20%	0.94	1.05	1.17	1.29	1.40

D. Other Economic Indicators

D. Other Economic Indicators	
Costs	
Cost per new user	€41,800
Cost per user	€41,800
Cost per scheme km	€895,708
Carbon	
Total tonnes of CO2 avoided	287
Cost per tonne of CO2 avoided	€50,214
Mode Shift	
Annual vehicle kilometres avoided	18,585
Cost per driving kilometre avoided	€775.94
Benefit per km travelled	
Pedestrians	€1.37
Cyclists	€0.79

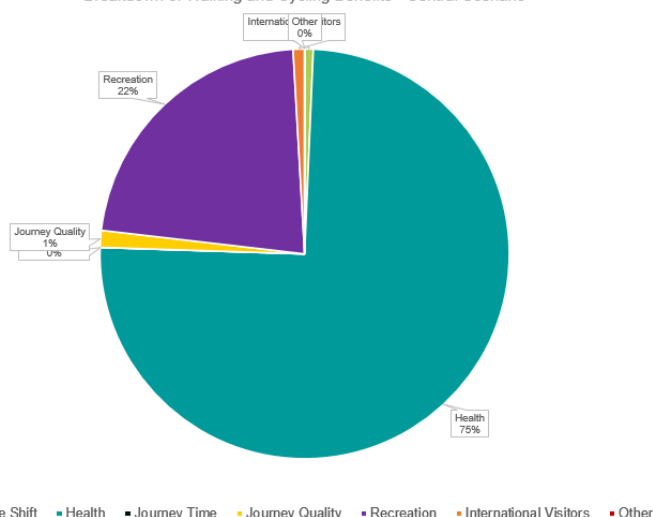
Summary of Outputs from the Tool for Economic Appraisal of Active Modes

EMERGING PREFERRED ROUTE CORRIDOR OPTION SUMMARY

A. Cost Benefit Analysis

		Present Value
Tick to include:	Mode Shift	€188,725
☒	Vehicle Operating & Ownership Costs	€52,204
☒	Carbon	€94,156
☒	Air Quality	€4,953
☒	Noise	€3,237
☒	Congestion	€34,175
	Health	€20,753,521
☒	Reduced Mortality	€20,327,352
☒	Workplace Absenteeism	€426,169
	Journey Time	€0
☒	Journey Quality	€368,766
☒	Recreation	€6,174,792
☒	International Visitors	€250,213
	Other	€0
Present Value of Benefits (PVB)		€27,736,017
Present Value of Costs (PVC)		€23,590,876
Net Present Value (NPV)		€4,145,141
Benefit-to-Cost Ratio (BCR)		1.18

Breakdown of Walking and Cycling Benefits - Central Scenario



B. Discounted Annual Economic Flows

B. Discounted Annual Economic Flows (€000s) - Central Scenario

Discount Rate for Economic Appraisal

Vehicle Operating & Ownership Costs	€52.2
Carbon	€94.2
Air Quality	€5.0
Noise	€3.2
Congestion	€34.2
Reduced Mortality	€20,327.4
Workplace Absenteeism	€426.2
Journey Time	-
Journey Quality	€368.8
Recreation	€6,174.8
International Visitors	€250.2
Present Value of Benefits (€000s)	€27,736.0
Present Value of Costs	-€23,590.9
Economic Net Present Value	€4,145.1

Summary of Outputs from the Tool for Economic Appraisal of Active Modes

C. Sensitivity Analysis

C. Sensitivity Analysis - Potential Range of Benefits & Costs

Demand Sensitivity

	Low	Central	High
Present Value of Benefits	€22,735,780	€27,736,017	€32,762,885

Benefits Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Benefits	€22,188,813	€24,962,415	€27,736,017	€30,509,618	€33,283,220

Costs Sensitivity

	-20%	-10%	+0%	+10%	+20%
Present Value of Costs	€18,872,701	€21,231,788	€23,590,876	€25,949,963	€28,309,051

C. Sensitivity Analysis - Combined BCRs

Demand Sensitivity

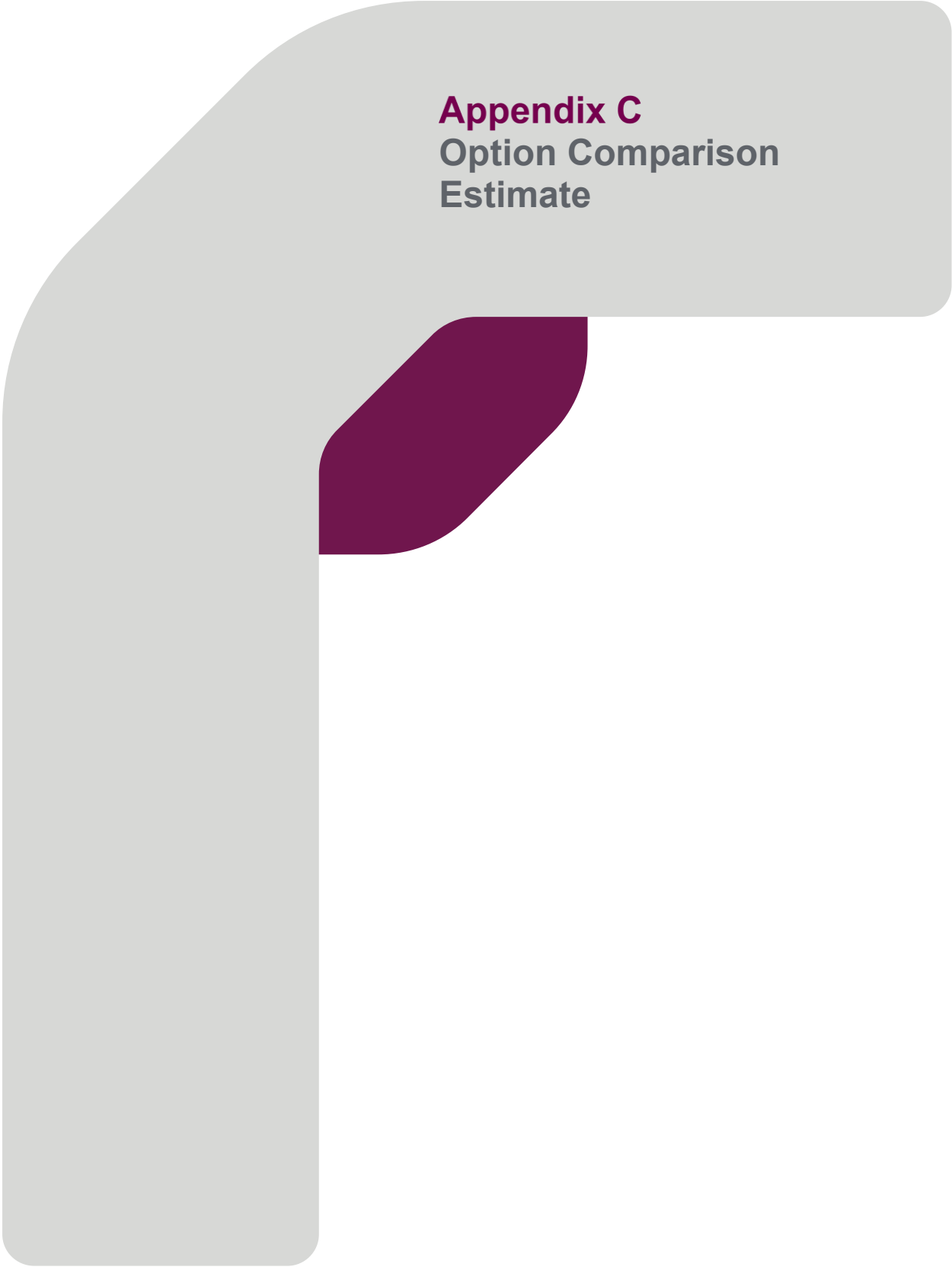
	Low	Central	High
-20%	1.20	1.47	1.74
-10%	1.07	1.31	1.54
+0%	0.96	1.18	1.39
+10%	0.88	1.07	1.26
+20%	0.80	0.98	1.16

Benefit Sensitivity

	-20%	-10%	+0%	+10%	+20%
-20%	0.75	0.85	0.94	1.03	1.13
-10%	0.85	0.95	1.06	1.16	1.27
+0%	0.94	1.06	1.18	1.29	1.41
+10%	1.03	1.16	1.29	1.42	1.55
+20%	1.13	1.27	1.41	1.55	1.69

D. Other Economic Indicators

D. Other Economic Indicators	
Costs	
Cost per new user	€35,636
Cost per user	€35,636
Cost per scheme km	€821,982
Carbon	
Total tonnes of CO2 avoided	567
Cost per tonne of CO2 avoided	€41,635
Mode Shift	
Annual vehicle kilometres avoided	37,070
Cost per driving kilometre avoided	€636.40
Benefit per km travelled	
Pedestrians	€1.38
Cyclists	€0.79

A large, light grey abstract shape with rounded corners and a diagonal cutout. A maroon-colored shape fills the cutout. The text 'Appendix C Option Comparison Estimate' is positioned within the upper right portion of the grey shape.

Appendix C

Option Comparison Estimate

OPTION COMPARISON ESTIMATES (PHASE 2)											
Project Name	Kilbeggan to Mullingar Greenway				TII Ref.	WH/23/32548					
					Phase	2		X-Sec			
Possible Mid-Construction Date	2030	Current Year	2024	Inflation-Construction	3%	Inflation Land & Property		3%	% Prog. Risk		5%
Option Number / Reference	1A	2A	1B	2B	1C	2C	1D	2D	Link CD	Lilliput Link	
Mainline Length	8.00	4.00	1.90	2.60	4.50	5.10	14.10	16.10	1.50	2.90	
Grade Separated Junctions	0	0	0	0	0	0	0	0	0	0	
No. of Bridges (Ordinary)	2	3	2	3	1	1	8	7	0	0	
No.Viaducts / Signature Structures	0	0	0	0	0	0	0	0	0	0	
OPTIONS COSTS											
BASE COSTS (Incl VAT & Project Specific Risk Contingencies) - €million											
Main Contract Construction	€5,465,188	€3,209,893	€1,300,249	€1,958,022	€2,493,016	€3,019,649	€13,505,362	€14,128,909	€729,094	€1,783,193	
Main Contract Supervision	€385,211	€226,248	€91,648	€138,010	€175,719	€212,839	€951,920	€995,870	€51,390	€125,688	
Archaeology	€361,136	€212,107	€85,920	€129,385	€164,737	€199,536	€892,425	€933,628	€48,178	€117,832	
Advance Works and Other Contracts	€240,757	€141,405	€57,280	€86,256	€109,824	€133,024	€594,950	€622,419	€32,119	€78,555	
Public Transport Connectivity/Asset Renewal	€0	€0	€0	€0	€0	€0	€0	€0	€0	€0	
Land & Property	€779,658	€405,017	€192,383	€263,261	€283,512	€486,021	€810,035	€972,041	€30,376	€70,878	
Planning & Design	€385,211	€226,248	€91,648	€138,010	€175,719	€212,839	€951,920	€995,870	€51,390	€125,688	
Subtotal	€7,617,162	€4,420,918	€1,819,127	€2,712,945	€3,402,528	€4,263,908	€17,706,611	€18,648,738	€942,547	€2,301,833	
Total Inflation Allowance	€1,404,221	€814,995	€335,355	€500,130	€627,255	€786,050	€3,264,208	€3,437,889	€173,758	€424,342	
TII Programme Risk	€380,858	€221,046	€90,956	€135,647	€170,126	€213,195	€885,331	€932,437	€47,127	€115,092	
Option Comparison Estimate	€9,402,241	€5,456,959	€2,245,439	€3,348,722	€4,199,909	€5,263,153	€21,856,149	€23,019,063	€1,163,432	€2,841,267	
Signatures	Project Services						Senior Engineering Inspector				
	Regional Manager						Head of Roads Capital Programme				