



Green Sustainable Travel Corridors Phase 1

Economic Appraisal Report

July 2019

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Executive Summary

Mott MacDonald has undertaken an assessment of transport economic benefits for the proposed Green Sustainable Travel Corridors (GSTC) schemes.

The assessment relates to seven cycle schemes as described in Table 1. The aim is to introduce clearly defined direct routes, which utilise off-road and segregated routes to encourage increased uptake in cycling and walking in the region.

Table 1: Schemes

Work package	GSTC Scheme Name	Scheme Promoter
WP 1	Liverpool City Centre - Speke	Liverpool City Council
WP 2	Seaforth - Southport	Sefton Metropolitan Borough Council
WP 3	Prescot - Runcorn	Halton Borough Council & Knowsley Metropolitan Borough Council
WP 4	Liverpool Loopline	Merseytravel
WP 5	St Helens	St Helens Metropolitan Borough Council
WP 6	Leasowe to Seacombe Ferry Terminal	Wirral Metropolitan Borough Council
WP 7	Runcorn to Daresbury Links	Halton Borough Council

Source: Merseytravel

The outcome of this study is a benefit-cost ratio (BCR) and Value for Money Statement for use at Full Business Case (FBC).

Value for Money Statement

The calculation of the BCR value for each scheme is given in Table 2. The table presents the scheme costs, the scheme costs with optimism bias, the present value of costs (PVC), the present value of benefits (PVB), the BCR and the Value for Money calculation according to Department for Transport (DfT) guidance and criteria¹.

All schemes are classified as High or Very High Value for Money. Overall, the schemes have a **Present Value of Benefits (PVB) of £37.7m** against a **Present Value of Costs of £12.1m** (all in 2010 prices discounted to 2010). This equates to a **BCR of 3.1** which is High Value for Money.

It can be concluded, therefore, that the quantifiable elements of the benefits for the Green Sustainable Travel Corridors produces a strong Value for Money case.

¹ Value for Money Assessment: Advice Note for Local Transport Decision Makers, Department for Transport
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267296/vfm-advice-local-decision-makers.pdf

Table 2: Assessment summary (in £000s, 2010 prices if not stated)

	WP1	WP2	WP3	WP4	WP5	WP6	WP7	Total
Scheme Costs in 2019 prices (£000's)	2,147	3,820	2,917	500	1,515	1,235	2,894	15,027
Scheme Costs (including optimism bias of 15% in 2019 prices, £000's)	2,469	2,469	2,361	405	1,226	1,000	3,328	13,255
(All entries below are present values in £000's discounted to 2010, in 2010 prices)								
Ambience Benefits	1,193	4,429	2,411	408	1,047	739	1,073	11,299
Decongestion Impacts	762	408	1,600	86	707	462	686	4,711
Physical Activity Impacts	3,484	1,865	7,311	394	3,232	2,109	3,135	21,529
Absenteeism Impacts	17	9	37	2	16	11	16	108
Present Value of Costs (PVC)	1,734	3,090	2,355	405	1,223	998	2,340	12,145
Present Value of Benefits (PVB)	5,454	6,710	11,352	889	5,000	3,319	4,907	37,631
Benefit to Cost Ratio (BCR)	3.15	2.17	4.82	2.20	4.09	3.33	2.10	3.10
Value for Money	High	High	Very High	High	Very High	High	High	High

1 Introduction

Mott MacDonald has undertaken an assessment of transport economic benefits for the proposed Green Sustainable Travel Corridors (GSTC) schemes. This report provides a summary of the assessment of transport related benefits that have been calculated.

1.1 Scheme Overview

The assessment relates to seven cycle schemes as described in Table 3. The aim is to introduce clearly defined direct routes, which utilise off-road and segregated routes to encourage increased uptake in cycling and walking in the region.

Table 3: Schemes

Work package	GSTC Scheme Name	Scheme Promoter
WP 1	Liverpool City Centre - Speke	Liverpool City Council
WP 2	Seaforth - Southport	Sefton Metropolitan Borough Council
WP 3	Prescot - Runcorn	Halton Borough Council & Knowsley Metropolitan Borough Council
WP 4	Liverpool Loopline	Merseytravel
WP 5	St Helens	St Helens Metropolitan Borough Council
WP 6	Leasowe to Seacombe Ferry Terminal	Wirral Metropolitan Borough Council
WP 7	Runcorn to Daresbury Links	Halton Borough Council

Source: Merseytravel

The schemes are comprised of:

- WP 1 Liverpool City Centre – Speke: 6.8km of upgraded cycle and walking facilities linking new key housing sites at Festival Gardens and Port of Garston with major employment sites in the city centre and Estuary Commerce Park in Speke
- WP 2 Seaforth – Southport: 15km of new and upgraded cycle and walking facilities which links into a wider strategic cycling route into Liverpool City Centre. The route links major growth areas with new areas of housing and completes the Sefton Coastal cycle route.
- WP 3 Prescot – Runcorn: 7.4km of new and upgraded off-road cycle and walking facilities linking key employment and housing sites at Halsnead, Cronton Colliery with Widnes and Runcorn over the refurbished Silver Jubilee Bridge.
- WP 4 Liverpool Loop Line: Access Improvements to Loop Line along with 6km of upgraded cycle and walking route. The route intersects several planned strategic cycle routes, which will offer a seamless link into the wider LCR routes. Innovative solar LED lighting will be installed in the Walton Vale tunnel on the route.
- WP 5 St Helens: This 6.3km cycle route will link St Helens town centre to Burntonwood and onwards to employment opportunities at Omega. The route also provides links to the proposed Cowley Hill Urban Development Site of 350 plus homes and the Pilkington Park employment site.
- WP6 Leasowe – Seacombe Ferry Terminal: This 3.7km mostly off-road cycle route links Leasowe train station with the numerous employment and housing sites planned for Wirral

Waters. The route then continues to Seacombe Ferry Terminal which allows cyclists and pedestrians an attractive means of crossing the river into the City Centre.

- WP 7 Runcorn - Daresbury: 7.6km of new and upgraded off road cycling and walking infrastructure introduced.

1.2 Report Structure

This technical report provides information on the following:

- The baseline data used;
- The approach to demand forecasting;
- The approach to calculation of benefits; and
- The results of the economic assessment.

The assessment methodology follows TAG ² guidance in respect of proportionality and makes best use of the information available at the time of the assessment.

1.3 Guidance

All demand estimates and the overall economic assessment have been undertaken in line with recognised Department for Transport (DfT) guidance, that are set out in the following:

- Cost benefit analysis - TAG Unit A1.1 Autumn 2014 – Cost Benefit Analysis
- Preparation of scheme costs - TAG Unit A1.2 Autumn 2014 – Scheme Costs
- Cycling scheme assessment - TAG Unit A5.1 Autumn 2014 – Active Mode Appraisal
- Decongestion benefits - TAG Unit A5.4 Autumn 2014 – Marginal External Congestion Costs
- Modelling and Assessment Values – TAG Databook May 2019

1.3.1 Activity Benefits

For the improvement to cycling facilities the activity benefits have been quantified using published research by the World Health Organisation (WHO) and distinguishing two principal sources of benefits:

Mortality

The benefits to new cyclists through the reduction in the relative risk of premature death due to physical inactivity have been calculated. The reduction in relative risk is based on WHO research that indicates that there is a maximum reduction in relative risk of 0.28 with 36 minutes of exercise per day. The average time spent active per day is calculated based on an average cycle trip length of 3.49 km (from the Countywide Travel Survey), and an average cycle speed of 15kph (National Travel Survey 2016) and an assumption that 90% of new trips form part of a return journey. This has then been used to calculate the reduction in relative risk by assuming a linear relationship between the reduction in relative risk and minutes of exercise. The reduction in relative risk is applied to the average mortality rate and multiplied by the number of new cyclists as a result of the scheme to determine the expected change in deaths. This is calculated for the whole of the assessment period and monetised using the value of a prevented fatality from TAG databook.

² Department for Transport: Transport Analysis Guidance

Absenteeism

The benefits of the reductions in absenteeism from work have been calculated based on WHO research which indicates a reduction in absenteeism from cycling of 6% based on 30 minutes activity per day. The average time spent active per day as a result of the scheme is calculated in the same way as physical activity benefits. This is then used to calculate the reduction in absenteeism assuming a linear relationship between reduction in absenteeism and minutes of exercise. This is then applied to the average number of days absent from work (sourced from the Office of National Statistics labour force survey) and multiplied by the number of new users to calculate the reduction in the number of days lost to absenteeism from work. This is calculated for the whole of the assessment period and monetised using the average value of a day's work time from TAG databook.

2 Baseline Demand

2.1 Current Demand

Demand has been extracted from Census 2011 Travel to Work data for Middle Super Output Areas (MSOA) through which each scheme passes. This captures commute trips only. These have been converted to all-purpose trips by applying a factor of 2.2 calculated from the Countywide Travel Survey.

Table 4 presents the daily 2011 cycle demand.

Table 4: 2011 Cycle Demand

ID	Scheme	Commute Trips	All Purpose Trips
WP 1	Liverpool City Centre - Speke	526	1,157
WP 2	Seaforth - Southport	1,858	4,088
WP 3	Prescot - Runcorn	755	1,661
WP 4	Liverpool Loopline	764	1,681
WP 5	St Helens	286	629
WP 6	Leasowe to Seacombe Ferry Terminal	545	1,199
WP 7	Runcorn to Daresbury Links	473	1,041

Source: Census 2011

2.2 Future Year Demand

Forecast years of 2025, 2035 and 2040 have been used for the assessment.

Background growth in demand has been taken from TEMPRO 7.2³ for the Liverpool City Region, which forecasts a small decrease in demand as presented in Table 5. No account has been taken of specific developments which could increase the future demand or of policy measures to increase the level of cycling.

Table 5: TEMPRO 7.2 Growth Factors

	2011-2025	2011-2035	2011-2040
Cycle	0.92	0.90	0.89

³ DfT's Trip End Model Presentation Program

3 Economic Assessment

The assessment has been carried out in line with DfT guidance. A spreadsheet based approach has been used to calculate benefits using appropriate values from TAG. The following elements have been calculated:

- Journey ambiance benefits;
- Physical activity and absenteeism; and
- Decongestion (using the Marginal External Cost (MEC) method).

The scheme has been assumed to open in 2019. An assessment period of 20 years has been assumed. Costs and benefits incurred in future years have been converted to a common price base year of 2010 and discounted to a present value year of 2010. Maintenance costs have not been included.

3.1 Number of Cyclists with the Proposed Scheme

Wardman, Tight and Page (2007) derived a model to forecast the impacts of improvements in the attractiveness of cycling for commuting trips of 7.5 miles or less. The full version of this model gives an expression for the forecast market share for cycling given changes in the utility of the different modes. This model has been used to determine the additional demand as a result of the improvements.

For cyclists the valuation of improvements was identified from Table 4.1.6 in the TAG data book. This gives a value of 7.03 pence per minute for the provision of off-road cycle facilities where no facility was provided previously. To determine the time spent on the new facility a travel speed of 15 km per hour has been assumed in line with TAG. It has been assumed that each cyclist will use a proportion of the proposed route, based on the length of the proposed cycle routes compared to the average cycle trip length. The valuation has only been applied to the part of the route that contains new infrastructure. Table 6 presents the percentage uplift applied to each scheme.

Table 6: Cycle Demand Uplift

ID	Scheme	Cycle Uplift (%)
WP 1	Liverpool City Centre - Speke	1.16
WP 2	Seaforth - Southport	1.02
WP 3	Prescot - Runcorn	1.23
WP 4	Liverpool Loopline	1.01
WP 5	St Helens	1.27
WP 6	Leasowe to Seacombe Ferry Terminal	1.09
WP 7	Runcorn to Daresbury Links	1.16

3.2 Benefits Calculated

Activity benefits have been appraised with reference to WHO research on the benefits in terms of reduced risk of mortality and reductions in work place absenteeism.

The marginal external costs method (as per guidance in TAG Unit A5.4) was used to calculate the monetary impacts as result of a reduction in highway km, of the following:

- Congestion;
- Infrastructure;
- Accidents;
- Local Air Quality;
- Noise;
- Greenhouse Gases; and
- Indirect Taxation.

The calculation of marginal external costs used the pence per km valuations for inner and outer conurbation for average congestion conditions. An average trip distance of 3.49 km was used and it was assumed that 26% of new trips diverted from car.

3.3 Scheme Costs

Table 7 presents the scheme costs in 2019 prices. Optimism bias has been applied at 15% as per TAG A1.2.

Table 7: Scheme Costs (2019 prices)

ID	Scheme	Scheme Cost	Scheme Cost Including Optimism Bias of 15%
WP 1	Liverpool City Centre - Speke	£2,146,599	£2,468,589
WP 2	Seaforth - Southport	£3,820,000	£4,393,000
WP 3	Prescot - Runcorn	£2,916,985	£3,354,533
WP 4	Liverpool Loopline	£499,926	£574,915
WP 5	St Helens	£1,515,000	£1,742,250
WP 6	Leasowe to Seacombe Ferry Terminal	£1,235,220	£1,420,503
WP 7	Runcorn to Daresbury Links	£2,893,523	£3,327,551

Source: Merseytravel

4 Results

This section presents the results of the assessment.

4.1 Transport Economic Efficiency (TEE)

The TEE for each scheme is presented in Table 8. As the scheme involves improvements to cycling infrastructure the only journey time improvements observed are as a result of decongestion – and the transfer of a relatively small number of trips from private motor car to other modes.

Table 8: TEE (2010 Prices and Values)

User benefits (£)	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7
Travel time	747,000	400,000	1,567,000	85,000	693,000	452,000	672,000
Vehicle operating costs	-	-	-	-	-	-	-
User charges	-	-	-	-	-	-	-
During Construction & Maintenance	-	-	-	-	-	-	-
NET BENEFITS	747,000	400,000	1,567,000	85,000	693,000	452,000	672,000
Business							
Private sector provider impacts							
Revenue	-	-	-	-	-	-	-
Operating costs	-	-	-	-	-	-	-
Investment costs	-	-	-	-	-	-	-
Grant/subsidy	-	-	-	-	-	-	-
Subtotal	-	-	-	-	-	-	-
Other business impacts	-	-	-	-	-	-	-
Developer contributions	-	-	-	-	-	-	-
NET BUSINESS IMPACT	-	-	-	-	-	-	-
TOTAL							
Present Value of Transport Economic Efficiency Benefits (TEE)	747,000	400,000	1,567,000	85,000	693,000	452,000	672,000

All values are in £000's, rounded to the nearest £1,000.

4.2 Public Accounts Impact

As shown in Table 9 below. The impact of the scheme on wider public finances is modest (£427k), arising from the indirect taxation impacts of a reduction in highway km.

Table 9: Public Accounts (2010 Prices and Values)

	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7
Funding	-	-	-	-	-	-	-
Revenue	-	-	-	-	-	-	-
Operating Costs	-2,778	-1,487	-5,828	-314	-2,576	-1,682	-2,499
Investment Costs	1,737,000	3,091,000	2,361,000	405,000	1,226,000	1,000,000	2,342,000
Developer and Other Contributions	-	-	-	-	-	-	-
Grant/Subsidy Payments	-	-	-	-	-	-	-
NET IMPACT	1,734,222	3,089,513	2,355,172	404,686	1,223,424	998,318	2,339,501
Indirect Tax Revenues	-69,000	-37,000	-145,000	-8,000	-64,000	-42,000	-62,000
TOTALS							
Broad Transport Budget	1,734,000	3,090,000	2,355,000	405,000	1,223,000	998,000	2,340,000
Wider Public Finances	-69,000	-37,000	-145,000	-8,000	-64,000	-42,000	-62,000

All values are in £000's, rounded to the nearest £1,000.

4.3 Analysis of Monetised Costs and Benefits

The overall impacts for the scheme are shown in Table 10. The main benefit of the scheme is to journey quality and physical activity. The BCRs range from 2.10 to 4.82, meaning all schemes are classed as *High or Very High Value for Money* according to DfT criteria⁴.

⁴ Value for Money Assessment: Advice Note for Local Transport Decision Makers, Department for Transport
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/267296/vfm-advice-local-decision-makers.pdf

Table 10: AMCB (2010 Prices and Values)

Costs and Benefits (£)	WP 1	WP 2	WP 3	WP 4	WP 5	WP 6	WP 7
Noise	4,000	2,000	9,000	0	4,000	3,000	4,000
Local Air quality	-	-	-	-	-	-	-
Greenhouse Gases	13,000	7,000	27,000	1,000	12,000	8,000	12,000
Journey Quality	1,193,000	4,429,000	2,411,000	408,000	1,047,000	739,000	1,073,000
Physical Activity	3,502,000	1,874,000	7,348,000	396,000	3,248,000	2,120,000	3,150,000
Accidents	64,000	35,000	135,000	7,000	60,000	39,000	58,000
Economic Efficiency	747,000	400,000	1,567,000	85,000	693,000	452,000	672,000
Wider Public Finances (Indirect Taxation Revenues)	-69,000	-37,000	-145,000	-8,000	-64,000	-42,000	-62,000
Present Value of Benefits (PVB)	5,454,000	6,710,000	11,352,000	889,000	5,000,000	3,319,000	4,907,000
Broad Transport Budget	1,734,000	3,090,000	2,355,000	405,000	1,223,000	998,000	2,340,000
Present Value of Costs (PVC)	1,734,000	3,090,000	2,355,000	405,000	1,223,000	998,000	2,340,000
OVERALL IMPACTS	-	-	-	-	-	-	-
Net Present Value (NPV)	3,720,000	3,620,000	8,997,000	484,000	3,777,000	2,321,000	2,567,000
Benefit to Cost Ratio (BCR)	3.15	2.17	4.82	2.20	4.09	3.33	2.10

All values are in £000's, rounded to the nearest £1,000.

4.4 Sensitivity Tests

TAG A5.1 sets out a series of potential sensitivity tests to be undertaken on the appraisal of cycle schemes:

- Length of Appraisal period;
- Length of scheme used by a trip;
- Level of demand; and
- Scheme costs.

The sensitivity tests undertaken are:

1. Appraisal period reduced to 15 years;
2. Length of scheme used by trip increased by 20%;
3. Length of scheme used by trip decreased by 20%;
4. Level of demand increased by 20%;
5. Level of demand decreased by 20%;
6. Scheme costs increased by 20%; and
7. Scheme costs decreased by 20%.

The table below presents the results.

TO BE COMPLETED.

5 Conclusion – Value for Money Statement

Mott MacDonald has undertaken an assessment of transport economic benefits for the proposed Green Sustainable Travel Corridors (GSTC) schemes.

The assessment relates to seven cycle schemes as described in Table 1. The aim is to introduce clearly defined direct routes, which utilise off-road and segregated routes to encourage increased uptake in cycling and walking in the region.

Table 11: Schemes

Work package	GSTC Scheme Name	Scheme Promoter
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All schemes are classified as High or Very High Value for Money. Overall, the schemes have a **Present Value of Benefits (PVB) of £37.7m** against a **Present Value of Costs of £12.1m** (all in 2010 prices discounted to 2010). This equates to a **BCR of 3.1** which is High Value for Money.

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Value for Money	High	High	Very High	High	Very High	High	High	High

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