Future Proofing Musselburgh's Infrastructure for Sustainable Modes of Travel

Appendix I – Business Case

East Lothian Council

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Quality information

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Table of Contents

1. Economic Case

1.1 Introduction

This chapter sets out the economic case supporting the development of a Masterplan for the greater Musselburgh area to provide for a sustainable transport network that is accessible by all. The Masterplan considers the future planned developments in and around Musselburgh to allow East Lothian Council (ELC) to consider future opportunities in connecting the town sustainably.

The appraisal has been carried out using the Department for Transport (DfT) Active Mode Appraisal Toolkit[1], in accordance with the principles set out in the DfT's WebTAG guidance A5.1[2], over a 20 year appraisal period. Values from the TAG databook, December 2017[3], have been used to forecast the benefits that could be potentially delivered by the cycle route and monetises the following benefits:

- Health or physical activity impacts;
- Absenteeism;
- Journey quality; and
- Marginal external costs.

Other impacts such as anticipated change in number of cycle collisions and Gross Cycling Product (GCP), have also been appraised and monetised for the purpose of this economic appraisal.

While the schemes' main focus is cycling, a large proportion of the new facilities will be shared use. Accordingly, the potential pedestrian benefits associated with the route have also been considered as part of the economic assessment for each of the schemes.

1.2 Assumptions

The following appraisal assumptions have been considered:

- Capital costs and optimism bias proportions agreed by East Lothian Council. Capital costs for each route have been profiled prior to the schemes opening, ending initial funding in 2021 (assumed opening year). A profile of maintenance and renewals over the asset life of the project has also been assumed for each of the schemes;
- There are no cycle facilities along the route corridors in the base scenario, with each scheme providing a high quality cycle track along the route, particularly segregated cycle track and shared-use paths, including a series of quite road sections;
- Existing cycle demand is based on available census 2011 data (travel to work or study). The cycling demand model (DfT's WebTAG guidance A5.1) assumes that the utility of all modes except cycling remain unchanged;
- Cycle users are assumed to use approximately 50% of each scheme for their daily commute (one-way trips), taking into consideration that "*the average cycling journey is 4.7km and that 51% of all car journeys are under 5km*"[4]. Pedestrians are also assumed to use approximately 50 % of each scheme for their daily trips, taking into consideration that a realistic walk distance is generally accepted to be around 1600m[5][6] for pedestrians accessing facilities;

[1] https://www.gov.uk/government/publications/cycling-and-walking-the-economic-case-for-action
[2] DfT, TAG Unit 5.1 – Active Mode Appraisal, December 2017 https://www.gov.uk/government/publications/webtag-tag-unit-a5-1-active-mode-appraisal-december-2017
[3] DfT WebTAG: TAG data book, December 2017 https://www.gov.uk/government/publications/webtag-tag-data-book-december-2017
[4] Cycling Scotland, Annual Cycling Monitoring Report 2017. https://www.cycling.scot/mediaLibrary/other/english/1114.pdf
[5] PAN75: "*A maximum threshold of 1600m for walking is broadly in line with observed travel behaviour*". Available at: http://www.gov.scot/Publications/2005/08/16154453/44568

- Speed: 14kph for cycling and 5kph for walking;
- Benefits are forecast based on a 20 year scheme life;
- All costs and benefits to be discounted to 2010 prices (WebTAG A1.1). This is in line with guidance discount rates (3.5% years 1 to 30); and
- A 0% decay rate[7] has been considered to forecast the "value for money" of each scheme.

1.3 Approach

The potential (forecast) cycle demand of the schemes have been estimated using the disaggregate mode choice model derived by Wardman, Tight and Page (2007), as suggested by DfT's WebTAG guidance A5.1[8], to assess the impact of improvements in the attractiveness of cycling for commuting trips of 7.5 miles or less. This model assumes that the utility of all modes except cycling remain unchanged.

Details of the new active travel infrastructure have been provided in Table 1.1. For assessment purposes, it has been assumed that existing and future cycle users would use 50% of the new schemes for their daily trips. Average time spent on route per trip is also detailed below, assuming an average cycling speed along each of the routes of 14kph.

Table 1.1: Musselburgh Active Travel Infrastructure

Route	Total (km)	Segregated (km)	Shared-Use (km)	Quiet Road (km)	Cycle Time (mm:ss)
1	2.516	1.956	-	0.56	05:23
2	3.841	2.143	-	1.698	08:14
3	2.525	-	1.247	1.278	05:25
4	6.263	0.241	4.747	1.275	13:25
5	3.801	-	2.93	0.871	08:09
6	2.952	-	2.257	0.695	06:20
7	3.711	3.711	-	-	07:57
8	3.829	-	3.001	0.828	08:12
9	6.275	-	6.114	0.161	13:27
All	35.713	8.051	20.296	7.366	

Estimated existing levels of cycle demand within the study area have been based on census data (2011). Observed data throughout the study area was not available for the purposes of this study.

To identify the catchment that could potentially be attracted to use the new infrastructure provided as part of the proposed sustainable travel network, a 1km buffer zone (as the crow flies) was defined around each of the identified routes using GIS mapping. Figure 1.1 presents an example of the estimated catchment area around the proposed Route 1.

An indicative figure for the existing active travel demand within the area was then calculated using travel to work / study census data[9] (2011)

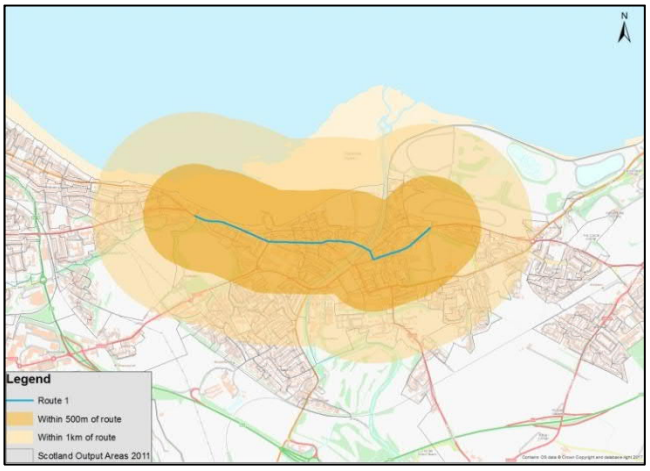

Figure 1.1: Route 1 Catchment Area

[6] It should be noted that walking distance assumed for Route 9 exceeds the average walking distance suggested by guidance. However, this has been retained based on the route's wider context.

[7] DfT, TAG Unit 5.1 – Active Mode Appraisal. Section 5.1: "*Rate of decay of users and benefits. The existing evidence base is relatively sparse on how long the benefits of active mode schemes last. Therefore the impact of different forecast assumptions on the scale of benefits should be tested (potentially including negative decay rates to represent increased use encouraging others to take up active modes over time). It may be that some schemes are more sensitive than others, which may affect the decision of which scheme to adopt were outturn forecasts to be more pessimistic, say, relative to the core scenario.*"

[8] DfT, TAG Unit 5.1 – Active Mode Appraisal. Section 2.3: Estimating from Disaggregate Mode Choice Models

[9] *Source: Census 2011 Table: QS702SC – Method of Travel to work or study*

from the output areas identified within the catchment identified for each of the routes. Table 1.2 illustrates the estimated cycle mode share of all work/study trips for each of the individual routes.

Table 1.2: Musselburgh Active Travel Infrastructure – Cycle Mode Share by Route (Census 2011)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
Mode Share %	1.9%	1.7%	1.7%	1.6%	1.6%	1.8%	3.9%	1.5%	0.7%

Based on current levels of cycling within the area, suggested by census data[10], a number of conversion factors and background growth rates[11] have been applied in order to understand the estimated existing cycle demand prior to the potential opening of each of the routes. Table 1.3 illustrates the annualised figures in terms of one-way trips and users per day forecasted by 2021 (assumed opening year).

Table 1.3: Estimated Existing Cycle Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
One-way Trips	96	97	58	90	74	98	292	72	6
Number of Users	48	49	29	45	37	49	146	36	3

With the schemes in place (assumed opening year of 2021), based on the type of improvements that the different schemes would deliver, overall it is anticipated the schemes could generate a significant increase in cycle commute levels. Table 1.4 illustrates the projected annualised figures in terms of one-way trips and users per day following the opening of the schemes.

Table 1.4: Estimated Future Cycle Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
One-way Trips	140	168	82	231	131	152	505	129	16
Number of Users	70	84	41	116	66	76	252	64	8

Table 1.5 below illustrates the estimated level of growth in terms of cycle commute levels for each of the routes following the opening of the schemes.

Table 1.5: Estimated Increase in Cycle Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
Increase of Cycle Demand Levels (%)	46%	73%	43%	157%	78%	56%	73%	79%	179%

While it is recognised that these are significant increases, the figures are in line with the step change in use that the sustainable travel network could deliver when coupled with the untapped potential for increasing cycling, together with the active travel infrastructure improvements to be delivered throughout the wider area. This untapped potential is highlighted through the census data (short distance car journeys to work) and the Bike Life project (people who do not ride a bike but would like to).

1.4 Costings

The initial feasibility study for all the routes combined forecasts the total cost within the range of £12m to £36m (refer to sections 9 to 17 of the *"Future Proofing Musselburgh's Infrastructure for Sustainable Modes of Travel"* report), including 44% optimism bias (66% optimism bias applied to bridge structures). Table 1.6 overleaf details

[10] No observed data from counters was available for the purpose of this study
[11] NTEM 7.2 (TEMPRO). Available at: https://www.gov.uk/government/collections/tempro

the total cost estimate per route. A 'low', 'medium' and 'high' cost has been provided, based on the standard of the intervention.

Table 1.6: Musselburgh Active Travel Infrastructure – Total Cost Estimates per Route (£K, 2016 Prices)

Route	Low Cost	Medium Cost	High Cost
1	£2,342.8	**£4,290.6**	£10,765.1
2	£1,148.3	**£2,244.5**	£4,064.7
3	£553.3	**£1,245.1**	£2,383.4
4	£2,034.1	**£2,217.3**	£2,400.6
5	£1,054.6	**£2,392.0**	£2,595.3
6	£416.3	**£2,247.0**	£3,063.9
7	£1,910.4	**£4,275.0**	£6,412.6
8	£1,051.0	**£1,104.7**	£1,158.3
9	£2,469.1	**£3,099.9**	£3,730.7

Capital costs for each for each route have been profiled over two years prior to scheme opening, ending initial funding in 2021 (assumed opening year), as set out in Table 1.7.

Table 1.7: Estimated Increase in Cycle Demand by Route (Year 2021)

Year	2018	2019	2020	2021	2022	2023	Total
Proportion Split	0%	0%	60%	40%	0%	0%	100%

To account for maintenance and renewal costs, a profile of maintenance and renewals over the asset life of the project was assumed for each of the routes. In the absence of detailed costs, these were accounted for as a proportion of the capital costs which occur at various intervals throughout the life of the project (20 years).

The total cost estimates (considering the "Medium Cost" estimates) per route used within the economic appraisal are detailed in Table 1.8. These costs have been quantified over the same appraisal period as the user benefits (20 years), converted to 2010 real prices using the GDP deflator and discounted to 2010 (DfT's current base year), which reflects the preference for current consumption over future consumption.

Table 1.8: Musselburgh Active Travel Infrastructure Cost Estimate (£K, Discounted, in 2010 prices)

Route	Capital Costs	Maintenance and Renewal Costs	Present Value of Costs
1	£3,247.7	£476.8	**£3,724.5**
2	£1,698.9	£249.4	**£1,948.3**
3	£942.5	£138.4	**£1080.8**
4	£1,678.4	£246.4	**£1,924.8**
5	£1,810.6	£265.8	**£2,076.4**
6	£1,700.8	£249.7	**£1,950.5**
7	£3,235.9	£475.0	**£3,711.0**
8	£836.1	£122.7	**£958.9**
9	£2,346.4	£344.5	**£2,690.9**

1.5 Benefits

Analysis of the appraisal results indicates that a significant element of the overall benefits is provided by the journey quality improvements (27%; average value for all routes) and physical fitness improvements (66%; average value for all routes), which are provided by the different routes. The new users benefiting from these links also provide additional scheme benefits through the reduction in highway congestion due to modal transfer, also resulting in environmental and accident benefits. A summary of each type of benefit is provided in the sections below.

1.5.1 Health

Physical activity impacts typically form a significant proportion of benefits for active travel mode schemes. The physical activity benefits of each of the schemes are estimated for the potential new cyclists along the scheme route using the active travel health benefits toolkit (which is now embedded in the Active Mode Appraisal Toolkit, updated in April 2018). Based on the estimated number of new cycling trips, the toolkit calculates the estimated impact on mortality of the scheme using default National Travel Survey (NTS)-based assumptions on age, gender, distance, speed, relative risks for all-cause mortality and the background mortality. The reduction in mortality is monetised using the value of a Quality-Adjusted Life year (£60,000 in 2012 prices and values) with future benefits discounted at 1.5%.

A conservative approach to measuring health benefits has been used for each of the different schemes. This excludes the physical activity benefits from journeys made to reach the new routes. As such, there is likely to be an underestimation of the level of health benefits delivered by these new schemes.

1.5.2 Absenteeism

Research carried out by the World Health Organisation (WHO) (2003)[12] found improved health from increased physical activity can lead to reduction in absenteeism from work (4.3 days average short-term sick leave absence in UK[13]). Moderate physical activity, such as cycling to work, can lead to a reduction in sick days taken from work (25% reduction for every 30min of activity per day[14]) and hence provides a benefit to the employer through reduction in lost productivity. This is in addition to the benefit of better health for the individual.

The absenteeism reduction is then applied to the number of new cyclists, and factored in WebTAG values of time (£19.27 per hour in 2010 prices[6]); an average of 7.5 working hours per day lost from day leave is assumed when calculating absenteeism benefits.

As with the health benefits, the conservative approach to estimating increased cycling distances means that the above figure is likely to be an underestimation of the level of absenteeism benefits delivered by these new schemes.

1.5.3 Cycle Collisions

A review of collision data within the proximity to the area (1km buffer area) where the proposed cycle routes are to be implemented has been undertaken for each of the nine routes identified as part of this study.

Collision data was obtained from www.cyclestreets.net, which uses STATS19 data from the Department for Transport. Data was analysed for the period between the 1st of January 2012 and the 31st of December 2016 (5 years).

Empirical research undertaken by Jacobsen[15] (2003) has shown that increasing levels of cycling does not result in an equivalent increase in the numbers of collisions involving cyclists (all other things being equal). This research indicated that a 100% increase of cycle numbers would lead to a 32% increase in cycle related collisions, meaning the cycle collision rate would decrease.

Based on the latter, and with consideration of the forecast change in cycle commute levels for each of the routes (refer to Table 1.5), increases of total number of cycle collisions per route have been calculated. These disbenefits have then been monetised using values detailed in WebTAG Table A4.1.3, which produces a forecast monetised disbenefit across the scheme's life (20 years).

However, it is very important to recognise that the number of collisions per mile cycled would not be expected to increase. The 2015 Bike Life monitoring report determined that a serious or fatal injury occurs only every 1.1million miles cycled in Edinburgh.

[12] The World Health Organisation (WHO), Health Economic Assessment Tool (HEAT).

[13] Office for National Statistics - Sickness Absence in the Labour Market 2016. Available at: https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/labourproductivity/articles/sicknessabsenceinthelabourmarket/2016

[14] DfT, TAG Unit 4.1 – Social Impact Appraisal. Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/670358/tag-4.1-social-impact-appraisal-dec17.pdf

[15] P.L. Jacobsen, 2003, "*Safety in numbers: more walkers and bicyclists, safer walking and cycling*", Injury Prevention., 9, 205–209. Available at: http://www.cycle-helmets.com/safety_in_numbers.pdf

It should also be noted that the change in collision rate only accounts for the fact that increased levels of cycling leads to increased probability of cycle related collisions. In reality, the new cycle routes would provide higher quality infrastructure which is separated from busy traffic, rather than existing non-segregated routes. As such, it is justifiable to consider that collision rates may fall through the implementation of the schemes and the above stated disbenefits may be reduced or nulled.

1.5.4 Journey Quality

Journey quality impacts from any form of infrastructure improvement cover for users' fear of potential accidents, quality of infrastructure and environmental conditions on-route, and any other aspects which might enhance and improve a user's experience of travelling along a route. Such impacts are, as would be expected, subjective and primarily experienced by existing route users.

In accordance with the principles set out in the DfT's WebTAG guidance A5.1, as an impact which is apparent mainly to existing users, it is assumed that current users would experience the full benefit of any improvements to quality whilst new users would only experience half of the benefit.

Journey quality impacts for cyclists have been assessed based on the values provided by DfT's WebTAG Databook (December 2017)[16]. Values of journey ambience for each route have been weighted out based on the different infrastructure improvements that form each of the routes.

Journey quality impacts for pedestrians have been assessed based on the values provided by DfT's WebTAG Databook (December 2017)[17], including values for level kerbs, information panels, pavement evenness, directional signage, street lighting or benches.

1.5.5 Marginal External Costs

It is also important to understand how the different routes could lead to modal shift towards active travel. A transfer from car-based modes amongst functional route users[18] (i.e. commuters) will provide benefits through reduced traffic congestion, collisions, greenhouse gas, air quality, noise and indirect tax benefits. These benefits have been estimated using the Marginal External Cost (MEC) method, based on the forecast reduction in car kilometres as a result of each of the schemes. In order to quantify the level of MEC benefits for each of the routes, the potential proportion of mode shift generated by each route is assumed to be the equivalent mode share for car-based mode trips (Census 2011) within the 1km buffer area of each route. In order to inform each of the aspects that form the external costs, the study area covering all routes has been considered as "*Inner and Outer Conurbations*".

As for the health and absenteeism benefits described above, this is likely to be a conservative estimate, as MEC benefits take into consideration the length of the proposed scheme only. New users would require covering an additional length to make us of the proposed cycle route, and therefore this approach underestimates the level of MEC benefits delivered by these new schemes.

1.5.6 Gross Cycle Benefit

Research suggests that cycling benefits the local economy through bicycle sales, accessories and cycling employment. A study carried out by the London School of Economics (LSE) in 2010[19] concluded that each cyclist contributes a Gross Cycling Product (GCP) of £230 per year to the UK economy, accounting for a total £2.9bn in 2010. This research was supported by a European wide study which found that cycling delivers wider economic benefits in terms of supporting jobs and driving tourism, with cycling having greater employment intensity than any other transport sub-sector.

1.5.7 Other Benefits

A number of other, non-quantified benefits could be delivered by the schemes, including:

- Edinburgh and its wider area have aspirations to achieve national active travel targets over the coming years. The opening of these schemes would be expected to benefit wider work and investment in

[16] Cycling Journey Quality Benefits – WebTAG *Data book Table 4.1.6 (December 2017)*
[17] Walking Journey Quality Benefits – WebTAG *Data book Table 4.1.7 (December 2017)*
[18] *It is important to note that this assessment captures the benefits generated by the leisure trips, which means that benefits from mode shift are likely to be overestimated, given that leisure trips are not a result of modal shift from car.*
[19] London School of Economics (2010). Available at: http://eprints.lse.ac.uk/38063/1/BritishCyclingEconomy.pdf

measures to promote active travel throughout the area, and it could be assumed that the opening of the schemes would be followed with sustained growth over the coming years, and hence users and benefits are expected to increase.

- Potential improvements in journey time reliability for cyclists due to the high proportion of route segregation delivered by these schemes, particularly during the morning and evening peak hours.

1.5.8 Walking Benefits

While the main focus for these schemes is cycling, it is envisaged that a high proportion of the new facilities would benefit pedestrians and people who live and work in the areas, via improved public realm. Accordingly, the potential pedestrian benefits associated with the routes have also been considered as part of the economic assessment.

It should be noted that walking impacts have only been assessed for routes which present some form of shared-use infrastructure improvements. For this reason, Route 1, 2 and 7 have not been considered as part of this analysis.

As done for cycling, an indicative figure for the existing on-foot travel demand within the area was calculated using travel to work/study census data[20] (2011) from the output areas identified within the catchment identified for each of the routes. Table 1.9 illustrates the estimated walking mode share of all work/study trips for each of the individual routes.

Table 1.9: Musselburgh Active Travel Infrastructure – Walking Mode Share by Route (Census 2011)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
Mode Share %	-	-	17.3%	19.1%	22.1%	20.7%	-	21.4%	33.5%

Based on current levels of walking within the area, suggested by census data[21], a number of conversion factors and background growth rates[22] have been applied in order to understand the estimated existing walking demand prior to the potential opening of each of the routes. Table 1.10 illustrates the annualised figures in terms of one-way trips and users per day forecasted by 2021 (assumed opening year).

Table 1.10: Estimated Existing Walking Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
One-way Trips	-	-	575	1,079	992	1,129	-	993	296
Number of Users	-	-	288	540	496	564	-	497	148

With the schemes in place (assumed opening year of 2021), based on the type of improvements that the different schemes would deliver, overall it is anticipated the schemes could generate an increase in walking commute levels. Table 1.11 illustrates the projected annualised figures in terms of one-way trips and users per day following the opening of the schemes.

Table 1.11: Estimated Future Walking Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
One-way Trips	-	-	619	1,366	1,129	1,260	-	1,140	321
Number of Users	-	-	310	683	564	630	-	570	161

Table 1.12 overleaf illustrates the estimated level of growth in terms of walking commute levels for each of the routes following the opening of the schemes.

[20] *Source: Census 2011 Table: QS702SC – Method of Travel to work or study*
[21] No observed data from counters was available for the purpose of this study
[22] NTEM 7.2 (TEMPRO). Available at: https://www.gov.uk/government/collections/tempro

Table 1.12: Estimated Increase in Walking Demand by Route (Year 2021)

	Route 1	Route 2	Route 3	Route 4	Route 5	Route 6	Route 7	Route 8	Route 9
Increase of Walking Demand Levels (%)	-	-	8%	27%	14%	12%	-	15%	9%

As expected, walking mode share has less potential for growth compared to cycling, therefore the delivery of these active travel schemes could generate slight to moderate increases of walking commute levels within the area.

1.6 Benefit Cost Ratio

This section provides details of the appraisal outputs for each individual scheme in the form of Benefit to Cost Ratio (BCR)[23]. Present Value of Benefits (PVB), combining both cycling and walking benefits, Present Value of Costs (PVC) and Net Present Value (NPV) for each individual route are detailed below.

Table 1.13: Route 1 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£425.17	£425.17
Absenteeism	£18.08	£18.08
Journey quality	£207.65	£207.65
Cycle collisions	-£369.98	-£369.98
Gross cycling product (GCP)	-	£134.71
Marginal external costs	£28.11	£28.11
Present Value of Benefits	£309.02	£443.72
Present Value of Costs	£3,724.40	£3,724.40
Net Present Value	-£3,415.39	-£3,280.68
Benefit Cost Ratio	**0.08**	**0.12**

Table 1.14: Route 2 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£685.43	£685.43
Absenteeism	£44.49	£44.49
Journey quality	£305.57	£305.57
Cycle collisions	-£664.96	-£664.96
Gross cycling product (GCP)	-	£217.16
Marginal external costs	£70.39	£70.39
Present Value of Benefits	£440.91	£658.07
Present Value of Costs	£1,948.12	£1,948.12
Net Present Value	-£1,507.21	-£1,290.05
Benefit Cost Ratio	**0.23**	**0.34**

[23] BCRs are used to provide an indication of the likely Value for Money (VfM) of a scheme, and are based on monetised impacts in line with WebTAG guidance. The categories are: poor VfM if the BCR is less than 1; low VfM if the BCR is between 1.0 and 1.5; medium VfM if the BCR is between 1.5 and 2.0; high VfM if the BCR is between 2.0 and 4.0; and very high VfM if the BCR is greater than 4.0.

Table 1.15: Route 3 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£417.09	£417.09
Absenteeism	£35.29	£35.29
Journey quality	£284.15	£284.15
Cycle collisions	-£217.21	-£217.21
Gross cycling product (GCP)	-	£75.44
Marginal external costs	£30.54	£30.54
Present Value of Benefits	£549.87	£625.31
Present Value of Costs	£1,080.74	£1,080.74
Net Present Value	-£530.87	-£455.43
Benefit Cost Ratio	**0.51**	**0.58**

Table 1.16: Route 4 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£2,520.75	£2,520.75
Absenteeism	£764.63	£764.63
Journey quality	£1,020.65	£1,020.65
Cycle collisions	-£529.33	-£529.33
Gross cycling product (GCP)	-	£430.78
Marginal external costs	£601.83	£601.83
Present Value of Benefits	£4,378.52	£4,809.30
Present Value of Costs	£1,922.94	£1,922.94
Net Present Value	£2,455.58	£2,886.36
Benefit Cost Ratio	**2.28**	**2.50**

Table 1.17: Route 5 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,106.60	£1,106.60
Absenteeism	£218.26	£218.26
Journey quality	£344.97	£344.97
Cycle collisions	-£512.20	-£512.20
Gross cycling product (GCP)	-	£175.13
Marginal external costs	£156.82	£156.82
Present Value of Benefits	£1,314.44	£1,489.57
Present Value of Costs	£2,075.93	£2,075.93
Net Present Value	-£761.49	-£586.35
Benefit Cost Ratio	**0.63**	**0.72**

Table 1.18: Route 6 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,058.82	£1,058.82
Absenteeism	£161.36	£161.36
Journey quality	£398.74	£398.74
Cycle collisions	-£459.64	-£459.64
Gross cycling product (GCP)	-	£167.14
Marginal external costs	£115.04	£115.04
Present Value of Benefits	£1,274.31	£1,441.45
Present Value of Costs	£1,950.12	£1,950.12
Net Present Value	-£675.81	-£508.67
Benefit Cost Ratio	**0.65**	**0.74**

Table 1.19: Route 7 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£2,046.21	£2,046.21
Absenteeism	£128.31	£128.31
Journey quality	£1,190.14	£1,190.14
Cycle collisions	-£517.76	-£517.76
Gross cycling product (GCP)	-	£648.30
Marginal external costs	£146.40	£146.40
Present Value of Benefits	£2,993.29	£3,641.59
Present Value of Costs	£3,710.53	£3,710.53
Net Present Value	-£717.24	-£68.94
Benefit Cost Ratio	**0.81**	**0.98**

Table 1.20: Route 8 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,142.59	£1,142.59
Absenteeism	£236.58	£236.58
Journey quality	£439.12	£439.12
Cycle collisions	-£415.64	-£415.64
Gross cycling product (GCP)	-	£173.43
Marginal external costs	£152.25	£152.25
Present Value of Benefits	£1,554.90	£1,728.34
Present Value of Costs	£958.44	£958.44
Net Present Value	£596.47	£769.90
Benefit Cost Ratio	**1.62**	**1.80**

Table 1.21: Route 9 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,730.01	£1,730.01
Absenteeism	£701.16	£701.16
Journey quality	£739.18	£739.18
Cycle collisions	-£413.64	-£413.64
Gross cycling product (GCP)	-	£266.54
Marginal external costs	£506.79	£506.79
Present Value of Benefits	£3,263.51	£3,530.05
Present Value of Costs	£2,689.36	£2,689.36
Net Present Value	£574.16	£840.69
Benefit Cost Ratio	**1.21**	**1.31**

1.7 Sensitivity Analysis: High Demand

Given the high level assumption-based nature of this exercise, for comparison purposes, a "high demand sensitivity case" has been considered in order to mitigate the risk of underestimating growth within the study area. A 1.5 factor has been applied to all demand outputs. This is based on the latest planning data (HLA 2017 based) for each of the council areas within the study area, which suggests that households and population growth will increase exponentially over the next decade. Some reports suggest that population in Musselburgh may increase around 50% by 2024[24]. All other values considered in the assessment process remain unchanged; including the Medium Cost scenario used within the economic appraisal (refer to Table 1.8).

The following sections provide details of the appraisal outputs for each individual scheme in the form of Benefit to Cost Ratio (BCR) under this sensitivity scenario case.

[24] http://musselburghheritage.org.uk/?p=539

Table 1.22: Route 1 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£637.76	£637.76
Absenteeism	£27.11	£27.11
Journey quality	£311.47	£311.47
Cycle collisions	-£369.98	-£369.98
Gross cycling product (GCP)	-	£202.06
Marginal external costs	£42.16	£42.16
Present Value of Benefits	£648.52	£850.58
Present Value of Costs	£3,724.36	£3,724.36
Net Present Value	-£3,075.84	-£2,873.78
Benefit Cost Ratio	**0.17**	**0.23**

Table 1.23: Route 2 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,028.14	£1,028.14
Absenteeism	£66.73	£66.73
Journey quality	£458.35	£458.35
Cycle collisions	-£664.96	-£664.96
Gross cycling product (GCP)	-	£325.74
Marginal external costs	£105.59	£105.59
Present Value of Benefits	£993.85	£1,319.59
Present Value of Costs	£1,948.02	£1,948.02
Net Present Value	-£954.17	-£628.43
Benefit Cost Ratio	**0.51**	**0.68**

Table 1.24: Route 3 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£625.63	£625.63
Absenteeism	£52.94	£52.94
Journey quality	£426.23	£426.23
Cycle collisions	-£217.21	-£217.21
Gross cycling product (GCP)	-	£113.16
Marginal external costs	£45.82	£45.82
Present Value of Benefits	£933.41	£1,046.57
Present Value of Costs	£1,080.69	£1,080.69
Net Present Value	-£147.28	-£34.12
Benefit Cost Ratio	**0.86**	**0.97**

Table 1.25: Route 4 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£3,781.12	£3,781.12
Absenteeism	£1,146.94	£1,146.94
Journey quality	£1,530.98	£1,530.98
Cycle collisions	-£529.33	-£529.33
Gross cycling product (GCP)	-	£646.17
Marginal external costs	£902.74	£902.74
Present Value of Benefits	£6,832.45	£7,478.62
Present Value of Costs	£1,922.04	£1,922.04
Net Present Value	£4,910.41	£5,556.58
Benefit Cost Ratio	**3.55**	**3.89**

Table 1.26: Route 5 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,659.90	£1,659.90
Absenteeism	£327.38	£327.38
Journey quality	£517.46	£517.46
Cycle collisions	-£512.20	-£512.20
Gross cycling product (GCP)	-	£262.70
Marginal external costs	£235.22	£235.22
Present Value of Benefits	£2,227.76	£2,490.46
Present Value of Costs	£2,075.69	£2,075.69
Net Present Value	£152.07	£414.77
Benefit Cost Ratio	**1.07**	**1.20**

Table 1.27: Route 6 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,588.22	£1,588.22
Absenteeism	£242.04	£242.04
Journey quality	£598.11	£598.11
Cycle collisions	-£459.64	-£459.64
Gross cycling product (GCP)	-	£250.71
Marginal external costs	£172.56	£172.56
Present Value of Benefits	£2,141.29	£2,392.00
Present Value of Costs	£1,949.95	£1,949.95
Net Present Value	£191.34	£442.05
Benefit Cost Ratio	**1.10**	**1.23**

Table 1.28: Route 7 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£3,069.31	£3,069.31
Absenteeism	£192.47	£192.47
Journey quality	£1,785.21	£1,785.21
Cycle collisions	-£517.76	-£517.76
Gross cycling product (GCP)	-	£972.45
Marginal external costs	£219.59	£219.59
Present Value of Benefits	£4,748.82	£5,721.26
Present Value of Costs	£3,710.31	£3,710.31
Net Present Value	£1,038.51	£2,010.95
Benefit Cost Ratio	**1.28**	**1.54**

Table 1.29: Route 8 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,713.89	£1,713.89
Absenteeism	£354.87	£354.87
Journey quality	£658.68	£658.68
Cycle collisions	-£415.64	-£415.64
Gross cycling product (GCP)	-	£260.15
Marginal external costs	£228.38	£228.38
Present Value of Benefits	£2,540.18	£2,800.33
Present Value of Costs	£958.21	£958.21
Net Present Value	£1,581.97	£1,842.12
Benefit Cost Ratio	**2.65**	**2.92**

Table 1.30: Route 9 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£2,595.02	£2,595.02
Absenteeism	£1,051.75	£1,051.75
Journey quality	£1,108.77	£1,108.77
Cycle collisions	-£413.64	-£413.64
Gross cycling product (GCP)	-	£399.80
Marginal external costs	£760.19	£760.19
Present Value of Benefits	£5,102.09	£5,501.90
Present Value of Costs	£2,688.59	£2,688.59
Net Present Value	£2,413.50	£2,813.30
Benefit Cost Ratio	**1.90**	**2.05**

1.8 Sensitivity Analysis: 1.5 Kilometre Buffer

Given the high level assumption-based nature of this exercise, for comparison purposes, a second sensitivity, assuming a 1.5km buffer has been considered (rather than 1km) in order to mitigate the risk of underestimating the catchment of each of the proposed routes. All other values considered in the assessment process remain unchanged; including the Medium Cost scenario used within the economic appraisal (refer to Table 1.8).

The following sections provide details of the appraisal outputs for each individual scheme in the form of Benefit to Cost Ratio (BCR) under this sensitivity scenario case.

Table 1.31: Route 1 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£667.77	£667.77
Absenteeism	£28.39	£28.39
Journey quality	£328.65	£328.65
Cycle collisions	-£382.76	-£382.76
Gross cycling product (GCP)	-	£211.57
Marginal external costs	£45.58	£45.58
Present Value of Benefits	£687.63	£899.20
Present Value of Costs	£3,724.35	£3,724.35
Net Present Value	-£3,036.72	-£2,825.15
Benefit Cost Ratio	**0.18**	**0.24**

Table 1.32: Route 2 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£828.18	£828.18
Absenteeism	£53.75	£53.75
Journey quality	£370.53	£370.53
Cycle collisions	-£674.70	-£674.70
Gross cycling product (GCP)	-	£262.39
Marginal external costs	£86.60	£86.60
Present Value of Benefits	£664.36	£926.75
Present Value of Costs	£1,948.07	£1,948.07
Net Present Value	-£1,283.71	-£1,021.32
Benefit Cost Ratio	**0.34**	**0.48**

Table 1.33: Route 3 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£604.67	£604.67
Absenteeism	£52.79	£52.79
Journey quality	£455.41	£455.41
Cycle collisions	-£368.31	-£368.31
Gross cycling product (GCP)	-	£104.13
Marginal external costs	£43.12	£43.12
Present Value of Benefits	£787.67	£891.80
Present Value of Costs	£1,080.70	£1,080.70
Net Present Value	-£293.03	-£188.90
Benefit Cost Ratio	**0.73**	**0.83**

Table 1.34: Route 4 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£4,104.74	£4,104.74
Absenteeism	£1,173.72	£1,173.72
Journey quality	£1,693.51	£1,693.51
Cycle collisions	-£1,814.46	-£1,814.46
Gross cycling product (GCP)	-	£754.21
Marginal external costs	£965.80	£965.80
Present Value of Benefits	£6,123.32	£6,877.53
Present Value of Costs	£1,921.85	£1,921.85
Net Present Value	£4,201.47	£4,955.68
Benefit Cost Ratio	**3.19**	**3.58**

Table 1.35: Route 5 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,318.71	£1,318.71
Absenteeism	£259.64	£259.64
Journey quality	£407.41	£407.41
Cycle collisions	-£594.10	-£594.10
Gross cycling product (GCP)	-	£209.25
Marginal external costs	£190.18	£190.18
Present Value of Benefits	£1,581.85	£1,791.09
Present Value of Costs	£2,075.82	£2,075.82
Net Present Value	-£493.98	-£284.73
Benefit Cost Ratio	**0.76**	**0.86**

Table 1.36: Route 6 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,697.13	£1,697.13
Absenteeism	£243.89	£243.89
Journey quality	£655.96	£655.96
Cycle collisions	-£492.05	-£492.05
Gross cycling product (GCP)	-	£290.76
Marginal external costs	£176.54	£176.54
Present Value of Benefits	£2,281.47	£2,572.23
Present Value of Costs	£1,949.94	£1,949.94
Net Present Value	£331.54	£622.30
Benefit Cost Ratio	**1.17**	**1.32**

Table 1.37: Route 7 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£3,596.28	£3,596.28
Absenteeism	£225.51	£225.51
Journey quality	£2,120.97	£2,120.97
Cycle collisions	-£730.41	-£730.41
Gross cycling product (GCP)	-	£1,139.41
Marginal external costs	£258.84	£258.84
Present Value of Benefits	£5,471.19	£6,610.59
Present Value of Costs	£3,710.19	£3,710.19
Net Present Value	£1,761.00	£2,900.40
Benefit Cost Ratio	1.47	1.78

Table 1.38: Route 8 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£2,574.00	£2,574.00
Absenteeism	£515.93	£515.93
Journey quality	£967.94	£967.94
Cycle collisions	-£775.03	-£775.03
Gross cycling product (GCP)	-	£410.44
Marginal external costs	£357.01	£357.01
Present Value of Benefits	£3,639.85	£4,050.30
Present Value of Costs	£957.82	£957.82
Net Present Value	£2,682.03	£3,092.48
Benefit Cost Ratio	3.80	4.23

Table 1.39: Route 9 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£3,594.92	£3,594.92
Absenteeism	£1,421.53	£1,421.53
Journey quality	£1,521.94	£1,521.94
Cycle collisions	-£997.13	-£997.13
Gross cycling product (GCP)	-	£573.15
Marginal external costs	£1,004.64	£1,004.64
Present Value of Benefits	£6,545.90	£7,119.05
Present Value of Costs	£2,687.86	£2,687.86
Net Present Value	£3,858.05	£4,431.20
Benefit Cost Ratio	2.44	2.65

1.9 Sensitivity Analysis: High Demand and 1.5 Kilometre Buffer

For comparison purposes, a third sensitivity case has been developed by combining the “high demand sensitivity case” and a 1.5km buffer around each of the routes, as detailed in sections 1.7 and 1.8 respectively. All other values considered in the assessment process remain unchanged; including the Medium Cost scenario used within the economic appraisal (refer to Table 1.8).

The following sections provide details of the appraisal outputs for each individual scheme in the form of Benefit to Cost Ratio (BCR) under this sensitivity scenario case.

Table 1.40: Route 1 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,001.65	£1,001.65
Absenteeism	£42.58	£42.58
Journey quality	£492.98	£492.98
Cycle collisions	-£382.76	-£382.76
Gross cycling product (GCP)	-	£317.35
Marginal external costs	£68.38	£68.38
Present Value of Benefits	£1,222.83	£1,540.18
Present Value of Costs	£3,724.28	£3,724.28
Net Present Value	-£2,501.45	-£2,184.10
Benefit Cost Ratio	**0.33**	**0.41**

Table 1.41: Route 2 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,242.27	£1,242.27
Absenteeism	£80.63	£80.63
Journey quality	£555.79	£555.79
Cycle collisions	-£674.70	-£674.70
Gross cycling product (GCP)	-	£393.59
Marginal external costs	£129.90	£129.90
Present Value of Benefits	£1,333.89	£1,727.48
Present Value of Costs	£1,947.94	£1,947.94
Net Present Value	-£614.05	-£220.46
Benefit Cost Ratio	**0.68**	**0.89**

Table 1.42: Route 3 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£907.00	£907.00
Absenteeism	£79.18	£79.18
Journey quality	£683.11	£683.11
Cycle collisions	-£368.31	-£368.31
Gross cycling product (GCP)	-	£156.19
Marginal external costs	£64.68	£64.68
Present Value of Benefits	£1,365.66	£1,521.85
Present Value of Costs	£1,080.63	£1,080.63
Net Present Value	£285.03	£441.22
Benefit Cost Ratio	**1.26**	**1.41**

Table 1.43: Route 4 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£6,157.12	£6,157.12
Absenteeism	£1,760.59	£1,760.59
Journey quality	£2,540.27	£2,540.27
Cycle collisions	-£1,814.46	-£1,814.46
Gross cycling product (GCP)	-	£1,131.32
Marginal external costs	£1,448.70	£1,448.70
Present Value of Benefits	£10,092.21	£11,223.53
Present Value of Costs	£1,920.39	£1,920.39
Net Present Value	£8,171.81	£9,303.14
Benefit Cost Ratio	**5.26**	**5.84**

Table 1.44: Route 5 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£1,978.07	£1,978.07
Absenteeism	£389.46	£389.46
Journey quality	£611.12	£611.12
Cycle collisions	-£594.10	-£594.10
Gross cycling product (GCP)	-	£313.87
Marginal external costs	£285.27	£285.27
Present Value of Benefits	£2,669.82	£2,983.69
Present Value of Costs	£2,075.54	£2,075.54
Net Present Value	£594.28	£908.15
Benefit Cost Ratio	**1.29**	**1.44**

Table 1.45: Route 6 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£2,545.70	£2,545.70
Absenteeism	£365.84	£365.84
Journey quality	£983.94	£983.94
Cycle collisions	-£492.05	-£492.05
Gross cycling product (GCP)	-	£436.14
Marginal external costs	£264.81	£264.81
Present Value of Benefits	£3,668.24	£4,104.38
Present Value of Costs	£1,949.67	£1,949.67
Net Present Value	£1,718.57	£2,154.71
Benefit Cost Ratio	**1.88**	**2.11**

Table 1.46: Route 7 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£5,394.42	£5,394.42
Absenteeism	£338.27	£338.27
Journey quality	£3,181.45	£3,181.45
Cycle collisions	-£730.41	-£730.41
Gross cycling product (GCP)	-	£1,709.11
Marginal external costs	£388.26	£388.26
Present Value of Benefits	£8,571.99	£10,281.10
Present Value of Costs	£3,709.80	£3,709.80
Net Present Value	£4,862.19	£6,571.30
Benefit Cost Ratio	**2.31**	**2.77**

Table 1.47: Route 8 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£3,861.00	£3,861.00
Absenteeism	£773.89	£773.89
Journey quality	£1,451.91	£1,451.91
Cycle collisions	-£775.03	-£775.03
Gross cycling product (GCP)	-	£615.67
Marginal external costs	£535.51	£535.51
Present Value of Benefits	£5,847.29	£6,462.96
Present Value of Costs	£957.28	£957.28
Net Present Value	£4,890.01	£5,505.67
Benefit Cost Ratio	**6.11**	**6.75**

Table 1.48: Route 9 - Analysis of Monetised Costs and Benefits (£K, Discounted, in 2010 prices)

	Excluding GCP	Including GCP
Health	£5,392.39	£5,392.39
Absenteeism	£2,132.30	£2,132.30
Journey quality	£2,282.91	£2,282.91
Cycle collisions	-£997.13	-£997.13
Gross cycling product (GCP)	-	£859.72
Marginal external costs	£1,506.96	£1,506.96
Present Value of Benefits	£10,317.42	£11,177.14
Present Value of Costs	£2,686.34	£2,686.34
Net Present Value	£7,631.08	£8,490.80
Benefit Cost Ratio	**3.84**	**4.16**

1.10 Limitations

Given the high level assumption-based nature of this exercise, it is important to highlight that the economic case results should be interpreted as indicative of the magnitude of benefits that each of the routes may deliver.

Specifically, whilst this study has been informed by WebTAG guidance on the development of economic assessments for active travel schemes, as indicated earlier in this note, the demand forecasting exercise has been based on numerous assumptions due to the lack of available observed data throughout the study area.

A series of risks associated with the demand forecasting aspects of this study have been identified throughout the process, and should be considered when interpreting the indicative outputs of this study:

- Whilst background growth results derived from NTEM are known to be conservative, as planning data fed into this is less up to date and considers historical planning/population trends, as a DfT tool, NTEM/TEMPRO is considered appropriate for the high level analysis which is to be undertaken for the purpose of this study.

  However, in order to mitigate the risk of underestimating growth within the study area, a sensitivity case has been developed covering for a potential high demand scenario, as detailed in Section 1.7. A factor of 1.5 was applied to all demand outputs. This is based on the latest planning data (Housing Land Audit 2017 based) for each of the council areas within the study area, which suggests that households and population growth will increase exponentially over the next decade. Some reports suggest that population in Musselburgh may increase around 50% by 2024.

- A total of nine routes have been identified within the study area, resulting in catchment areas partially overlapping for several of the routes. As no survey data or observed data is available for this study, the approach described in Section 1.3 may lead to some form of duplication when calculating baseline and projected demand figures for each individual scheme.

  In order to mitigate the impacts of this approach, assumptions on the amount and length of trips undertaken in each of the routes have been kept 'conservative', as 'potential cyclists' may have several route choices following the outputs of this study (assuming that all routes are to be taken forward). If the latter was not the case, demand figures calculated, and hence any subsequent benefits generated by each of the routes, may be underestimated.

- The 'acceptable' distance individuals may be willing to travel in order to access cycle facilities and the overall journey distance they may be willing to undertake is highly variable and dependent on a number of factors. Additionally, when considering travel mode choice, individuals may be anticipated to use journey time as a proxy for measuring an 'acceptable' cycle distance.

  In order to mitigate the risk of underestimating the catchment of each route, a sensitivity case has been developed covering for a potential higher 'acceptable' distance threshold, as detailed in Section 1.8. This sensitivity case threshold is in alignment with the Scottish Government's vision for end-to-end trips that by 2030 'Many more people are walking and cycling for everyday, shorter journeys, usually up to 2 miles for walking and up to 5 miles for cycling'[25].

[25] https://www.transport.gov.scot/media/33649/long-term-vison-for-active-travel-in-scotland-2030.pdf

- The alignment for several of the identified routes overlap, which leads to some form of duplication, across all demand, costs and benefit aspects. Therefore, outputs from this study should be reviewed following the sifting process of the identified active travel schemes, to allow refining the different assumptions considered as part of this high level assumption-based exercise.

- The same demand forecasting methodology has been applied for both cycling and walking. However it is important to note, as highlighted by guidance, that the approach to establish cycle mode share targets could be extended to cover walking but research in this area is problematic. People do not regard walking as a mode of transport in quite the same way as driving, using a bus or even cycling, so studying their reaction to changes in the walking environment is difficult.

2. Summary

The results presented in Table 1.49 (assuming a 44% Optimism Bias for the costing elements), summarises the analysis of monetised cost and benefits for each of the individual routes which have been assessed under the "Core Demand Scenario", as detailed throughout Section 1.6. This demonstrates that, based on the high level assumption-based nature of this exercise, only routes 4, 8 and 9 would be anticipated to generate a positive BCR, together with the adjusted BCR including the Gross Cycling Product.

Table 1.49: Summary of Benefit Cost Ratios – Core Scenario and 1km Buffer (£K, Discounted, in 2010 prices)

Benefit Cost Ratio (Core Scenario)		
Route	Excluding GCP	Including GCP
1	0.08	0.12
2	0.23	0.34
3	0.51	0.58
4	2.28	2.50
5	0.63	0.72
6	0.65	0.74
7	0.81	0.98
8	1.62	1.80
9	1.21	1.31

The results presented in Table 1.50 (assuming a 44% Optimism Bias for the costing elements) summarise the analysis of monetised cost and benefits for each of the individual routes which have been assessed under the "High Demand Sensitivity Case" developed for comparison purposes, as detailed throughout Section 1.7, which was set up to mitigate the risk of underestimating growth within the study area. This demonstrates that under the "High Demand Sensitivity Case", routes 4, 5, 6, 7, 8 and 9 would be anticipated to generate a positive BCR, together with the adjusted BCR including the Gross Cycling Product.

Table 1.50: Summary of Benefit Cost Ratios – High Demand and 1km Buffer (£K, Discounted, in 2010 prices)

Benefit Cost Ratio (High Demand Sensitivity Case)		
Route	Excluding GCP	Including GCP
1	0.17	0.23
2	0.51	0.68
3	0.86	0.97
4	3.55	3.89
5	1.07	1.20
6	1.10	1.23
7	1.28	1.54
8	2.65	2.92
9	1.90	2.05

The results presented in Tables 1.51 & 1.52 (assuming a 44% Optimism Bias for the costing elements), summarise the analysis of monetised cost and benefits for each of the individual routes which have been assessed with a 1.5km buffer, under both the "Core Demand Scenario" and "High Demand Sensitivity Case", as detailed throughout Section 1.8 and 1.9 respectively, which were set up to mitigate the risk of underestimating the catchment of each of the routes proposed within the study area. This demonstrates that, based on the high level assumption-based nature of this exercise, only routes 4, 6, 7, 8 and 9 would be anticipated to generate a positive BCR, together with the adjusted BCR including the Gross Cycling Product. Routes 3 and 5 would only be anticipated to generate a positive BCR under the "High Demand Sensitivity Case".

Table 1.51: Summary of Benefit Cost Ratios – Core Scenario and 1.5km Buffer (*£K, Discounted, in 2010 prices*)

Benefit Cost Ratio (1.5km Buffer Sensitivity Case)		
Route	**Excluding GCP**	**Including GCP**
1	0.18	0.24
2	0.34	0.48
3	0.73	0.83
4	3.19	3.58
5	0.76	0.86
6	1.17	1.32
7	1.47	1.78
8	3.80	4.23
9	2.44	2.65

Table 1.52: Summary of Benefit Cost Ratios – High Demand and 1.5km Buffer (£K, Discounted, in 2010 prices)

Benefit Cost Ratio (High Demand &1.5 km Buffer Sensitivity Case)		
Route	**Excluding GCP**	**Including GCP**
1	0.33	0.41
2	0.68	0.89
3	1.26	1.41
4	5.26	5.84
5	1.29	1.44
6	1.88	2.11
7	2.31	2.77
8	6.11	6.75
9	3.84	4.16