APPENDIX 2

Economic Impacts of Active Modes

Introduction

The Bromsgrove LTP4 active modes scheme will promote cycling and walking across the town through a comprehensive series of improvements, including new links, crossings and resurfacing. This will promote cycling and walking across the entire urban area of Bromsgrove. The location of improvements is identified in the location plan in Appendix 1.

NPIF 'Guidance on the Application Process' (April 2017) states that "*where other material factors not mentioned above… have particular relevance to the bid, these should be captured in applications. These could relate to benefits to… sustainable modes (walking and cycling and accessibility)".* The Department for Transport's Cycling and Walking Appraisal Toolkit (also referred to as the DfT's Active Mode Appraisal Toolkit, March 2015) has therefore been used to assess scheme benefits as part of a wider value for money assessment.

This section briefly outlines the modelling approach, key appraisal assumptions and results of the analysis.

For the purposes of the assessment of economic impact, the core urban area of Bromsgrove has been defined by four MSOA's. The use of Office of National Statistics defined Middle Super Output Areas (MSOAs) to establish the study area ensures that data (census method of travel to work etc) can be collected at a recognized scale. In particular, the urban area is defined as grouping of the following four MSOAs: E02006705, E02006706, E02006707, E02006708.

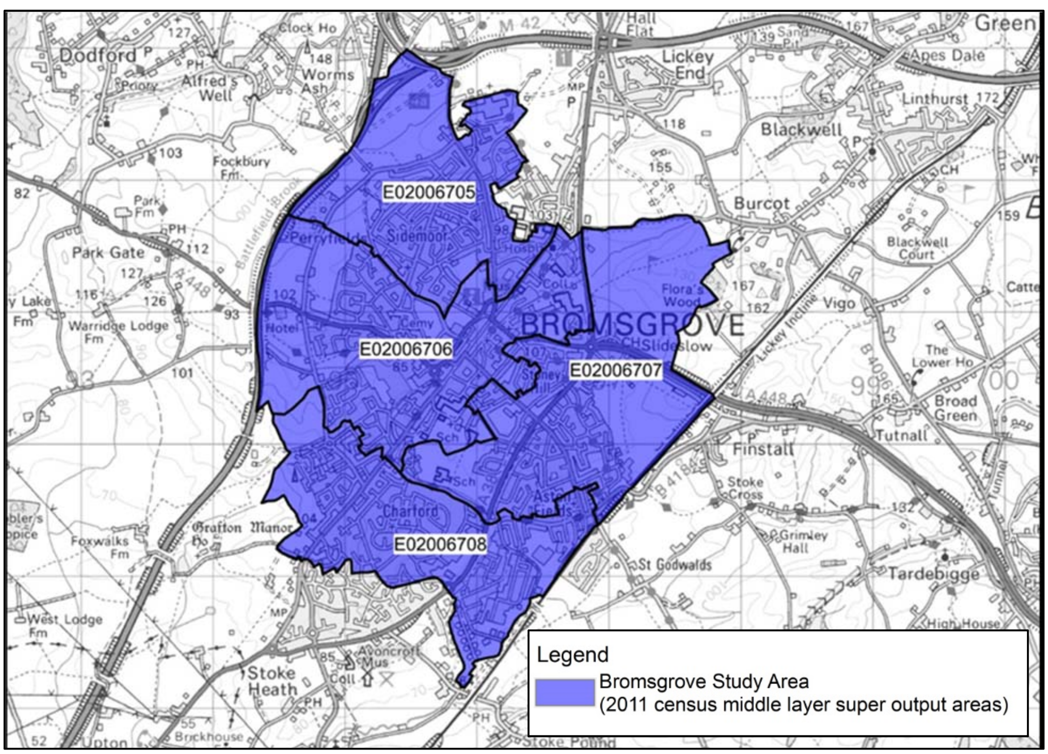

FIGURE 1: BROMSGROVE URBAN AREA MSOAS

Modelling Approach

The key focus of these interventions is to encourage a step change in walking and cycling across Bromsgrove, which includes provision of a safer route between the town centre and new railway station. New developments on the edge of the urban area will also have better connections to the town centre, station and other key destinations in the town.

Due to the nature of individual location based interventions, and how they work together to provide an impetus to encourage walking and cycling across the whole area, these schemes have been assessed as a single package of investment, using DfT's Active Mode Appraisal Toolkit, March 2015. The DfTs Active Mode Appraisal Toolkit covers a range of economic, environmental and social impacts. These are summarised in the table below.

Impact	Benefit Estimated
Physical Activity	Yes
Absenteeism	Yes
Accident benefits	Yes
Environmental benefits	Partially included. As study area is defined as 'Other Urban', WebTAG does not allow air quality benefits to be included.
Decongestion and indirect tax	Yes
Journey quality	Yes – WebTAG Data Book values used to define impact on journey quality (Unit A 4.1.6 for cyclists and A 4.1.7 for pedestrians.)

Table 1: Impacts Assessed for Bromsgrove Town Centre Network Efficiency

Key Assumptions

Journey Quality Assumptions

WebTAG Data Book Unit A 4.1.6 has been used to assess the value of journey quality impacts to cyclists. The scheme includes a number of new accesses, crossings, bridges and links (contraflow and shared use paths) alongside some existing links being resurfaced.

The value for 'on-road segregated cycle lane' has been used as a benchmark for the journey quality impact. This is valued at 2.99 pence per minute, as shown in Table 2.

Table 4.1.6: Value of journey ambience benefit of cycle facilities relative to no facilities (2010 prices & 2010 values)		
Scheme type	Value p/min	Source
Off-road segregated cycle track	7.03	Hopkinson & Wardman (1996)
On-road segregated cycle lane	2.99	Hopkinson & Wardman (1996)
On-road non-segregated cycle lane	2.97	Wardman *et al.* (1997)
Wider lane	1.81	Hopkinson & Wardman (1996)
Shared bus lane	0.77	Hopkinson & Wardman (1996)
	pence	
Secure cycle parking facilities	98.14	Wardman *et al.* (2007)
Changing and shower facilities	20.82	Wardman *et al.* (2007)

TABLE 2: WEBTAG UNIT A 4.1.6

For pedestrians, WebTAG Data Book Unit A 4.1.7 has been used to assess the value of journey quality impacts. The scheme includes resurfacing, new crossings, dropped kerbs and also a comprehensive review of all signage on existing and new routes. Therefore, the values for 'kerb level', 'pavement evenness' and directional signage' have been added together to give a journey quality value of 4 pence per kilometre for pedestrians.

Table 4.1.7: Values of aspects in pedestrian environment (2010 values and 2010 prices)		
Scheme type	Value p/km	Source
Street lighting	3.7	Heuman (2005)
Kerb level	2.6	Heuman (2005)
Crowding	1.9	Heuman (2005)
Pavement evenness	0.9	Heuman (2005)
Information panels	0.9	Heuman (2005)
Benches	0.5	Heuman (2005)
Directional signage	0.5	Heuman (2005)

TABLE 3: WEBTAG UNIT A 4.1.7

Active Mode Toolkit assumptions - business

The key assumptions adopted for this assessment are listed in Table 5 below. It is also worth noting that a range of benchmark values are built into the DfT's Active Mode Appraisal Toolkit to facilitate the estimation of benefits by different impact categories. These DfT assumptions are visible in the Toolkit.

The uplift in cycling and walking was estimated using monitoring data from similar schemes aimed at dramatically increasing walking and cycling. Table 4 outlines results from a Sustrans report *'The Real Cycling Revolution',* which indicates that cycling uplifts from investment in good quality provision can be as high as 1000%.

Case Study	Start	End	Start No.	End No.	Uplift
Manchester NCN Canal Towpath Provision	2008	2011	22,359	98,304	340%
Rural Scotland Community Links	2007	2011	2,219	24,602	1023%
Newport City Centre to University	2009	2011	6,603	23,180	251%
Ardblair Trail, Blairgowrie			10	67	570%

TABLE 4: CASE STUDY UPLIFTS (SUSTRANS, 'THE REAL CYCLING REVOLUTION')

Table 5 outlines a full list of assumptions made for input into the Active Mode Toolkit for business in Bromsgrove. Assumptions made for schools follows in Table 6.

	Modelling criteria	Value	Commentary
Scheme Details	Opening year	2019	Following the approval of this funding application, the delivery of schemes can commence in early 2018. This is consistent with the requirements of the funding competition: *"Allow work to start in Spring 2018." Therefore, expected completion and opening in 2019.*
	Last year of initial funding	2019	The scheme delivery will be completed by end of 2019. This is consistent with the requirements of the funding competition: *"The Department will not be able to provide any funding beyond 31*

			March 2020."
	Decay rate	10%	Scheme benefits assumed to gradually erode over the appraisal period of 20 years, consistent with the central case example outlined in Table B1 of TAG Unit A5.1: Active Mode Appraisal
	Appraisal period	20 years	Strategic interventions which will achieve long term impacts to walking and cycling. The worked example in the Active Mode TAG Unit taken as the central case.
Do Nothing Scenario	Estimated number of cycle journeys	380	Based on census Modal Travel To Work data (MTTW): number of cyclists, for the four MSOAs selected to represent 'urban Bromsgrove'. MTTW data suggests that there are 196 cyclists in the 'urban Bromsgrove' area. Worcestershire Traffic model suggests that in other urban areas of Worcestershire 94% of journeys are return journeys. Hence, total cycle journeys are estimated at 380.
	Average. cycle journey length (km)	6.5 km	Weighted average of 2011 census JtW data (Nomis Web DC7701EWla - Method of travel to work (2001 specification) by distance travelled to work) for Bromsgrove (LA as a whole). Have discounted a small number of residents who reported cycling over 40 km to work.
	Ave. cycle speed (kph)	15 kph	The Analysis for Cycling Potential: Policy Analysis Research Report states average cycle speed is approximately 15 kph.
	Estimated number of pedestrian journeys	3,061	Based on census Modal Travel To Work data (MTTW): number of pedestrians, for the four MSOAs selected to represent 'urban Bromsgrove'. MTTW data suggests that there are 1,578 pedestrians in the 'urban Bromsgrove' area. Worcestershire Traffic model suggests that in other urban areas of Worcestershire 94% of journeys are return journeys. Hence, total cycle journeys are estimated at 3,061.
	Ave. walk journey length	2.6 km	Weighted average of 2011 census Journey to Work (JtW) data (Nomis Web DC7701EWla - Method of travel to work by distance travelled to work) for Bromsgrove (LA as a whole). Have discounted a small number of residents who reported walking over 30 km to work.
	Ave. walk speed (kph)	5 kph	The British Heart Foundation reports that the average walking pace is 5 kph.
	Estimate for the number of return journeys	94%	Worcestershire Traffic Model indicates that 94% of commuters make a return trip in other urban locations within Worcestershire.
Do Something Scenario	Estimated number of cycle journeys	760	Evaluation evidence for Sustrans case studies suggests that uplifts of over 250% can be achieved through provision of comprehensive cycle infrastructure (see Table 4). A 100% uplift factor has been used in order to be conservative. This value is applied to existing number of cycle journeys to forecast cycle journeys for the 'do

			something' scenario.
	Estimated number of pedestrian journeys	4,592	Evaluation evidence for Sustrans case studies suggests that uplifts of over 250% can be achieved through provision of comprehensive cycle infrastructure (see Table 4). A 100% uplift factor was used for cyclists in Bromsgrove in order to be conservative. Given the higher baseline figure for pedestrians, half of this figure has been applied to pedestrians. Therefore a 50% uplift value is applied to existing number of pedestrian journeys to forecast pedestrian journeys for the 'do something' scenario
Decongestion Benefit	Proportion of cyclists attracted from car	20%	Census data from the 'urban Bromsgrove' area suggests that a significant proportion (around 75%) of 'travel to work' journeys is undertaken by car. WCC believe this accentuates congestion within Bromsgrove. Through the proposed investments, WCC seek to reduce such journeys and instigate a step change in cycling across the town. As such WCC have a conservative target to ensure that at least 20% of new cyclists will be attracted from cars.
	Proportion of pedestrians attracted from car	20%	Census data from the 'urban Bromsgrove' area suggests that a significant proportion (around 75%) of 'travel to work' journeys is undertaken by car. WCC believe this accentuates congestion within Bromsgrove. Through the proposed investments, WCC seek to reduce such journeys and instigate a step change in walking across the town. As such WCC have a conservative target to ensure that at least 20% of new pedestrians will be attracted from cars.
	Area type	Other Urban	As defined in Table A2 of TAG Unit A5.4: Marginal External Costs.
Additional information	Background growth	0%	A comparison of 2001 and 2011 census JtW (method of travel to work) confirms that there has been a slight decrease in the use of active modes during the period. This demonstrates the outcomes of lack of active mode based investments within and around Bromsgrove. For the purpose of this appraisal, overall background growth has been adopted at 0%.
	Period of growth	n/a	Assumed to be zero as the area has witnessed no background growth in pedestrians and cyclists.
	Number of days in analysis period	253 days	Number of standard workdays / year.

TABLE 5: KEY ASSUMPTIONS

Active Mode Toolkit assumptions - schools

The assumptions which have been made to assess benefits to school children within the Active Mode Toolkit are outlined in Table 6.

	Modelling criteria	Value	Commentary
Scheme Details	Opening year	2019	Following the approval of this funding application, the delivery of schemes can commence in early 2018. This is consistent with the requirements of the funding competition: *"Allow work to start in Spring 2018." Therefore, expected completion and opening in 2019.*
	Last year of initial funding	2019	The scheme delivery will be completed by end of 2019. This is consistent with the requirements of the funding competition: *"The Department will not be able to provide any funding beyond 31 March 2020."*
	Decay rate	10%	Scheme benefits assumed to gradually erode over an appraisal period of 20 years, consistent with the central case example outlined in Table B1 of TAG Unit A5.1: Active Mode Appraisal
	Appraisal period	20 years	Strategic interventions which will achieve long term impacts to walking and cycling. The worked example in the Active Mode TAG Unit taken as the central case.
Do Nothing Scenario	Estimated number of cycle journeys	223	This is based on an analysis of the total school age population across the urban area of Bromsgrove (4,542, between the ages of 5 and 16). National travel survey indicates that as a weighted average, approx. 2% cycle to school. Assumed that each school child will make a return trip via bicycle, therefore creating two journeys. Furthermore, the analysis assumes that some cycling journeys to schools are escorted. In particular, the analysis assumes that none of the secondary school aged children are escorted. Furthermore, the primary school cycling journeys are escorted at the same level as average walking escort rate (across all age groups). This results in a weighted average of 23% for escorts across all age groups. The analysis also assumes that escorts only make two journeys (not four) per day.
	Ave. cycle journey length (km)	2.0 km	This is based on NTS data regarding distances travelled on bike to school. This is a weighted average to reflect the different trip lengths of primary (1.3km) and secondary school children (2.6) km).
	Ave. cycle speed (kph)	9 kph	The Analysis for Cycling Potential: Policy Analysis Research Report states average cycle speed is approximately 15 kph. There is no data available for average cycling speeds achieved by different age groups. That said evidence suggests that average walk speeds achieved by school aged children is approximately 60% of average adult walking speeds (see walking

			speed evidence). In the absence of any relevant data for cycling speeds by age groups, the locally achieved cycling speeds by adults have been adjusted to derive average cycling speeds achieved by school aged children.
	Estimated number of pedestrian journeys	6,093	This is based on an analysis of the total school age population across the urban area of Bromsgrove (4,542, up to the age of 16). National travel survey indicates that as a weighted average, approx. 55% walk to school. Assumed that each school child will create two journeys. Furthermore, the analysis assumes that some cycling journeys to schools are escorted. The National Travel Survey suggests a ten year weighted average of 62% of pupils aged between 7 and 13 are escorted to school (NTS Table 0616). At the same time, a ten year weighted average of 87% of pupils at the lower end of this cohort is also escorted to school. This figure provides a good proxy for the proportion of accompanied school trips for pupils aged 5 and 6. If it is assumed that no pupils aged 14 and above are escorted, the weighted average for escorted school trips across all age groups is 55%. The analysis also assumes that escorts only make two journeys (not four) per day.
	Ave. walk journey length	1.4 km	This is based on NTS data regarding distances travelled on foot to school. This is a weighted average to reflect the different trip lengths of primary (1.2km) and secondary school children (1.66 km).
	Ave. walk speed (kph)	3 kph	The Association between Blood Lead and Walking Speed in the National Health and Nutrition Examination Survey (NHANES 1999–2002; http://ehp.niehs.nih.gov/wp-content/uploads/121/6/ehp.1205918.t001.html) suggests that children up to 14 years (less than "9th graders") achieve and average walk speed of 2.8 feet per second or approximately 3 kph. This assumption has been adopted as the average walk speed for primary and secondary school children. This approximately 60% of the average adult walk speed of 5 kph.
	Estimate for the number of return journeys	100%	All school journeys are assumed to involve a return.
Do Something Scenario	Estimated number of cycle journeys	335	Half of the uplift value applied to business users (see Table 5) has been applied to school children. Therefore a 50% uplift value id applied to the existing number of cycle journeys to school to forecast cycle journeys for the 'do-something' scenario.
	Estimated number of pedestrian journeys	7,616	Half of the uplift value applied to business users (see Table 5) has been applied to school children.

			Therefore a 25% uplift value id applied to the existing number of cycle journeys to school to forecast cycle journeys for the ‘do-something’ scenario.
Decongestion Benefit	Proportion of cyclists attracted from car	20%	Census data from the ‘urban Bromsgrove’ area suggests that a significant proportion (around 75%) of travel to work journeys is undertaken by car. WCC believe this accentuates congestion within Bromsgrove. Through the proposed investments WCC seek to reduce such journeys and instigate a step change in cycling across the town. As such WCC have a conservative target to ensure that at least 20% of new cyclists will be attracted from cars.
	Proportion of pedestrians attracted from car	20%	Census data from the ‘urban Bromsgrove’ area suggests that a significant proportion (around 75%) of travel to work journeys is undertaken by car. WCC believe this accentuates congestion within Bromsgrove. Through the proposed investments WCC seek to reduce such journeys and instigate a step change in walking across the town. As such WCC have a conservative target to ensure that at least 20% of new pedestrians will be attracted from cars.
	Area type	Other Urban	As defined in Table A2 of TAG Unit A5.4: Marginal External Costs.
Additional information	Background growth	0%	A comparison of 2001 and 2011 census JtW (method of travel to work) confirms that there has been a slight decrease in the use of active modes during the period. This demonstrates the outcomes of lack of active mode based investments within and around Bromsgrove. For the purpose of this appraisal, overall background growth has been adopted at 0%.
	Period of growth	n/a	Assumed to be zero as the area has witnessed no background growth in pedestrians and cyclists.
	Number of days in analysis period	190	Number of standard schooldays / year.

TABLE 6: KEY ASSUMPTIONS – SCHOOLS

Economic Impacts and Value for Money

Commuters

From a commuter cycling perspective, the assessment of the Bromsgrove LTP4 Active Modes package using the DfT's Active Mode Appraisal Toolkit suggests that the scheme can deliver a present value of benefits (PVB) of £12.6 million over a central case appraisal period of twenty years. A summary of the economic impacts to commuters are provided in Table 7 below.

<table>
<tr><td>Impact Drivers</td><td>Estimates (present value in 2010 prices)</td><td rowspan="11">Note: PVB is derived from the Active Mode Appraisal Toolkit. Local air quality benefits are zero. This is due to the fact that current WebTAG marginal external costs for the years, post 2015 are zero.</td></tr>
<tr><td>Noise</td><td>4.43</td></tr>
<tr><td>Local Air Quality</td><td>0.00</td></tr>
<tr><td>Greenhouse Gases</td><td>14.16</td></tr>
<tr><td>Journey Quality</td><td>2,748.27</td></tr>
<tr><td>Physical Activity (incl. absenteeism)</td><td>9,572.67</td></tr>
<tr><td>Accidents</td><td>66.00</td></tr>
<tr><td>Decongestion</td><td>273.62</td></tr>
<tr><td>Indirect taxation</td><td>-75.33</td></tr>
<tr><td>Private contribution</td><td>0.00</td></tr>
<tr><td>Present Value of Benefits (PVB)</td><td>12,603.82</td></tr>
</table>

TABLE 7: ECONOMIC IMPACTS (COMMUTERS ONLY) – SUMMARY TABLE (ESTIMATES IN £ '000S)

Physical activity, including absenteeism, is the largest impact driver, followed by journey quality benefits. Further details of the forecast of the impacts can be reviewed in the attached populated Active Mode Appraisal Toolkit for the interventions.

Trips to School

From a school cycling perspective, the assessment of the Bromsgrove LTP4 Active Modes package using the DfT's Active Mode Appraisal Toolkit suggests that the scheme can deliver a present value of benefits (PVB) of £6.9 million over a central case appraisal period of twenty years. A summary of the economic impacts from trips to school are provided in Table 8 below.

<table>
<tr><td>Impact Drivers</td><td>Estimates (present value in 2010 prices)</td><td rowspan="11">Note: PVB is derived from the Active Mode Appraisal Toolkit. Local air quality benefits are zero. This is due to the fact that current WebTAG marginal external costs for the years, post 2015 are zero.</td></tr>
<tr><td>Noise</td><td>1.21</td></tr>
<tr><td>Local Air Quality</td><td>0.00</td></tr>
<tr><td>Greenhouse Gases</td><td>3.88</td></tr>
<tr><td>Journey Quality</td><td>1,324.33</td></tr>
<tr><td>Physical Activity (incl. absenteeism)</td><td>5,483.29</td></tr>
<tr><td>Accidents</td><td>18.10</td></tr>
<tr><td>Decongestion</td><td>75.03</td></tr>
<tr><td>Indirect taxation</td><td>-20.66</td></tr>
<tr><td>Private contribution</td><td>0.00</td></tr>
<tr><td>Present Value of Benefits (PVB)</td><td>6,885.18</td></tr>
</table>

TABLE 8: ECONOMIC IMPACTS (TRIPS TO SCHOOL ONLY) – SUMMARY TABLE (ESTIMATES IN £ '000S)

Physical activity, including absenteeism, is the largest impact driver, followed by journey quality benefits. Further details of the forecast of the impacts can be reviewed in the attached populated Active Mode Appraisal Toolkit for the interventions.

Summary

The total active mode benefits of £19.5 million (present value in 2010 prices) are compared against the present value costs of Bromsgrove LTP4 Active Modes package to forecast the scheme's benefit cost ratio (BCR) in Appendix 3.