This TAG Unit is guidance for the **APPRaisal PRACTITIONER**

This TAG Unit is part of the family **A5 – UNI-MODAL APPRAISAL**

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1 Introduction

1.1.1 This Unit gives guidance on how to estimate and report impacts on active modes (e.g. walking and cycling). Specific cycling and walking schemes are often relatively small. The amount of effort devoted to the analysis of such schemes should be proportional to the scale of the project or the scale of impact on cycling and walking modes.

1.1.2 Section 2 describes methods that can be used to forecast demand for interventions targeting active modes; section 3 describes how the key impacts resulting from an intervention should be monetised; section 4 describes how the results should be reported; section 5 discusses sensitivity testing; and section 6 discusses the importance of monitoring and evaluation.

1.1.3 This Unit is most applicable to schemes with a significant active modes focus, but is in principle applicable in all cases. When reading these sections it may help to assume that a scheme aimed at active mode use is being appraised. TAG Guidance on The Transport Appraisal Process describes the option development process, where a cycling or walking scheme may have emerged as the best transport solution for a given problem. TAG Unit A5.5 – Highway Appraisal describes a basic method for treating impacts on pedestrians and cyclists where they are not explicitly included in the modelling approach.

1.1.4 This Unit follows the standard approach to appraisal as explained in Guidance for the Technical Project Manager and TAG Unit A1.1 – Cost-Benefit Analysis. However, issues of particular importance to active modes such as physical activity benefits and journey quality are more fully explained.

1.1.5 There is significant uncertainty around the use of the techniques and the valuations suggested in this Unit and thorough use of sensitivity testing around core assumptions should be used when presenting results. Therefore this guidance will be most useful in assessing the effectiveness of one cycling and/or walking scheme against another, using similar input assumptions.

2 Active Mode Forecasting

2.1 Introduction

2.1.1 TAG Unit M1.1 – Principles of Modelling and Forecasting provides guidance on how modelling may be used to estimate future demand for transport facilities. Where cycling and walking schemes form part of a larger set of transport proposals, demand models or spatially aggregate models of the types described in that Unit may be appropriate.

2.1.2 Where cycling and walking is an integral part of a strategy, for example the imposition of 20mph speed restrictions in urban areas, coupled with other changes to create a more appealing environment for pedestrians and cyclists, then model design should include appropriate representation of the alternatives to cycling and walking.

2.1.3 Walking and cycling schemes may be promoted separately from other transport investment proposals and in these circumstances different modelling approaches may be required. This section summarises three possible approaches to forecasting demand for new cycling and walking facilities forecast outside of a formal model. Analysts should also bear in mind the potential impact on the use of other modes.

2.1.4 It is of crucial importance to forecast walk and cycle demand as accurately as possible to produce a successful appraisal. Forecasts are the primary indicator of a scheme’s effectiveness, along with estimates of the resulting change in use of other modes. Since the cost of walking and cycling schemes is often relatively low and the scale of impact relatively small, the cost-benefit analysis is highly sensitive to the quality of these forecasts. Sensitivity tests will be necessary to examine the potential impacts in the face of uncertainty. On the cost side, optimism bias (at the appropriate rate) should also be included in the scheme costs (see TAG Unit A1.2 – Scheme Costs).
2.1.5 It is important that the without-scheme case includes the impacts of other schemes that may affect the mode share of active modes (e.g. the introduction of town centre pedestrian areas, or a congestion charging system). Where the impacts of a cycling or walking scheme are being considered in the context of another major scheme, it may be appropriate to include the major scheme in the without scheme scenario to identify the incremental effects on cycling and walking. The methods described below are valid for forecasts over and above the without scheme case. Inaccuracies in the base growth forecasts may cause the benefit-cost ratios of the appraised schemes to be inconsistent with those in other areas.

2.1.6 It is anticipated that demand management measures such as Smarter Choices initiatives should be assessed with a proportionate application of a full appraisal, which is likely to require a demand model. These schemes can achieve relatively large impacts on mode choice and hence the change in the volume of motorised traffic may be significant enough to warrant a full model. TAG Unit M5.2 – Modelling Smarter Choices provides further guidance.

2.1.7 The existing evidence base on how long the demand impact of active mode schemes will last is relatively sparse. For behavioural interventions, such as Smarter Choices initiatives, it may be reasonable to assume initial increases in walking and cycling decline over time. This phenomenon can be represented in forecasts through use of a decay rate, so that demand in the ‘with scheme’ scenario converges with the ‘without scheme’ demand forecasts over time. For infrastructure investments however, assuming such a reduction in annual demand over time would be inconsistent with appraisal for other transport modes, where decay rates are not routinely applied. Therefore the recommended default assumption for infrastructure investments for active modes is zero decay.

2.1.8 It is important that consistent assumptions are used when comparing schemes and it is advised when undertaking the analysis to include different forecast assumptions to gauge how successful the scheme may be given different forecasts around the core. 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.

2.2 Approach 1: Comparative Study

2.2.1 The least complex and costly approach to estimating future levels of cycling and walking is through comparisons with similar schemes. Larger proposals are likely to have greater demand changes and afford better potential for comparison with existing schemes. Examples could include river crossings or the creation of other significant links in a network that reduce time and distance, or comprehensive urban centre networks that significantly change the balance between motor traffic and walking and cycling generalised costs.

2.2.2 The difficulty with this method is the many other transport system and socio-economic differences and changes that may exist between the two study areas. Forecasting and valuing benefits form only part of the decision making process and, depending on other policy aspirations, there may be sufficient confidence in an approach based on comparative study.

2.2.3 Encouraging walking and cycling: Success Stories (DfT, 2004a) provides some useful starting points and some indication of potential levels of change for a variety of schemes that have achieved positive outcomes throughout Great Britain. Other sources of data may include monitoring exercises undertaken before and after a similar scheme has been implemented in the local area. The availability of this data is limited, although scheme-specific monitoring is an area that is receiving greater attention and should be encouraged to increase the number of case studies available and hence improve forecasts in future appraisals.

2.3 Approach 2: Estimating from Disaggregate Mode Choice Models

2.3.1 A general introduction to the use of bespoke and other mode choice models is in TAG Unit M2 – Variable Demand Modelling.
2.3.2 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.

2.3.3 The example below of the model only applies to changes in the generalised costs of cycling. As such it implies that the utility of all modes except cycling remain unchanged. However, it is fairly straightforward to extend the logit model to include changes in the generalised costs of other modes following the advice given in TAG Unit M2. Given the assumption of no changes in the costs of other modes the logit model used simplifies to:

\[ P^f_y = \frac{P^b_y e^{\Delta U_y}}{P^b_y e^{\Delta U_y} + (1 - P^b_y)} \]

Where:

- \( \Delta U_y \) is the change in utility of the cycling mode, in year \( y \)
- \( P^b_y \) is the proportion of those choosing to cycle out of the maximum of those where it is a viable option, without any intervention, in year \( y \)
- \( P^f_y \) is the proportion of those choosing to cycle out of the maximum of those where it is a viable option, with intervention, in year \( y \).

2.3.4 This formula applies to those who would consider the cycle mode as an option. In reality, a significant proportion of people will never select cycling as a viable transport option. Therefore, the model here should not be applied to the whole population. The survey used to derive this model found that 60% of commuters (the purpose being tested) would never consider cycling. Therefore the result of the formula only applies to the 40% who might. To give a figure for total mode share, one simply multiplies this result through by 40%.

2.3.5 The changes in utility are calculated using the equation below and the coefficients in Table 1. These are empirically-based coefficients of utility derived from the above study that apply to the number of people with short commutes (7.5 miles or less) who could enjoy the benefit provided. Only those coefficients relevant to changes in cycle conditions are shown.

\[ \Delta U = t(c_w - c_n) \]

Where:

- \( \Delta U \) is the change in utility of the cycling mode
- \( t \) is the travel time
- \( c_w \) is the coefficient of utility on routes with facilities (i.e. the do something, with-intervention case)
- \( c_n \) is the coefficient of utility on routes with no facilities (i.e. do nothing, without-scheme case)
<table>
<thead>
<tr>
<th>Change</th>
<th>Interpretation</th>
<th>Coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in time on off-road cycle track</td>
<td>Minutes</td>
<td>-0.033</td>
</tr>
<tr>
<td>Change in time on segregated on-road cycle lane</td>
<td>Minutes</td>
<td>-0.036</td>
</tr>
<tr>
<td>Change in time on non-segregated on-road cycle lane</td>
<td>Minutes</td>
<td>-0.055</td>
</tr>
<tr>
<td>Change in time on no facilities</td>
<td>Minutes</td>
<td>-0.115</td>
</tr>
<tr>
<td>Outdoor parking facilities</td>
<td>present/not present</td>
<td>0.291</td>
</tr>
<tr>
<td>Indoor cycle parking</td>
<td>present/not present</td>
<td>0.499</td>
</tr>
<tr>
<td>Shower/changing facilities plus indoor cycle parking</td>
<td>present/not present</td>
<td>0.699</td>
</tr>
<tr>
<td>Payment to cycle</td>
<td>one way payment in pence</td>
<td>0.013</td>
</tr>
</tbody>
</table>

2.3.6 The most favourable cycling conditions are assumed to be on an off-road cycle track (-0.033 ‘utils’ per minute), favourable when compared to a road with no facilities, which has a higher coefficient of disutility (-0.115 ‘utils’ per minute). However, the coefficient is negative because cycling for a minute still produces a disutility, as does travel time more generally.

2.3.7 Using the coefficients supplied in Table 1, the change in utility from ten minutes’ use of a road with no facilities to a segregated cycle track is therefore $0.82 (= 10 \times (0.115 - 0.033))$. Note that zero overall change in travel time is assumed.

2.3.8 If the base proportion of the population who cycle is 2% of all travellers and we assume that a maximum of 40% would cycle, we derive $p_{y_b}$ as 5%. The model predicts that the proportion of this population cycling after the change will be 10.7% of the total mode share:

$$0.107 = 0.05 \times \exp(0.82) / (0.05 \times \exp(0.82) + (1 - 0.05))$$

As discussed, to calculate the total mode share of cycling, should it be required, we can multiply by 40% to get a value of 4.3% of the whole population.

2.3.9 Analysts should note that this model only applies to those who could make use of any change to facilities on short commuting journeys. The impact of a variety of different changes can be calculated but these results should be regarded as very approximate in general application.

2.3.10 In theory, such models 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.

2.4 Approach 3: Sketch Plan Methods

2.4.1 **TAG Unit M1.2 – Data Sources and Surveys** provides guidance on nationally available data sets. Sources that may be useful include Census journey to work trip matrices and distances and [Department for Transport National Trip End Model (NTEM)](https://www.gov.uk/government/organisations/dft) forecasts of trip ends by mode (including cycling and walking), journey mileage, car ownership and population and workforce planning data. NTEM modal split figures only reflect demographic factors and increasing car ownership. Local models will take account of changes in the generalised cost of travel by each mode and other impacts of rising incomes and local policy action to influence travellers’ “taste” for different modes.

2.4.2 Changes to levels of walking and cycling as evidenced or forecast from these data sources may be approximately estimated by rule-of-thumb calculations. Care needs to be taken when assessing the extent to which a scheme might influence trip making, given the sensitivity of the cost-benefits analysis to the forecasts.
2.4.3 Popularity of walking and cycling may also vary from place to place with the acceptability of those modes in those areas, as well as their attractiveness. For example, local walk and cycle initiatives may change the overall attractiveness of these modes without consideration of individual infrastructural schemes. At any rate, background growth, such as that forecast by NTEM, in walking and cycling is required so that the change in demand brought on by a scheme may be compared to the reference case scenario that will experience the background growth.

2.4.4 An approximate elasticity estimate for the change in demand for cycling in a district, based on a change in the proportion of route that has facilities for cycle traffic (cycle lanes, bus lanes and traffic free route), is +0.05. This has been derived from models of the variation in cycle use at ward level (specifically a revision of the models used in Parkin, 2004). As an example, a district might have 2,000 trips by bicycle per day with a total road length of 500 kilometres and an existing length of cycle facilities in the district of 50 kilometres. A scheme is proposed to create a new off-carriageway cycle route of 10 kilometres in length. The new cycle facilities increase the proportion of cycle facilities by 20% (from 10% to 12% of total road length). The expected increase in cycle trip numbers would be 1% (+0.05 * 20%), or 20 trips per day (1% * 2000 trips). It should be noted that this is a useful, albeit approximate method for predicting the increase in demand for cycling and the results may differ somewhat from the more multifaceted approach described when estimating from disaggregate mode choice models.

2.5 Other Considerations

2.5.1 Forecasting does not usually distinguish between children and adults. In respect of cycling and the journey to school it may be appropriate to explicitly consider the different responses that children may make to schemes.

2.5.2 Catchments for new public transport modes are based around distances from existing public transport nodes and the topography of the catchments is also sometimes considered. Where there is a proposal for a significant walking or cycling route, for example a traffic-free route along a previously inaccessible green corridor, it may be appropriate to consider analogous techniques.

2.5.3 In comparison to other modes, the choice for walking and cycling is more likely to be influenced by the journey purpose because this affects, for example, the amount of luggage that needs to be carried and the type of clothing that it is appropriate to wear. It may be appropriate to consider modelling techniques that explicitly account for journey end activity.

2.5.4 Estimation of the demand for cycling and walking might also need to take into account the different types of user. For example, pedestrians could be characterised as “striders”, who are using walking to get somewhere and might be sensitive to changes in travel time or “strollers”, who might be less concerned about travelling efficiently but more sensitive to environmental factors (Heuman, 2005). DfT (2004b) suggests a number of different types of “design pedestrian types” and “design cyclist types”. These include commuters, utility cyclists and shopper/leisure walkers all of which might be expected to react differently to different interventions in the form of facilities.
3 Calculation of Key Impacts

3.1.1 Table 2 below shows the key indicators that govern most of the costs and benefits that need to be measured to undertake an appraisal. Figure 1 in Appendix A shows how the indicators inter-relate to the impacts appraised in schematic form. The subsequent guidance explains these in greater detail.

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Used to appraise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cycling and walking users</td>
<td>Journey quality</td>
</tr>
<tr>
<td>New individuals cycling or walking</td>
<td>Physical activity</td>
</tr>
<tr>
<td></td>
<td>Journey quality</td>
</tr>
<tr>
<td>Car kilometres saved</td>
<td>Accidents</td>
</tr>
<tr>
<td></td>
<td>GHG emissions, air quality and noise</td>
</tr>
<tr>
<td></td>
<td>Indirect tax revenue</td>
</tr>
<tr>
<td></td>
<td>Travel time (decongestion)</td>
</tr>
<tr>
<td>Commuter trips generated</td>
<td>Absenteeism</td>
</tr>
</tbody>
</table>

3.1.2 **TAG Unit A1.1 – Cost Benefit Analysis** provides guidance on appraisal periods. Most walking and cycling schemes will have finite project lives and/or significant uncertainty around the longevity of impact (particularly for demand management schemes) so that the sixty year appraisal period recommended for large-scale infrastructure projects might not be applicable. The length of appraisal period will have a significant impact on the appraisal and monetised estimates of impacts should be subject to sensitivity tests around the appraisal period (sensitivity testing is discussed further in section 5). Where longer appraisal periods are used it is vital that all maintenance and renewal costs during the appraisal period are included in cost estimates.

3.1.3 **TAG Unit A1.1** also requires all monetary values in appraisal to be presented in real, discounted values (in the Department's base year) and in the market prices unit of account. This applies to walking and cycling schemes just as it does to other schemes.

3.1.4 Scheme promoters can use the Active Mode Appraisal Toolkit to calculate the key impacts of cycling and walking interventions.¹ The Active Mode Appraisal Toolkit is a spreadsheet model developed within the Department for Transport. The toolkit is aimed at scheme promoters with limited technical expertise, and includes guidance on how to use the tool.

3.1.5 Appendix B provides a worked example of how to apply this guidance to a case study, including sensitivity tests around key assumptions such as the length of the appraisal period and the decay rate applied to demand impacts.

3.2 Physical Activity Impacts

3.2.1 Physical activity impacts typically form a significant proportion of benefits for active mode schemes. The recommended method for estimating physical activity impacts of active travel is based on monetising the change in mortality resulting from a change in walkers and cyclists, i.e. the benefits from gaining life years. The method requires estimates of the number of new walkers or cyclists as a result of the scheme. This approach is supported by a strong evidence base, which is also included in WHO's 2014 update of its Health Economic Assessment Tool. More detailed guidance on estimating these benefits is given in the physical activity section of **TAG Unit A4.1 - Social Impact Appraisal**.

3.3 Absenteeism Impacts

3.3.1 Improved health from increased physical activity (such as walking or cycling) can also lead to reductions in short term absence from work. These benefits can be estimated using the methods in TfL (2004), details of which are given in TAG Unit A4.1. The method requires estimates of the number of new walkers and cyclists who are commuting; the time per day they will spend active; and average absenteeism rates and labour costs.

3.4 Journey Quality Impacts

3.4.1 Journey quality is an important consideration in scheme appraisal for cyclists and walkers. It includes fear of potential accidents and therefore the majority of concerns are about safety (e.g. segregated cycle tracks greatly improve journey quality over cycling on a road with traffic). Journey quality also includes infrastructure and environmental conditions on a route. As an impact which is apparent to users, the journey quality benefits should be subject to the ‘rule of a half’ (see TAG Unit A1.3 – User and Provider Impacts) – current users of the route will experience the full benefit of any improvements to quality but the benefits for new cyclists/walkers should be divided by two.

3.4.2 The evidence in this area is fairly limited. Analysts should use judgment, or potentially a ‘sliding scale’ approach to value journey quality impacts depending on the perceived quality of an intervention, using published research figures as a guide to the maximum value for an improvement. The journey quality section of TAG Unit A4.1 provides further guidance and the values for estimating journey quality impacts for cyclists and pedestrians are given in TAG Data Book, respectively. Analysts must ensure that when the benefits of schemes are compared against one another, consistent assumptions are made concerning journey quality monetary benefits.

3.5 Accident Impacts

3.5.1 Accident benefits (or disbenefits) are calculated from changes in the usage of different types of infrastructure by different modes and the accident rates associated with those modes on those types of infrastructure. Therefore accident analysis should take account of changes in accidents involving pedestrians and cyclists, resulting from changes in walking and cycling and the infrastructure used, and the impact of mode switch on accidents involving other road users.

3.5.2 The accidents section of TAG Unit A4.1 provides guidance on forecasting and valuing active mode accidents. Where there is significant mode switch, the marginal external cost (MEC) method (TAG Unit A5.4 – Marginal External Congestion Costs) can be used as a simplified approach to estimate the change in accidents generated by a change in car kilometres.

3.6 Environmental Impacts

3.6.1 The environmental benefits from a walk or cycling scheme are achieved through a reduction in motorised traffic and hence a reduction in the associated externalities. The assessment of disbenefits such as noise, air pollution and greenhouse gases are explained in TAG Unit A3 – Environmental Impact Appraisal and TAG Unit A5.4 describes how these impacts can be estimated using the MEC method. Other environmental factors such as the impact on landscape and biodiversity should also be considered.

3.6.2 Some schemes will have more accurate information through use of a formal transport model. Where information on speeds and types of vehicle affected are available, more accurate estimates of greenhouse gas impacts can be estimated using tables in the TAG Data Book for fuel consumption (Table A1.3.11), carbon emissions (Table A3.3) and carbon values (Table A3.4).

3.7 Decongestion and Indirect Tax Impacts

3.7.1 Mode switch from car to active modes will benefit those who continue to use the highways (decongestion benefit) and impact on indirect tax revenues. The MEC method used to estimate
accident and environmental benefits from reductions in car use can also be applied to these impacts (see TAG Unit A5.4).

3.7.2. The diversion factors in WebTAG data book table A.5.4.7 can be used to calculate the change in vehicle kilometres.

3.7.3. The diversion factors have been produced by a study carried out by RAND Europe and Systra for Department for Transport. The literature review involved searching the relevant academic and grey literature as well as making enquiries to experts in the field to identify material, such as unpublished studies.

3.7.4. The diversion factors indicate how passenger trips on other modes would be affected if an intervention lead to an increase or decrease in bus patronage. For example with a full choice set, if there are 100 new cyclists, there are 11 less people travelling by car.

3.7.5. The diversion factors should be used for uni-modal appraisal. If more complex modelling is required see WebTAG guidance for modelling practitioners.

3.7.6. The diversion factors can be used to calculate the effect of the intervention on road congestion, and the related decongestion benefits. There is currently no guidance on how to appraise the effects of an increase in cycle use on other modes.

3.7.7. Car user trips should be converted to car vehicle kilometres when these diversion factors are used to calculate decongestion benefits with MECs. The change in car kilometres due to the intervention can be calculated by dividing the total distance of passenger trips by the average car occupancy rate. Average car occupancy rates can be found in WebTAG data book table A.1.3.3.

3.7.8. A similar calculation can also be made for taxi journeys. Bespoke analysis of National Travel Survey data carried out by the Department for Transport found an average taxi occupancy rate of 2.4 (not including the driver) between 2002 and 2016.

3.7.9. Diversion factors vary based on the choice set of transport modes which are available. For instance if light rail is not an available alternative, diversion to cycling from other modes will increase. If all the recipient/source modes listed in the table are available alternatives (even if not of interest for scheme) then the diversion factors can be read directly from WebTAG data book table A.5.4.7.

3.7.10. If not all recipient/source modes are available then the values can be renormalized so that all available alternatives sum to 1. For instance if light rail was not available in a metropolitan area, then all other values should be divided by 0.88 (=1-0.12) Diversion to/from car would become 0.12 (=0.11/0.88) This method assumes that passengers are equally split across all other modes and is therefore an approximation.

3.7.11. The literature review only found sufficient evidence to estimate values for metropolitan areas and we would expect diversion factor to differ based on the length and purpose of the trip. Scheme promoters can use different values if they can justify it with relevant evidence. It is recommended the WebTAG values are used as a sensitivity test.

3.7.2. It may be appropriate to use the cycling diversion factors to provide an indicative estimate for walking diversion factors, where alternative bespoke evidence on walking is not available. The Department's Active Mode Appraisal Toolkit applies this approach as the default assumption for walking, but further work is needed to improve the evidence base in this area.

3.8 Time Saving Impacts on Active Mode Users

3.8.1 While many active mode schemes may aim to increase demand for walking and cycling through improved quality of facilities, they may also result in time savings to pedestrians and cyclists through provision of quicker or shorter routes. In such circumstances the time saving benefits should be
estimated using the ‘rule of a half’ method described in TAG Unit A1.3 – User and Provider Impacts and the values in TAG Data Book.

4 Reporting the Impacts of Walking and Cycling Schemes

4.1.1 The impacts of a walking and/or cycling scheme should generally be reported in the same way as any other scheme, using the same reporting tables.

4.2 Transport Economic Efficiency (TEE) Table

4.2.1 Impacts on walkers and cyclists, in qualitative or monetised form, should be reported in the ‘Other’ column of the TEE table, split by business, commuting and other journey purposes. Where decongestion benefits for road users are calculated using the MEC method, these should be recorded as time benefits in the ‘Road’ column².

4.3 Public Accounts (PA) Table

4.3.1 TAG Unit A1.2 – Scheme Costs provides guidance on estimating scheme investment and operating costs. Costs of walking and cycling schemes should be treated in the same way as for other schemes; including appropriate adjustments for risk and optimism bias and presented in the market prices unit of account.

4.3.2 Where there is significant mode shift and the MEC method has been used, the change in indirect tax should be recorded. Note that costs in the PA table are recorded as positive values so that a reduction in indirect tax revenue should appear as a positive value.

4.4 Analysis of Monetised Costs and Benefits (AMCB) Table

4.4.1 Sub-totals from the TEE and PA tables should be carried over to the AMCB table. Monetised estimates of physical activity (comprising health and absenteeism impacts), journey quality, accidents and environmental impacts following the methods described in this unit should also be included in the AMCB table.

4.5 Appraisal Summary Table (AST)

4.5.1 Monetised estimates should also be recorded in the ‘Monetary’ column of the appropriate rows of the AST. Practitioners should refer to TAG Units relating to specific impacts for guidance on what should be recorded in the ‘Summary of key impacts’ column and any further quantitative information that should be reported.

4.6 Non-monetised Impacts

4.6.1 The appraisal should also consider impacts that it is not possible to monetise. Practitioners should refer to TAG Units relating to the specific impacts for further guidance on how they should be assessed and reported in the AST.

5 Sensitivity Testing

5.1.1 A critical issue with the appraisal of walking and cycling schemes is that the above analyses can be highly sensitive to the forecasts and assumptions used. Therefore, in all cases it is advised, to produce as robust an analysis as possible, that sensitivity tests are undertaken on the core assumptions made.

² The decongestion benefits include both time and vehicle operating cost (e.g. fuel) savings but time savings tend to dominate.
5.1.2 Key assumptions to consider in sensitivity testing include the following, but other variables may also be relevant:

- **Length of appraisal period.** How long will the benefits really last before reinvestment is required? This is especially pertinent if demand management measures are being appraised or considered;

- **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.

- **Quantum of journey quality benefits.** It can be particularly difficult to assess the size of journey quality benefits to apply, not only in terms of the values to adopt, but the applicability of those values to users. The latter will depend on the length of time users are exposed to improvements (e.g. cyclists will often not use a full length of improved infrastructure for their journey). Different unit benefits per user should be tested to better understand how this impacts on the potential scheme benefits.

- **Other key assumptions.** All other assumptions underpinning the appraisal need careful consideration and justification since these will impact on the sensitivity of the scheme assessment and the resulting costs and benefits produced. For example, assumptions concerning average journey length will be important. In the case of a pedestrian bridge, for example, the scheme may encourage more walkers but will result in less health benefits if, say, journey times are reduced as a result of the connectivity benefits derived by the new crossing. The active mode appraisal spreadsheet toolkit supporting this guidance contains default assumptions around journey speeds and lengths, but where these are varied by the user based on local evidence the results may be highly sensitive to changes made.

6 **Monitoring and Evaluation**

6.1.1 Monitoring and evaluation are important elements of implementing schemes that affect walking and cycling. Monitoring and evaluation should take place in a timely manner and planning monitoring and evaluation will help to clarify scheme aims and objectives.

6.1.2 Data arising from evaluation exercises will add to the current evidence base. This will be of great use when forecasting for subsequent schemes, especially if similar schemes are planned in the future and in light of the importance of sustainable transport options to health and the environment. Since post-scheme monitoring should be an important part of the implementation of a successful scheme, an estimate of the costs to do so should be included in the scheme costs.

6.1.3 Monitoring of schemes is essential both before and after implementation. A set of ‘before scheme’ data is required to establish a Without Scheme case against which to compare forecasts. The purpose of collecting post-scheme evaluation data is to ensure that the impact of any scheme is identified to:

- check whether the predictions made about a scheme were correct;
- determine whether a scheme was a success or not;
- analyse why it was effective (or otherwise);

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• identify what can be learned from the scheme; and
• inform the analysis and appraisal of future schemes.

6.1.4 Evaluation can also be used to publicise a scheme and make the lessons learned available to the wider transport planning community. Useful guidance on the evaluation of Road Safety Education Interventions is contained in ‘Guidelines for Evaluating Road Safety Education Interventions’ (DfT, 2004c) and much of this may be applicable to the evaluation of a walking or cycling scheme.

6.1.5 The advent of Smarter Choices Initiatives also make monitoring and evaluation of vital importance. The data collected will assist in quantifying demand shifts through the introduction of softer measures and the propensity for people to change modes having received better information to make more informed choices. There is an evident overlap with the needs of transport models to forecast these changes in demand effectively, requiring relatively large volumes of good quality data.

6.1.6 Table 3 details the potential monitoring requirements of cycling and walking schemes.

<table>
<thead>
<tr>
<th>Table 3 Minimum Monitoring Requirements of Cycling and Walking Schemes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data to be collected</strong></td>
</tr>
<tr>
<td><strong>Prior to scheme implementation</strong></td>
</tr>
<tr>
<td>Number of cyclists/pedestrians per day</td>
</tr>
<tr>
<td>Utility/leisure split</td>
</tr>
<tr>
<td>Journey time</td>
</tr>
<tr>
<td>Origins and destinations</td>
</tr>
<tr>
<td><strong>Scheme Details</strong></td>
</tr>
<tr>
<td>Length of scheme</td>
</tr>
<tr>
<td>Environmental improvements (landscaping, vegetation etc)</td>
</tr>
<tr>
<td>Safety/security improvements (lighting, CCTV etc)</td>
</tr>
<tr>
<td>Links with other schemes (part of a network, parking, resting places, crossings etc)</td>
</tr>
<tr>
<td>Information (signage)</td>
</tr>
<tr>
<td><strong>Following scheme implementation</strong></td>
</tr>
<tr>
<td>Number of cyclists/pedestrians per day</td>
</tr>
<tr>
<td>Utility/leisure split</td>
</tr>
<tr>
<td>Mode shift (previous journey mode)</td>
</tr>
<tr>
<td>Previous journey route (if transferred)</td>
</tr>
<tr>
<td>Journey time</td>
</tr>
<tr>
<td>Origins and destinations</td>
</tr>
</tbody>
</table>

6.1.7 Methods of monitoring cycling include the following:
• National Travel Survey, National Traffic Census, National Population Census (National level)
• Automatic Traffic Counters (ATCs) (including pneumatic tube counters, piezoelectric counters and inductive loops)
• Manual Classified Counts (MCC)
• Cordon and Screenline Counts
• Destination Surveys
• Interview Surveys

6.1.8 Monitoring techniques that should be used for walking include:
• Origin/destination surveys
• Household surveys and travel diaries
• Manual counts
• Automatic count methods (including video imaging, infrared sensors, piezoelectric pressure mats).

6.1.9 Further information on each of these monitoring techniques; how to select survey sites; and when to undertake surveys is provided in the 'Traffic Advisory Leaflets Monitoring Local Cycle Use' (DETR, 1999) and 'Monitoring Walking' (DETR, 2000).

7 References


DfT, (2004b) Policy, Planning and Design for Walking and Cycling, LTN 01/04 (Consultation Draft), April.


World Health Organisation (WHO) (2003), Health and development through physical activity and sport.

World Health Organisation (WHO) (2007), Quantifying the health effects of cycling and walking.

8 Document Provenance

This TAG Unit forms part of the restructured WebTAG guidance, taking previous TAG Units as its basis. It is based on previous Units 3.14.1 Guidance on the Appraisal of Walking and Cycling Schemes, which became definitive guidance in 2009, and 3.5.5 Impacts on Pedestrians, Cyclists and Others, which was based on Appendix G of Guidance on the Methodology for Multi-Modal Studies. The case study in the appendix has been updated to reflect changes to values in other guidance units.

This guidance was updated in December 2017 to reflect new research commissioned by the DfT into the health benefits of walking and cycling.
Appendix A  Summary Of Active Mode Scheme Appraisal Process

Figure 1, shows the basic processes used to collect together the various cost and benefit elements for the appraisal of a walking and cycling scheme. This method was used to generate the case studies in Appendix B.

### Benefits

- **Unit benefit to journey quality for given scheme per km**
- **New C/W trips (observed/forecast)**
- **Average W/C trip length**
- **C/W kms along scheme**
- **Car/bus kms saved**
- **Mode shift from SP surveys (those who could use a car/bus but didn’t)**
- **DECONGESTION BENEFIT**
  - Benefit due to reduced relative risk of mortality through physical activity (average individual)
- **TAX REVENUE**
  - Tax revenue per car km
- **ENVIRONMENTAL BENEFIT**
  - CO₂ emissions over time (Cg/l)
  - Average fuel consumption over time (Cg/l) for given speed
- **PRIVATE SECTOR BENEFIT**
  - Social Cost of Carbon (SCC) per tonne
- **JOURNEY QUALITY BENEFIT**
  - Change in accident rate over time
- **HEALTH BENEFIT**
  - Cost of accidents by severity
- **ACCIDENT BENEFIT**
  - Risk of accident by severity per km

### Costs

- **Subsidies (positive)**
- **Developer contributions (negative)**
- **REVENUE COST**
  - PT service revenue per passenger
- **TOTAL CAPITAL COSTS**
  - Real Maintenance costs
  - Real Construction costs
- **Optimism bias**
- **Market price adjustment**
Appendix B  Example Walking and Cycling Case Study

B.1  Introduction

B.1.1  This Appendix applies the guidance to an example hypothetical case study for illustrative purposes. Section B.2 describes the hypothetical scheme and its costs; section B.3 describes the forecasting approach used; section B.4 sets out how the costs and benefits are calculated; section B.5 how the results should be reported; section Error! Reference source not found. describes sensitivity testing; and section B.6 commentary on the case study.

B.2  The Case Study and Scheme Costs

B.2.1  This appraisal case study considers improvements to a canal towpath in London, providing access to a major industrial business park area. The project consists of upgrades to an existing 6km route carrying relatively high levels of usage from modest to high quality. Improving levels of commuter use is a particular priority.

B.2.2  Construction of the hypothetical scheme takes place in 2010, with the scheme opening in 2011. The construction cost is estimated at £182,000 with maintenance costs incurred every year and estimated as £18,800 per annum, in 2010 prices.

B.3  Estimating demand for and impacts of cycling and walking schemes

B.3.1  The demand impact of the scheme is estimated with Approach 1: Comparative Study. The increase in demand is based on user counts and surveys before and after an actual completed scheme, which showed a considerable increase in usage following upgrade to the route surface quality and connectivity.

B.3.2  In this case study, no background demand growth is assume for simplicity. In principle, background demand growth (by mode, or at the all-mode level if desired) can be taken from data from the National Trip End Model (NTEM) at a suitable level of spatial disaggregation.

B.3.3  Both the ‘without scheme’ and ‘with scheme’ scenarios are based on 2010 counts of walkers and cyclists using the route. The ‘without scheme’ scenario is then based on the annual NTEM growth rates above. The ‘with scheme’ scenario is based on counts from the comparative study, which showed a 51% increase in cyclists and 11% increase in pedestrians using a similar canal towpath two years after a similar upgrade (i.e. demand in 2012 in the with scheme scenario is 51%/11% greater than demand in 2010).

B.3.4  To calculate the number of cycling and walking users generated by the scheme, the number of users expected under the ‘without scheme’ scenario is subtracted from the forecast number of users under the ‘with scheme’ scenario. Table B1 below shows the usage in terms of numbers of cyclists and pedestrians based on the 2010 count data collected during the pre-implementation phase and the with and without scheme forecasts.
Table B1  Cyclists and pedestrians before and after intervention (based on observed counts)

<table>
<thead>
<tr>
<th></th>
<th>Cyclists</th>
<th>Walkers</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010 (usage per day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trips</td>
<td>1,085</td>
<td>517</td>
</tr>
<tr>
<td>Individuals</td>
<td>597</td>
<td>284</td>
</tr>
<tr>
<td>2012 (usage per day)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Without scheme (trips)</td>
<td>1,090</td>
<td>522</td>
</tr>
<tr>
<td>With scheme (trips)</td>
<td>1,636</td>
<td>572</td>
</tr>
<tr>
<td>Usage difference (trips)</td>
<td>546</td>
<td>50</td>
</tr>
<tr>
<td>Without scheme (individuals)</td>
<td>600</td>
<td>287</td>
</tr>
<tr>
<td>With scheme (individuals)</td>
<td>900</td>
<td>315</td>
</tr>
<tr>
<td>Usage difference (individuals)</td>
<td>300</td>
<td>27</td>
</tr>
</tbody>
</table>

B.3.5 The number of individual users is based on the assumption that 90% of trips are part of a return journey using the same route, to avoid double counting in the calculation of the number of individuals affected (e.g. 1,085 trips * 90% / 2 + 1,085 trips * 10% = 597 individual users). The number of new individual users is used in the calculation of health benefits and is calculated by subtracting the number of users in the previous year from the number of users during the current year. The proportion of users on commuting journeys (which is relevant to the calculation of absenteeism benefits) is 56.4%, taken from surveys as part of the comparative study.

B.3.6 As discussed in section 2.1, it is assumed that the initial increase in active mode users seen in 2012 is maintained indefinitely. This is a reasonable assumption as this is an infrastructure investment where the path is built and importantly maintained over time.

B.3.7 The number of car kilometres saved by the scheme is used in the calculation of decongestion, indirect tax and environmental impacts using the Marginal Externality Cost method. The total change in walking and cycling kilometres is calculated by multiplying the forecast ‘without scheme’ and ‘with scheme’ trips by the average trip lengths, which are assumed to be 3.7kms for cyclists and 1.1kms for walkers (taken from NTS) and subtracting the former from the latter. The proportion of users then reporting that they could have used a car but chose not to (27.3% in this example, based on surveys for the comparative study) is taken as the proportion of the total walking and cycling kilometres that can be described as car kilometres saved. Therefore, this example leads to 573 car kilometres being saved per day in 2012 (27.3%*(546 cycling trips * 3.7kms + 50 walking trips * 1.1kms)). Note in this example it is assumed that average journey lengths by mode remain unchanged. As a result, even though the intervention is a 6km length of off-road cycle track, it is not assumed that users will traverse the whole length of that track.

B.4 Calculating the costs and benefits

B.4.1 The combination of user numbers, growth rates and trip profiling form the basis for the calculation of total trips, numbers of new users, car kilometres saved, and numbers of commuter trips. Each of these is required for the generation of the monetised values for the items listed below. In each case the calculated value is the net present value over the appraisal period.

B.4.2 As discussed in section 3 the sixty year appraisal period over which most large-scale infrastructure schemes for other modes are assessed is not generally recommended for schemes targeting active modes. In this case study a twenty year appraisal period is used and sensitivity testing of this assumption is discussed in section B6.

B.4.3 This case study includes the physical activity, absenteeism, journey quality and decongestion (calculated using the Marginal Externality Cost method) benefits of the upgraded towpath. As it is an upgrade to an existing route, time savings to users are not included.
Scheme costs

B.4.4 The scheme investment costs (design and construction) and operating costs (maintenance) are required for the appraisal. Construction will take place in 2010 and the construction cost is estimated at £182,000. Maintenance costs will be incurred every year and are estimated as £18,800 per annum, in 2010 prices. The estimated costs have been adjusted by +15% to account for optimism bias (in practice, this varies with the level of development of the scheme – see TAG Unit A1.2 – Scheme Costs), and a further 19.1% has been added to adjust total capital costs and operating costs to market prices. The maintenance costs presented in Table B2 have been summed and discounted over the twenty year appraisal period to form part of the Present Value of Costs (PVC) (see TAG Unit A1.1 – Cost Benefit Analysis).

Table B2 Present value costs of the case study after inclusion of optimism bias and adjustment to market prices (2010 prices)

<table>
<thead>
<tr>
<th></th>
<th>Capital costs</th>
<th>Maintenance costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scheme capital cost</td>
<td>£182,000</td>
<td>£276,545</td>
</tr>
<tr>
<td>+15% optimism bias</td>
<td>£209,300</td>
<td>£318,027</td>
</tr>
<tr>
<td>+19.1% market price adjustor</td>
<td>£249,276</td>
<td>£378,770</td>
</tr>
</tbody>
</table>

Physical Activity

B.4.5 The physical activity benefits of the scheme are estimated for the potential new walkers and cyclists along the scheme route using the active travel health benefits toolkit. The user inputs the estimated number of new cycling and walking trips and the toolkit then calculates the estimated impact on mortality of the scheme using default 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%.

B.4.6 In this example, the total monetary benefit from physical activity is £4.2m, in 2010 present values after discounting. More detail on this methodology is given in the physical activity section of TAG Unit A4.1 - Social Impact Appraisal.

Table B3 Calculation of reduction in relative risk of mortality for cyclists and walkers

<table>
<thead>
<tr>
<th></th>
<th>Cyclists</th>
<th>Walkers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Return</td>
<td>Single</td>
</tr>
<tr>
<td>Daily distance (km)</td>
<td>7.5</td>
<td>3.7</td>
</tr>
<tr>
<td>Average speed (kph)</td>
<td>11.0</td>
<td>11.0</td>
</tr>
<tr>
<td>Active time per day (mins)</td>
<td>24.0</td>
<td>12.0</td>
</tr>
<tr>
<td>Proportion of individuals</td>
<td>0.9</td>
<td>0.1</td>
</tr>
<tr>
<td>Average active time per day (mins)</td>
<td>22.9</td>
<td>18.9</td>
</tr>
<tr>
<td>Reduction in relative risk (average)</td>
<td>0.16</td>
<td>0.07</td>
</tr>
</tbody>
</table>

B.4.7 As the evidence on reductions in relative risk for walkers is based on increased activity for 7 days a week, the active time per day is adjusted for the number of days per year (220) the new walkers are assumed to use the upgraded towpath.

B.4.8 The calculated reduction in relative risk of death and the number of new walkers and cyclists are used to calculate a figure for the potential number of lives saved based on average mortality rates. For this case study an average mortality rate of 0.0024 is used, the mean proportion of the population of England and Wales aged 15-64 who die each year. It is also assumed that the benefit

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5 Source: ONS 2007
of using active modes accrues over a five year period, after which new cyclists or pedestrians achieve the full health benefit of their activities.

B.4.9 The number of potentially prevented deaths is then multiplied by the conditional life expectancy and the VOLY value of £60,000 per life year lost to give a monetised benefit for each year of the appraisal.

B.4.10 These calculations are repeated for both cyclists and walkers for each year of the appraisal period, including real growth in the value of a prevented fatality in line with forecast GDP/capita, then summed and discounted to give a total benefit of £4.2m, in 2010 present values. This may also be converted into a unit saving per additional cyclist or pedestrian for ease of calculation across the appraisal period.

Absenteism

B.4.11 Absenteism from work is expected to decrease where more people walk or cycle to work. Moderate physical activity is seen to lead to a reduction in sick days taken from work and hence provides a benefit to the employer. This is not the same as the benefit of better health for the individual.

B.4.12 Average annual absenteeism rates per person (7.2 days per year, based on London-specific data) are multiplied by the expected reduction in absenteeism from increased cycling and walking (25% based on 30mins activity per day), based on a meta-analysis carried out by TfL, resulting in a reduction in sick days of 1.8 days per affected individual (7.2 * 6%). The employer cost saving of the reduction is then calculated, based on a daily employment cost of £300, resulting in a benefit of £540 per affected individual (£300 * 1.8). The number of new cyclists and walkers is factored by the proportion of commuting trips on the route (56.4%) to give the number of individuals affected. This results in a value for the reduction in absenteeism per new user of £232 per annum per new cyclist (£540 * 56.4% * 22.9 mins / 30mins) and £192 per annum per new walker (£540 * 56.4% * 18.9 mins / 30mins), based on the average time spent active relative to the 30 minutes per day in the US study.

B.4.13 As with the physical activity benefits, the absenteeism benefits are assumed to accrue over a five year period, are estimated for each year, including real growth in the employment cost in line with forecast GDP/capita, and then summed and discounted to give a total benefit of £1.2m, in 2010 present values.

Journey Quality

B.4.14 Journey quality is calculated on the basis of a ‘safety-insecurity’ value, as derived from the research studies cited in the relevant section of TAG Unit A4.1. The approach is based on assigning a ‘quality value’ to each trip made by existing and new users. Separate journey quality values are used for cyclists and pedestrians. In each case the ‘rule of a half’ is used whereby current users experience the full benefit of quality improvements but the benefits for new users are divided by 2.

B.4.15 For cycling trips, the journey quality value is derived from the willingness to pay value of an off-road cycle track (7.03 pence per minute in 2010 prices). The assumption is also made that the average cyclist will use the upgraded towpath for approximately half their journey and that the upgrade from previous conditions represents only half of the full value. Effectively this means that one quarter of this value is used, which converts to a unit benefit of 21 pence per cycle trip (7.03p / 2 / 2 * 11.7mins/trip).

B.4.16 For walkers it has been assumed that the improvements to the towpath will include level kerbs (1.9p/km), information panels (0.9p/km), pavement evenness (0.9p/km), directional signage (0.6p/km) and bench provision (06.p/km). Again it is assumed that walkers use the route for half

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6 See the ‘Estimating Impact on Absenteeism’ section of TAG Unit A4.1 for further details.
their journey and so that full benefits are halved. This gives an approximate unit benefit of 3 pence per walking trip \(( (1.9+0.9+0.9+0.6+0.6) / 2 \times 1.15)\).

B.4.17 The benefit per trip is applied to the forecast number of trips in the ‘without scheme’ case and, following the rule of a half, half the benefit per trip is applied to new trips in the ‘with scheme’ case. In these calculations an annualisation factor of 220 is used, based on the number of working days in a year. Weekend use is therefore not included and this may represent a conservative view. Quality benefits are calculated for each year, including real growth in the values in line with forecast GDP/capita, summed and discounted to give a total quality benefit of £1.0m, in 2010 present values.

**Benefits estimated with the Marginal External Cost method**

B.4.18 Decongestion, accident, greenhouse gas, air quality, noise and indirect tax benefits have been estimated using the marginal external cost method using forecasts of reduced car kilometres as a result of the scheme. Reduced highway maintenance costs (which are netted off the construction and maintenance costs in the PVC) are also calculated in the same way. Detail on this method, including a worked example based on this case study, is given in [TAG Unit A5.4 – Marginal External Costs](#).

B.4.19 Table B5 shows the 2010 present value of the impacts estimated with the marginal external cost method.

<table>
<thead>
<tr>
<th>Impacts</th>
<th>Present value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decongestion</td>
<td>£1,125,217</td>
</tr>
<tr>
<td>Accidents</td>
<td>£49,490</td>
</tr>
<tr>
<td>Greenhouse gases</td>
<td>£2,117</td>
</tr>
<tr>
<td>Air quality</td>
<td>£3,322</td>
</tr>
<tr>
<td>Noise</td>
<td>£15,183</td>
</tr>
<tr>
<td>Indirect tax</td>
<td>-£89,079</td>
</tr>
<tr>
<td>Infrastructure</td>
<td>£1,537</td>
</tr>
</tbody>
</table>

**B.5 Reporting the results**

**Transport Economic Efficiency**

B.5.1 The only Transport Economic Efficiency (TEE) impacts estimated in this case study are the road decongestion benefits, estimated from the estimated reduction in car kilometres. The £1.2m benefit represents both time and vehicle operating cost savings and is not disaggregated by journey purpose.

**Public Accounts**

B.5.2 Table B6 shows a simplified Public Accounts (PA) table, recording the construction and maintenance costs of the scheme (from Table B2) and the reduced highway infrastructure costs and indirect tax impact estimated with the marginal external cost method (from Table B5).
### Table B6 Public Accounts (PA) table

<table>
<thead>
<tr>
<th>Funding</th>
<th>Walk / cycle</th>
<th>Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revenue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating costs</td>
<td>£378,770</td>
<td>£1,537</td>
</tr>
<tr>
<td>Investment Costs</td>
<td>£249,276</td>
<td></td>
</tr>
<tr>
<td>Developer and Other Contributions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grant/Subsidy Payments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indirect Tax Revenues</td>
<td>£89,079</td>
<td></td>
</tr>
<tr>
<td><strong>Broad Transport Budget</strong></td>
<td>£626,509</td>
<td></td>
</tr>
<tr>
<td><strong>Wider Public Finances</strong></td>
<td>£89,079</td>
<td></td>
</tr>
</tbody>
</table>

### Analysis of Monetised Costs and Benefits

B.5.3 Values from the TEE and PA tables should be carried forward into the Analysis of Monetised Costs and Benefits (AMCB) table. In addition, values for ‘Physical activity’ (including absenteeism), ‘Journey quality’, ‘Accidents’, ‘Greenhouse gases’, ‘Noise’ and ‘Local air quality’ should also be included in the AMCB table. The scheme ‘Present Value of Costs’ (PVC) is the impact on the ‘Broad Transport Budget’ from the PA table. The ‘Present Value of Benefits’ (PVB) is the sum of all other impacts (including the indirect tax impact). The ‘Net Present Value’ and the ‘Benefit Cost Ratio’ are then calculated from the PVC and PVB. Table B7 shows the AMCB table for this example.

### Table B7 Analysis of Monetised Costs and Benefits

| Noise                          | £3,322      |
| Local Air Quality              | £2,117      |
| Greenhouse Gases               | £15,183     |
| Journey Quality                | £1,034,576  |
| Physical Activity (including absenteeism) | £5,349,049 |
| Accidents                      | £49,490     |
| Economic Efficiency (Decongestion) | £1,125,217  |
| Wider Public Finances (Indirect Tax Revenues) | -£89,079 |
| Present Value of Benefits (PVB) | £7,489,874  |
| Broad Transport Budget         | £626,509    |
| Present Value of Costs (PVC)   | £626,509    |

**OVERALL IMPACTS**

- **Net Present Value (NPV)**: £2,845,674
- **Benefit to Cost Ratio (BCR)**: 12.0

### B.6 Comments on the case study

B.6.1 The analysis shows that this scheme is forecast to be successful, with the main benefits resulting from physical activity, journey quality and decongestion. As the scheme is in a highly congested area (Central London) a high marginal external congestion cost is used in the calculation of decongestion benefits. Schemes in less dense and congested urban areas (where lower marginal external congestion costs should be used) are likely to see a lower proportion of decongestion benefits.

B.6.2 Physical activity benefits tend to dominate due to the relative success of the cycle track in encouraging new users to cycle and to a lesser extent to walk. The increase in demand will be in
part due to the increased amenity that the route provides and its attractiveness to users, new and existing.

B.6.3 Since the route is already in use by a significant number of users, the amenity benefits of improved journey quality are proportionately high, as existing users receive the full benefit and new users receive only half (due to applying the rule of a half). Since it is assumed that the real and perceived quality of the route is sustained across the appraisal period of twenty years, this benefit continues to accrue, even where the decay rate reduces the number of users back towards the levels without the scheme (since existing users are also relatively high in the without-scheme case).

B.6.4 This case study provides a hypothetical example of the key themes that largely summarise the appraisal benefits of walking and cycling schemes in general:

- Physical activity benefits will tend to dominate where forecasts of new walk and cycle users are relatively large (i.e. significant mode shift occurs);
- Journey quality will be proportionately greater where there is a relatively large number of existing users;
- Decongestion benefits will be much more important in congested urban areas of a higher density.

B.6.5 A significant caveat in this case study is that the comparative study used in the forecasting interacts with the London congestion charge zone. Therefore, forecast usage of walk and cycle modes may piggy-back on the mode shift expected from that major scheme. This case study has been undertaken as a methodological exercise. Clearly this emphasises the need to consider local factors and potential impacts from other schemes, especially where significant mode shift may have occurred. Although difficult, attempts should be made to separate out the potential impacts of other schemes in the locality so that a common realistic reference case can be used when comparing different scheme options. In the example of this case study, the reference case used may inform other schemes in the area on a comparative basis, but must be recognised as potentially biased when appraising schemes in other areas that will not benefit from the same mode shift impact associated with the congestion charge scheme.