Department for Transport

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Social Impact Appraisal

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Transport Analysis Guidance (TAG)

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This TAG Unit is guidance for the **Appraisal Practitioner**

This TAG Unit is part of the family **Social and Distributional Impacts**

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1. Social Impact Appraisal

1.1 Introduction

1.1.1 Social impacts cover the human experience of the transport system and its impact on social factors, not considered as part of economic or environmental impacts. Each social impact is required to be assessed as part of the appraisal and an assessment entered into the Appraisal Summary Table (AST). There are eight social impacts, namely:

- Accidents (Section 2);
- Physical Activity (Section 3);
- Security (Section 4);
- Severance (Section 5);
- Journey Quality (Section 6);
- Option and Non-Use Values (Section 7);
- Accessibility (Section 8);
- Personal Affordability (Section 9).

1.1.2 The approach to the appraisal of social impacts should be scoped out before the Further Appraisal stage and described in the Appraisal Specification Report (ASR). See Guidance for the Technical Project Manager for further details.

1.1.3 Where specific social impacts are considered to be an important element of a scheme proposal, the methods described in this Unit allow the analyst to attempt to quantify and monetise most of these impacts in order to appreciate the scale of these impacts relative to other outcomes and to allow robust values to be presented in the appraisal. Where individual impacts are considered to be of lesser importance or where sufficient data or valuations are unavailable to undertake a quantitative approach, it may often be more amenable to appraise some impacts in a qualitative manner, presenting a seven-point scale of beneficial, neutral or adverse, in the AST. The key points are as follows:

- It is proportionate in most cases to calculate and present monetary values for accidents.
- Physical activity may be monetised in cases where significant numbers of active mode users are affected by an intervention, which will chiefly occur as a result of schemes targeted at those modes.
- Security and severance impacts are assessed and presented qualitatively in the AST.
- Journey quality impacts can be monetised where sufficient evidence exists regarding the effectiveness of measures aimed at improving quality, where this is of significance.

- The evidence base for monetising option and non-use values is relatively weak and hence it is recommended that these are presented qualitatively in the AST unless there are explicit reasons for not doing so.
- Accessibility and personal affordability impacts are assessed qualitatively. These also have important distributional impacts that the practitioner should scope and calculate quantitatively where appropriate.

2. Accidents Impacts

2.1 Introduction

2.1.1 Transport interventions may alter the risk of individuals being killed or injured as a result of accidents. Accidents occur across all modes of transport and affect non-users as well as users. This Section provides guidance on appraising accidents impacts for transport interventions.

2.1.2 Transport accidents impose a range of impacts on people and organisations. The types of impacts are shown in Table 2.1 below.

Table 2.1 Accident impacts of transport

Related to number of casualties	Related to number of accidents
Pain, grief and suffering	Material damage
Lost economic output	Police costs
Medical and healthcare costs	Insurance administration
	Legal and court costs

2.1.3 The estimated difference in the numbers of **accidents** and numbers of **casualties** (between the with-scheme and without-scheme case) form the key quantitative measures for the appraisal of transport interventions. Combining these estimates with values for the prevention of casualties and accidents yields a monetary estimate of the accident-related costs or benefits of proposed transport interventions.

2.1.4 The impact of casualties differs according to the severity of the injuries sustained. Three groups are usually differentiated; these are defined in the following way[1]:

- Fatality: any death that occurs within 30 days from causes arising out of the accident;

[1] More detailed information on the classification of particular types of injury can be found in Hopkin and Simpson, 1995.

- Serious injury: records casualties who require hospital treatment and have lasting injuries, but who do not die within the recording period for a fatality; and
- Slight injury: where casualties have injuries that do not require hospital treatment, or, if they do, the effects of the injuries quickly subside.

2.1.5 There is a key difference between the definition of accidents and casualties. Casualties are those individuals who incur injuries from accidents. One accident may have several casualties of different severities. Personal Injury Accidents (PIAs) are incidents where casualties occur. They are categorised by the most severe casualty caused by that accident. For example, a Severe Accident will have no fatalities, at least one severe injury and none or more slight injuries. Accidents may also be damage-only, where no personal injuries are sustained.

2.1.6 The values for the prevention of casualties which are used to place a monetary value on accident-related impacts, described in Section 2.2, are derived primarily for use in the appraisal of **road schemes**. Application in other contexts should be applied with appropriate caution. Section 2.3 explains the approach that should be followed when appraising changes in the number of road accidents, and subsequently describes the methods that should be followed in relation to other modes of transport.

2.2 Benefits to Society Arising from Prevention of Road Accidents and Casualties

Casualties

2.2.1 The valuation of both fatal and non-fatal casualties is based on a consistent willingness to pay (WTP) approach. This approach encompasses all aspects of the valuation of casualties including the human costs and the direct economic costs. Based on previous research, The Department uses a value of £1 million in 1997 prices for the prevention of a fatality[2].

2.2.2 This valuation includes losses to society as well as losses that are borne by the victims themselves, their friends and relatives. Losses to society arise because medical and ambulance costs are largely met by the NHS and because fatal injuries result in net economic output being lost (the difference between the present value of lifetime output and consumption).

2.2.3 The TAG Data Book contains the following tables of monetary values for the prevention of casualties:

A4.1.1: Average value of prevention per casualty by severity and element of cost

[2] Based on a Stated Preference method was used in Road Accidents Great Britain 1997 (TRL 1992 & 1994, Hopkin and Simpson, 1995). A similar approach has been used to derive the values for serious and slight casualties, which are pegged to the fatal value.

A4.1.2: Average value of prevention per road casualty by class of road user

2.2.4 The values for the prevention of fatal, serious and slight casualties, given in Table A4.1.1, include the following elements of cost:

- human costs, based on WTP values, representing pain, grief and suffering to the casualty, relatives and friends, and, for fatal casualties, the intrinsic loss of enjoyment of life, excepting consumption of goods and services.
- loss of output due to injury. This is calculated as the present value of the expected loss of earnings plus any non-wage payments (national insurance contributions, etc.) paid by the employer. Non-wage payments should be estimated based on the non-wage labour cost uplift factor of 1.265 to assess the full impact, meaning non-wage costs are approximately 21% of total labour costs. This includes the present value of consumption of goods and services that is lost as a result of injury accidents.
- ambulance costs and the costs of hospital treatment.

2.2.5 Values for the prevention of casualties by mode, as shown in Table A4.1.2, differ because of the differences in proportions of average casualty severity among each class of road user.

Accidents

2.2.6 The value of preventing a fatal accident might be more or less than the value of a fatality. This is due to two reasons:

1. an injury accident is classified according to the most severe casualty but on average may involve more or less than one casualty;

2. there are some costs which are part of the valuation of an injury accident but which are not specific to casualties[3]. These are:

- costs of damage to vehicles and property; and
- costs of police and the administrative costs of accident insurance.

2.2.7 For injury accidents occurring on the road, the value of prevention is **greater** than the value of prevention of the corresponding casualty. This is because accidents tend to involve more than one casualty. In 2010, for example, a fatal road accident on average involved 1.07 fatalities, 0.31 serious casualties and 0.50 slight casualties. In addition road accidents resulted in damage to vehicles and property, as well as incurring costs to the emergency services and car insurers.

2.2.8 The costs of accidents will change over time where there are changes to the average number of casualties by severity within each accident type.

2.2.9 Value of prevention of road accidents can be broken down into:

[3] Details of the derivation of these costs are available in a published Transport Research Laboratory Report (Simpson and O'Reilly, 1994).

1. Casualty related values which include lost output, medical and ambulance costs, and human costs;

2. Accident related values, i.e. the costs of police, insurance and property damage.

2.2.10 The following table in the TAG Data Book shows the total value of road accidents of different severities according to element of cost:

A4.1.3: Average value of prevention of road accidents by severity and element of cost

Since not all elements of accident values are quantified, these values may be regarded as minimum estimates. For instance, the total road accident values do not include the costs of delays to other road users following accidents.

2.2.11 The following tables of the TAG Data Book provide average values of prevention of road accidents by road type:

A4.1.4: Average value of prevention per road accident by severity and class of road: all hours

Data is provided separately for built-up and non-built up classes of road, where built-up roads are those roads other than motorways with speed limits of 40pmh or less.

2.2.12 The average values for prevention of road accidents vary between built-up and non-built-up roads and motorways because the average number of casualties per injury accident differs between categories of road. In addition, the cost of vehicle damage per accident varies by road category.

2.2.13 The values for prevention of road accidents and casualties which are provided in the tables linked to this Unit will vary over future years as a result of changes in the value of lost output, medical costs and willingness to pay for reductions in risk of injury. The 'willingness to pay' components of the accident values should be discounted as a 'health' impact, using the Green Book health discount rate schedule which starts at 1.5% (see TAG Unit A1.1 for details), and with no uplift applied to values over time for future appraisal years. However, uprating of historical WTP values applies between the value base year (currently 1997 for casualty costs) and the scheme appraisal year on the basis of outturn real GDP per capita growth (with an elasticity of 1.3), using the formula below.[4]

$$\text{Value}_y = \text{Value}_{base} \left(\frac{\text{GDPpc}_y}{\text{GDPpc}_{base}} \right)^{1.3}$$

[4] See Green Book annex 3. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938046/The_Green_Book_2020.pdf. The income elasticity of marginal utility (MU) of income is set to -1.3. If impacts are held constant in utility terms, it follows that their unit monetary values grow in inverse proportion to the MU of income. For example, if the MU of income halves, the monetary value of a unit impact must double. Given the elasticity of MU income is -1.3, it follows that the income elasticity of the monetary value of the good in question is 1.3.

2.2.14 The other (non-WTP) elements are assumed to change over time in line with the change in real GDP per capita (with an elasticity of 1) up to the scheme appraisal year, and assumed to grow at 1.5% p.a. for future appraisal years, consistent with the Office for Budgetary Responsibility long-term economic determinants (for further information on uplifting values in line with forecast GDP growth, see TAG Unit A1.1 – Cost Benefit Analysis). These non-WTP components should use the regular 3.5% discount rate.

2.3 Use of Accident and Casualty Values for Appraisal

Application to Major Highway Schemes (Road and Public Transport)

2.3.1 To appraise road accident impacts, a forecast of the numbers of road accidents of different severities must be produced for both with-scheme and without-scheme scenarios. An estimate of the monetary value of the difference in accident numbers and severities between the two scenarios must then be calculated.

2.3.2 In summary, overall accident costs are determined by multiplying the change in the forecast number of accidents by type (fatal, serious, slight or damage-only), between the without-scheme and with scheme scenarios, by the cost of each accident type. These must be reported in the Quantitative column of the Appraisal Summary Table (AST). In addition, the monetised present value of accident reduction benefits – in market prices – must be clearly presented in the assessment entry of the AST.

2.3.3 Accident rates are included in a specialist spreadsheet tool provided by the Department (COBALT) at the following link:

COBALT Spreadsheet Tool

2.3.4 This workbook may be used in order to undertake the calculations necessary to undertake an appraisal of accidents on highways. It requires as input link-based flows and speeds from a highway assignment model. This replaces the previous implementation in the COBA software.

2.3.5 The accident impact of major road transport interventions should be appraised using the methods set out in the COBALT Manual. These are embodied in COBALT, which may be used to forecast changes in the numbers of accidents and casualties, and estimate the monetary value of these impacts. This can be done using either variable or fixed trip matrices from the transport model. COBALT uses values for prevention of casualties that are derived on the same basis as described in this Unit, although the following should be noted:

i) the workbook severity splits are averaged over three to five years;
ii) the workbook uses a finer disaggregation of road categories and also details junctions separately.

2.3.6 The techniques used in COBALT to estimate the change in the number of accidents of different degrees of severity are based on established parameters

for the number of accidents per million vehicle-kilometres on different types of road. As the number of vehicle-kms on the network change as a result of the introduction of an intervention, so the number of accidents will also alter. Thus, if the impact of an intervention is to reduce the number of vehicle-kms travelled, then this will tend to reduce the number of accidents on the network. Similarly, if the intervention causes a reduction in the number of vehicle-kms on one type of road but an increase for a second type of road, then the net impact on the number of accidents will depend upon the relative accident rates for the two types of road.

2.3.7 COBALT calculates the total cost of accidents on a road network by multiplying the change in number of accidents, between the without-scheme and with-scheme scenarios, by a value of prevention of an accident. The value of prevention of an accident varies by type and area of road.

2.3.8 The number of accidents on a given length of road is expressed as an accident rate, defined as 'Personal Injury Accidents per million vehicle kilometres'. This measure assumes that, for example, doubling either the length of the road, or the traffic flow on the road, will double the number of accidents.

2.3.9 As well as using length and flow level, COBALT incorporates a method of separating the effects of links and junctions on accidents. Where junctions are coded for delay calculation, these should be coded for accident calculation. In addition, where there are junctions which are subsumed in links for speed calculations (in particular in urban areas), but which are likely to be associated with accidents, these should be coded as 'accident-only' nodes. Finally, where either a very large link-only network is used and 'accident-only' nodes are difficult to identify, or local data on existing accidents are difficult to split between links and junctions, combined 'link and junction' accident rates can be attributed to links. The treatment of accidents on links and junctions is described in greater detail in the COBALT Manual.

2.3.10 To forecast the average proportions of fatal and serious accidents on links and junctions, COBALT uses 1999-2001 data (see COBA Manual, Tables 3/2 and Table 3/3) that is adjusted using 'accident rate change coefficients' (COBA Manual, Table 4/1) in order to account for trend reductions in the rate and severity of accidents over time. Slight accidents comprise the remainder.

2.3.11 The average accident costs used in COBALT will normally be appropriate even where local accident rates differ from the average. In some circumstances the severity split may differ, with a consequent change in average accident costs, but this is only likely to be significant in a few cases. The use of local severity splits is discouraged and the Department must be consulted if their use is considered necessary. In such cases the user must:

- Demonstrate that the severity split is significantly different in statistical terms from the COBALT value, and also that this does not result from one or two particularly bad accidents, the effect of which will be evened out by less extreme accidents as time goes by. Data covering all available accident history, with a minimum of five years must be supplied.

- Arrange an Accident Investigation and Prevention Study by the Local Authority to identify the causes of the safety problem and recommend remedial safety measures. Where this study concludes that modest remedial works are unlikely to correct the problem then there may be a case for using a local severity split. However where modest remedial works are recommended, the cost of these works should be included in the without-scheme scenario and the revised severity split within COBALT used.

2.3.12 The values for preventing road accidents applied in COBALT include an allowance for damage only accidents. Statistics on damage only accidents are not generally available – because they are not comprehensively reported to the police – so instead survey information is used to estimate the occurrence of damage only accidents. COBALT assumes that damage only accidents occur at a rate of 17.7 per personal injury accident on urban roads, 7.8 on rural roads and 7.6 on motorways, and that these rates remain constant over time.

Application to Smaller Highway Schemes (Road and Public Transport)

2.3.13 In the case of smaller road schemes or public transport schemes where a highway assignment model is available, the same method should be used to calculate accident impacts as described above. Without a highway assignment model, where it is still assumed that there will be a significant enough change in accidents due to intervention, similar methods (i.e. the COBALT method) may still be applied, provided reasonable forecasts of future traffic flows may be attained. However, given the limited extent of the smaller scheme improvements the use of COBALT may not be appropriate. In these instances standard accident investigation and prevention assessments should be used to produce the accident forecasts.

2.3.14 Consideration should also be given to using the accident component of the Marginal External Costs from the National Transport Model, as described in TAG Unit A5.4 – Marginal External Costs, as a proportionate way of assessing the impacts.

Application to Rail Interventions

2.3.15 Railway duty holders are legally required to ensure health and safety on the railways as far as is reasonably practicable[5]. They undertake a process of risk assessment in order to meet this obligation. Cost benefit analysis provides an important tool in support of investment decisions[6]. GB mainline railway guidance, 'Taking Safe Decisions' (RSSB,2008), sets out common principles upon which decisions concerning safety on the railways may be based and gives details on factors that should be taken into account in decisions.

[5] See 'Internal guidance and general principles for assessing whether health and safety risks on Britain's railways have been reduced so far is as reasonably practicable' (ORR).

[6] See 'Internal guidance on cost benefit analysis (CBA) in support of safety-related investment decisions' (ORR, 2008a).

2.3.16 The guidance recommends the use of DfT's value for prevention of a fatality to estimate a monetary value of casualty reduction benefits. When considering accident risks, rail appraisals take into account the expected numbers of major and minor injuries which are expected to occur and weight these relative to fatalities (currently 0.1 of a fatality for a major injury and 0.005 for a minor injury). The following table in the TAG Data Book gives these weights by class of injury as well as the average monetary costs for rail injuries by severity:

A4.1.5: Rail injury classification, weights and values

2.3.17 A lower weighting of rail accident minor injury risk is given because these injuries are generally less severe than the road accident slight injury risk. For example, the road accident slight injury risk contains a high proportion of whiplash injuries, which can be quite severe in nature, and are not present to the same extent in the rail accident minor injuries. Note that these figures do not include any allowance for damage costs as they can vary too widely for similar casualties – these costs should be addressed by bespoke calculations elsewhere[7].

Active Modes: Application to Walking and Cycling Schemes

2.3.18 The methods set out earlier in this Unit are not directly applicable to active modes (walking and cycling). Appraisals of interventions that primarily affect active mode users, such as the development of a cycle route or footpath, should include quantified and monetised information on the costs or benefits arising from changes to accident and casualty numbers. The introduction of an intervention may also lead to mode shift, thereby changing the number of accidents associated with other modes, which should also be considered in the appraisal.

2.3.19 Accident benefits or disbenefits are calculated from changes in the levels of use of different types of infrastructure by different modes and the associated accident rates of these types of usage. An important consideration in the appraisal will be the type of scheme under consideration and how different schemes influence the safety of road users, as well as the existing safety conditions on the types of road or area to which a scheme is to be potentially applied.

2.3.20 For walking and cycling schemes, the information required is therefore:

- separate changes in walking and cycling use, disaggregated by different types of facility
- changes in the amount of use of other vehicle types (if this is likely to occur)
- separate walk and cycle accident rates associated with different types of facility
- accident rates for other vehicle types

[7] See RSSB 2008. The weighting of non-fatal injuries, 'T440 Fatalities and Weighted Injuries' and 'The Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995' (RIDDOR).

2.3.21 Only the last of these is generally available in the COBALT Manual. This section concentrates on the prediction of accident rates for different types of walking and cycling facility.

Active Modes: Forecasting Active Mode Accident Rates

2.3.22 Forecasting active mode accidents offers significant challenges, given the variety of different facilities which could form part of a scheme and the amount of time needed to establish changes in the number of accidents which result from a scheme.

2.3.23 Possible methods for estimating accident rates could include comparative studies of the performance of existing similar schemes combined with expert judgement. In all cases, the detail of the design might be crucial, as there are clear differences in scale and sensitivity compared to schemes for motorised users.

2.3.24 There is evidence to suggest that increasing levels of cycling does not result in an equivalent increase in the numbers of accidents involving cyclists (all other things being equal). Jacobsen (2003) used American and European data to create a power function model of the type:

$$I \quad aE^{b}$$

Where:
I = injury measure
E = measure of walking and cycling
a = a constant
b = a constant and was found to be approximately 0.4

2.3.25 This implies that a doubling of cycling would only lead to a 32% increase in the number of cycling accidents ($2^{0.4} = 1.32$) and that therefore the cyclist accident rate decreases. It seems intuitive that this model is applicable for cases above a certain critical mass of walkers and cyclists. For very small values a close-to-linear increase in accidents per additional unit may be more appropriate. The evidence base for this requires expanding through further research and monitoring.

2.3.26 The background changes to walk and cycle accident rates should be incorporated into the forecasts, which may indeed be decreasing over time. This may be due to increased bicycle safety, awareness and public information campaigns.

2.3.27 Where facilities are being introduced which are expected to have a significant impact on the accident rate for cyclists and pedestrians, such mitigation is likely to have a more significant local impact than any increase in these modes.

Active Modes: Monetisation

2.3.28 Once the accident forecasts have been completed, one can then assign economic values to those accidents in order to derive the benefits or costs brought about by the intervention. TAG Data Book contains monetary values for accidents of different severity: fatal, serious and slight.

2.3.29 In the absence of any information on the breakdown of casualty severities, it may be possible to apply the value for preventing a Pedal Cyclist or Pedestrian injury from TAG Data Book. This is equivalent to assuming a national average mix of injury severities for that mode. Note that the cost of a fatality here includes incident costs and hence is slightly higher than the value of a prevented fatality.

2.3.30 A simplified approach to estimating the change in number of accidents generated by a change in car kilometres is to use the appropriate Marginal External Costs of accidents applicable to road type and congestion conditions (which also change over time in line with GDP per capita, see TAG Unit A5.4 – Marginal External Costs). These are, however, approximate and more local data should be used in preference if available, using the methods described for highways at the beginning of this Section.

Application to Aviation Interventions

2.3.31 Interventions that affect air transport modes may have wide-ranging accident impacts. For instance the risk of individuals being killed or suffering injuries of different severities may alter as a result of changes in the operation of air terminals, or different patterns of ground movements by airport users (both within airports and on associated surface access routes), or as a result of aeroplane arrivals and departures.

2.3.32 The magnitude of the impact on accident risks will depend in part on passenger volumes and on the standard of the infrastructure in question. Where possible, these risks should be quantified and expressed as differences in the number of persons who are expected to be injured between the 'with' and 'without' development scenarios. The equivalent monetary value of these impacts should also be estimated using the values for prevention of casualties presented in Data Book Table A4.1.1 if sufficient data is available. However some elements of the values for prevention of casualties, particularly lost output and medical and ambulance costs, are likely to differ from those given in Table 1 due to differences in injury types and the context which they are sustained. Therefore the estimated value of the accident impact will subject to a degree of uncertainty and should be subjected to sensitivity analysis in order to test a range of assumptions around the value of preventing air transport casualties.

2.3.33 The values for prevention of road accidents presented in Data Book Table A4.1.3 and Data Book Table A4.1.4 should not normally be applied when appraising the accident impact of aviation developments. This is because each of the elements that comprise the value of aviation accidents could differ from those presented above for road accidents. This might arise because of

differences in the number of people involved in road and aviation accidents or the degree of damage these cause to property.

Application to Maritime Interventions

2.3.34 There are a number of different, but related, aspects of maritime safety which should be appraised. These include safety of dockworkers and others working in dock areas, safety of seafarers and passengers, safety of those living and working in the vicinity of ports, safety of maritime leisure users, the safety of ships and their cargoes, and changes in safety resulting from maritime search and rescue schemes. Safety on the surface access system that serves a port development by carrying cargo, passengers and employees should also be taken into account when appraising maritime proposals. Where appropriate accidents on surface access modes may be assessed using the methods detailed above.

2.3.35 There is no definitive method for the monetary valuation of safety impacts of maritime interventions. In the absence of other evidence the values set out in Data Book Table A4.1.1 should be used in the appraisal of any maritime intervention to provide a reference point that reflects the benefits of preventing injuries and fatalities. The results which are obtained should then be subjected to sensitivity analysis.

2.3.36 The costs of accidents caused by maritime interventions could be considerably different to other modes given the nature of sea transport (where the size of vessel relative to number of occupants and the likely environmental and supply chain consequences of accidents differ from other modes) so the values for preventing road accidents set out in Data Book Table A4.1.3 and Data Book Table A4.1.4 should not normally be applied.

2.3.37 Additional information on the appraisal of port accident impacts is provided by A Project Appraisal Framework for Ports (DfT, 2002).

2.4 Distributional Impacts of Accidents

2.4.1 Initial screening is required in order to assess the requirements of a Distributional Impacts (DI) analysis. In the case of accidents, this analysis looks primarily at impacts on children and older people (both particularly as pedestrians), young males, motorcyclists and the more deprived population, to ensure that all accident impacts on those groups, adverse or beneficial, are accounted for in the appraisal. It is a requirement that the distributional effects are reported in the AST.

2.4.2 For detailed guidance into undertaking DI analysis and the specific considerations that apply to appraising accident impacts, see TAG Unit A4.2 – Distributional Impact Appraisal.

3. Physical Activity Impacts

3.1 Introduction

3.1.1 There is longstanding recognition of the interrelation between transport, the environment and health[8]. Transport can affect levels of physical activity. Physical inactivity is a primary contributor to a broad range of chronic diseases such as coronary heart disease, stroke, diabetes and some cancers[9]. Physical activity also has an important role to play in preventing weight gain and obesity, and improving mental health. This section provides guidance for appraising the health benefits of active transport (i.e. cycling and walking).

Physical Activity

3.1.2 There is a strong evidence base behind the impact of physical activity on health. A 2012 meta-analysis estimated physical inactivity to be responsible for 5.3 (of 57) million deaths worldwide, similar to the burden of tobacco smoking and obesity.[10]

3.1.3 The World Health Organisation has produced the Health Economic Assessment Tool (HEAT) to conduct an economic assessment of the health benefits of walking and cycling, to support its inclusion in appraisal figures (WHO, 2007, 2011 & 2014). It estimates the value of reduced mortality risk that results from specified amounts of walking or cycling. It should be noted that relatively modest changes in walking and cycling can lead to significant economic benefits or disbenefits.

3.1.4 It is assumed that there is a dose-response type effect where greater levels of activity yield greater benefits to individuals, especially those induced to active modes from a relatively inactive lifestyle.

3.1.5 In 2016 the Department commissioned research into the valuation of active mode health impacts.[11] This work provided a literature review on the science on physical activity and health, and a summary of current methods used in TAG and the World Health Organisation Health Economic Assessment Tools (WHO HEAT). Based on this, the report proposed a refreshed method to calculate the physical health benefits of walking and cycling, which is the basis of the guidance presented in this section. The project also produced an excel toolkit,

[8] Road Transport and Health, British Medical Association, 1997
[9] Department of Health (2004): At Least Five a Week. A report from the Chief Medical Officer.
[10] Lee et al (2012): Impact of Physical Inactivity on the World's Major Non-Communicable Diseases, available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3645500/
[11] Available at: https://www.gov.uk/government/publications/transport-appraisal-valuing-health-impacts

recommended for use in appraising active mode health benefits, which can be found on the TAG social and distributional worksheets page.[12]

3.1.6 TAG's recommended method for appraising health impacts of active travel is based on estimating the change in premature death (mortality) resulting from a change in walkers and cyclists, i.e. health benefits from gaining more life years. An intervention which increases the number of active users is expected to reduce the relative risk of all-cause mortality. This can be monetised by estimating the number of deaths avoided, converting to Years of Life Lost (YLLs) and then multiplying by the value of a Quality-Adjusted Life Year (QALY). In the event that a scheme reduces the number of walkers and cyclists, this method can be used to monetise the health disbenefit.

3.1.7 For interventions targeted at cycling and walking promotion, physical activity benefits will usually be a large proportion of the scheme's benefits. For schemes primarily involving other modes, physical activity impacts will be important where it is demonstrated that there is significant mode shift due to the intervention to or from active modes.

3.1.8 Further research is ongoing on the relationship between physical activity and health[13]. Therefore the values derived from applying the methodology below should be taken to be indicative of the order of magnitude of the expected effect, rather than as precise estimates. However, this approach only captures the benefits of reduced premature mortality, and does not capture the impacts on the quality of life (morbidity). Future research may be needed to explore the impacts of physical activity on reducing the risk of the incidence of specific diseases and the associated morbidity (i.e. health related quality of life).

3.2 Methodology

Reporting Physical Activity Impacts in the Appraisal Summary Table

3.2.1 In preparing inputs for the Appraisal Summary Table (AST) the changes in the number of walkers and cyclists should be estimated using forecasting tools or methods where walking or cycling measures are key to the intervention being considered (see TAG Unit A5.1 – Active Mode Appraisal).

3.2.2 The AST entries should describe how the intervention affects the number of active users. The entry in the Overall Assessment column in the AST should provide the estimated value of changes to health, between the without-scheme and with-scheme scenarios, the impacts on pedestrians and cyclists being identified separately.

3.2.3 It should be remembered that schemes aimed at active mode use may contain a number of trade-offs between different impacts in the appraisal, including

[12] A more detailed toolkit, which runs in the software 'Analytica'. A free viewer version of Analytica, which allows the model to be used, can be downloaded at: http://www.lumina.com/products/free101/ Email tasm@dft.gsi.gov.uk to obtain a copy of the model to input into Analytica Free 101.

[13] TAG Unit A5.1 –Active Mode Appraisal includes suggestions and sensitivity tests around the assumptions concerned with active mode forecasting and the potential longevity of targeted interventions.

physical activity. For instance, a cycle bridge over a source of severance such as a railway line may have a key economic efficiency benefit of reducing journey times, but can reduce health benefits due to existing cyclists travelling shorter distances. However, it may also encourage more cycle use amongst users previously travelling by mechanised modes. The active travel health benefits toolkit supporting this guidance adopts a simple, proportionate approach of estimating health benefits based on the number of additional users and standard NTS active travel profiles. However, where such local effects are important this can be reflected by the analyst by varying assumptions around journey distance, speed etc (see the following section for further details).

3.2.4 In circumstances where forecasts of the change in number of active users is available or can be produced, the resulting health impact should be monetised..

3.2.5 In schemes that are demonstrated to have an immaterial impact on physical activity, such as inter-urban road building, it will be satisfactory to enter a qualitative indicator in the AST. In this context, “immaterial” means that the impacts are recorded as neutral, or in some marginal cases, slight. Where the impacts may be larger, monetisation should be undertaken. This includes interventions that may, for example, ease travel by motorised modes and encourage car use rather than active modes.

Calculating Physical Activity Impacts

3.2.6 To calculate physical activity impacts, the minimum input required from the user is to estimate the change in the number of walking and cycling trips. The active travel health benefits toolkit can then calculate the estimated impact on mortality and monetise this using the default assumptions detailed in the following paragraphs. These default assumptions can be adjusted by the user, if local data is available or if schemes are particularly targeted at certain demographics.

3.2.7 The user inputs the expected change in the number of walking and cycling trips. The toolkit converts this into the number of users affected, based on the assumption that 90% of trips are part of a return journey.

3.2.8 The age and gender distribution of the users is then estimated, using the average age and gender split of cycling and walking trips in England from the National Travel Survey (NTS) 2012-2014 (see table 3.1 below). If there is local evidence or schemes are particularly targeted at certain demographics (for instance commuters or school children) then the default age and gender distribution can be changed appropriately.

Table 3.1: Gender and age split of the observed main-mode cycle and walking trips

	Cycling			Walking		
Age group	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
0-19	16%	4%	20%	15%	15%	30%
20-49	39%	16%	55%	17%	24%	41%
50-64	13%	5%	18%	7%	9%	16%
65-80	5%	1%	6%	5%	5%	10%
80+	1%	0%	1%	1%	1%	2%
Total	74%	26%	100%	45%	54%	99%

Source: NTS, 2012-14

3.2.9 The NTS data on distance and speed is used to calculate the average time spent cycling and walking per person, by age and gender (see table 3.2 below). The top 1% of trips are excluded in order to limit the influence of outliers.

Table 3.2: Average cycling and walking times per

	Cycling		Walking	
Age group	**Male**	**Female**	**Male**	**Female**
0-19	2.37	2.79	2.14	2.03
20-49	3.28	2.76	2.17	2.07
50-64	3.53	2.64	2.33	2.35
65-80	2.99	2.29	2.35	2.32
80+	2.05	2.00	2.28	2.08

Source: NTS, 2012-14

3.2.10 This time is converted to Metabolically Equivalent Tasks (MET) hours using the 2011 Compendium of Physical Activities[14] where cycling is 6.8 METs and walking is 3.3 METs, as per table 3.3 below. METs provide a standard metric for physical exertion.

[14] https://sites.google.com/site/compendiumofphysicalactivities/

Table 3.3: Average MET and mMET increase per person due to cycling and walking

	Cycling		Walking	
	MET		mMET	
Age group	Male	Female	Male	Female
0-19	16.12	18.99	7.05	6.69
20-49	22.29	18.80	7.14	6.82
50-64	23.98	17.96	7.67	7.76
65-80	20.33	15.56	7.76	7.65
80+	13.92	13.63	7.52	6.87

Source: 2011 Compendium of Physical Activities

3.2.11 The mortality impact is calculated using log-linear relative risks (RRs) for all-cause mortality for regular walkers and cyclists, relative to the presence of mortality in the population as a whole, based on Kelly et al 2014[15]). For cycling the RR per 11.25METh/week is 0.90, so that these cyclists, in any given year, are thus 10% less likely to die from any cause than non-cyclists. Benefits are capped at RR values of 0.70 and 0.55 for walking and cycling respectively, following a similar approach used in HEAT (WHO 2014). These RRs are assumed to sufficiently take into account other forms of physical activity so that we can estimate health benefits of cycling and walking directly, without taking other forms of physical activity into account.

3.2.12 The number of deaths avoided (or incurred) by age and gender is then estimated by multiplying the change in background mortality with the background mortality for that age and gender group. This is based on the Global Burden of Disease 2015 study results for England, as shown in table 3.4 below. It assumes that cycling and walking will not decrease mortality in the youngest age group (0-19). The number of deaths is then converted to Years of Life Lost (YLLs) by age and gender, using the same GBD 2015 study (see table 3.5 below).

Table 3.4: Background mortality rates by age and gender

Age group	Male	Female
0-19	0.00042	0.00032
20-49	000118	0.00071
50-64	0.00627	0.00419
65-80	0.02459	0.01669
80+	0.11471	0.09948

Source: 2015 Global Burden of Disease (GBD) Results for England

[15] Kelly, P. et al (2014): Systematic review and meta-analysis of reduction in all-cause mortality from walking and cycling and shape of dose response relationship

Table 3.5: Average discounted and undiscounted YLL loss per death.

	Discounted YLLs		Undiscounted YLLs	
Age group	**Male**	**Female**	**Male**	**Female**
0-19	47.7	48.0	81.7	82.8
20-49	34.1	33.6	47.2	45.9
50-64	23.7	23.7	28.9	29.0
65-80	15.1	14.3	16.6	16.3
80+	5.8	5.8	6.4	5.7

Source: calculation based on GBD 2015 results for England

3.2.13 The resulting YLLs are converted to monetary impacts through multiplying by the value of a Quality-Adjusted Life Year (£70,000[16] in 2020/21 prices and present values), with future benefits discounted at 1.5%

3.2.14 An example calculation using this methodology is detailed in the research report for DfT by Tainio, M., Woodcock, J. et al (2016): *Research into valuing health impacts in Transport Appraisal.*

3.2.15 It is assumed that the appraised walking and cycling is the derived demand from transport need, and physical activity undertaken specifically to gain the health benefits of physical exercise is not included. The benefits outlined in this section should therefore not be subject to the 'rule of a half', which is consistent with the treatment of accident costs (see Section 2).

Estimating Impacts on Absenteeism

3.2.16 Reductions in short term absence from work can result from the improved levels of health of those who take up physical activity as a result of a walking or cycling intervention. These benefits can be monetised and entered into the appraisal as a value in the AST under the Physical Activity heading though it should be noted that these are business benefits rather than consumer benefits – the benefits that employers gain through reductions in lost productivity. The method suggested here is that used in TfL (2004).

3.2.17 Physical activity programmes involving 30 minutes of exercise a day have been shown to reduce short-term sick leave. NICE (2008)[17] uses a 27% reduction in short-term sick leave, based on research conducted by the Alberta Centre for Active Living in Canada, which is in line with the 24% reduction demonstrated by Van Amelsvoort et al (2006)[18]. These are both within the range of 13% to

[16] HM Treasury (2022): The Green Book, Annex A1
[17] NICE (2008): Business Case Tool for Physical Activity in the Workplace
[18] Van Amelsvoort et al (2006): Leisure time physical activity and sickness absenteeism: a prospective study

40% reduction found in Lechner et al (1997)[19]. Following this, TAG recommends to use a 25% reduction.

3.2.18 In order to calculate the benefits, this figure needs to be combined with the average gross salary costs and the number of affected working people. Average gross salary cost figures may be found in Data Book Table A1.3.1 with average hours worked. Market price values should be used, for consistency with other elements of the appraisal (see TAG Unit A1.1). This value should also increase over time to reflect increased wages and productivity in line with real GDP per capita.

3.2.19 The number of working people affected may be calculated from the number of new walking and cycling commuters who are expected to use the facility. These benefits should not be subject to the 'rule of a half' which is consistent with the treatment of other benefits from improved levels of health and accident costs.

3.2.20 In practice, the analyst may wish to employ a similar method to that used to estimate benefits due to decreased mortality, noting that the aforementioned findings were not taken from the same evidence, but are highly comparable. Therefore a linear interpolation of reduced sick days may be accrued where individuals travel for less than 30 minutes per day, or extrapolated if activity is longer.

3.3 Further Considerations

3.3.1 There are several assumptions made in the currently recommended methodology that could be refined with further research, or further resources that are likely to not be appropriate for the scope of the appraisal. These should require no specific action from analysts undertaking the appraisal methodology itself. However, these may be useful to bear in mind when interpreting and communicating the results. The following issues may be pertinent:

- This approach only estimates the benefits of reduced premature mortality, and does not capture the impacts of physical activity on health related quality of life (morbidity). For instance, no account is made for the economic disbenefits of obesity, especially in children, or of reduced risks of depression and dementia. Furthermore, NICE have produced a report on the Wider Societal Impacts of health. This is a good starting point for those interesting in appraising the broader welfare impacts of improvements to a population's health beyond the direct health benefit (be it mortality and/or morbidity) enjoyed by the active mode user.[20]
- The impact of a shift to walk or cycle is assumed to be the same for all individuals in that age and gender group. However, depending on their baseline levels of activity, an individual may derive little additional benefit from walking or cycling to reduce the chance of death by inactivity, or have a reduced relative risk through being partially active. There are some

[19] Lechner et al (1997): Effects of an Employee Fitness Program on Reduced Absenteeism
[20] NICE: Methodology for estimating "Wider Societal Benefits" as the net production impact of treatments, available at: https://www.nice.org.uk/Media/Default/About/what-we-do/NICE-guidance/NICE-technology-appraisals/DH-Documentation-for-Wider-Societal-Benefits.pdf

allowances made for this in the recommended approach, as relative risk reductions are capped. WHO stress that this methodology should not be used for populations with very high average levels of physical activity (e.g. the equivalent of more than 2 hours of brisk walking a day, which is equivalent to around 8.6 METh/day). Caution should also apply when using the approach in predominantly sedentary populations, since the underlying risk estimates were derived from populations with a broad distribution of activity levels. The recommended methodology could therefore slightly underestimate the effect in very sedentary population groups.

4. Security Impacts

4.1 Introduction

4.1.1 Transport interventions may affect the level of security for transport users. The assessment of these impacts should reflect both changes in security and the likely numbers of users affected. Depending on the nature of the intervention, an assessment of changes in security can be entered into the Appraisal Summary Table (AST) reflecting impacts on the security of road users, public transport passengers or freight (all modes), or on combinations of these. A potential for overlap with Journey Quality Impacts exists (see Section 6). To avoid this, some indicators (which reflect both security and journey quality) have been included only in the journey quality impacts assessment.

4.1.2 For public transport passengers, guidelines for railway stations and public transport operators (DETR, 1998) raises a number of key security issues and gives guidance on design and management practices. These are broad ranging and only a key sub-set has been included in the security indicator list within Table 4.1.

4.1.3 There are no formal guidelines for road users. However, the guidelines set out in Table 4.1 can be readily applied to road users. Points to note when considering these security indicators in relation to road users are:

- road users are more vulnerable to crime in circumstances where they are required to stop their vehicles or travel at slow speeds, such as at the approaches to signals or in congested conditions;
- road users are more vulnerable to crime at locations where they are required to leave their vehicles, such as at service stations, car parks and so on; and
- the importance of each indicator is likely to vary according to the location and nature of the road; for example: emergency call facilities are likely to be more important than surveillance when considering a rural road.

4.1.4 For freight, security at the terminal or interchange should be assessed under journey quality impacts. As for road users, the indicators shown in Table 4.1 may be interpreted for application to other aspects of freight movement.

Table 4.1 Security Indicators for Public Transport Passengers

Security Indicator	Poor	Moderate	High
Site perimeters entrances and exits	Unmarked or poorly marked site perimeters, exits etc. Use of solid walls or similar.	Attention to boundary and exit marking, but otherwise unfavourable use of materials.	Clearly marked site perimeters/exits. Use of open fencing rather than solid walls.
Formal surveillance	No CCTV system in place. Design discourages staff surveillance and isolates passengers.	CCTV system in place, but number, location of system not optimal. Poor design, which discourages staff surveillance.	Effective CCTV system in place. Design to encourage staff surveillance and group passengers.
Informal surveillance	Poor use of materials (fencing etc) and design. Poor visibility from site surrounds. Very isolated from retailers or other human activity.	Unfavourable use of materials (fencing etc) but reasonable proximity of retailers or other activity.	Positive use of materials (fencing etc) and design to encourage open visibility from site surrounds. Encouragement or proximity of retailers or other activity.
Landscaping	Landscaping features (design, plants etc) inhibits visibility and encourages intruders.	Evidence of some positive use of landscaping features (design, plants etc), but more measures needed to contribute to visibility and deter intruders.	Positive use of landscaping features (design, plants etc) to contribute to visibility and deter intruders.
Lighting and visibility	Poor design including recesses, pillars, obstructions etc., which hinder camera/monitor view. Poor or no lighting in passenger areas at night when facility open. No or poor lighting on any signing, information or help points.	Design includes some recesses but not problematical to camera/monitor view. Lighting in passenger areas at some, but not all times when facility open. Lighting not to daylight standard. Attention to lighting on signing, information and help points.	Good design to avoid recesses and facilitate camera/monitor view. Lighting to daylight standard in passenger areas when facility open. Attention to lighting on signing, information and help points.
Emergency call	No or very poor provision of emergency phones, help points and public telephones. Little provision or information on emergency help procedures.	Basic provision of emergency phones, help points and public telephones. Improvements to these and on emergency help procedures needed.	Good provision of emergency phones, help points, public telephones and information on emergency help procedure.

4.1.5 The Security Impacts Worksheet should be used to carry out an appraisal of the impact of a project on security. Where more than one mode is affected by a project, separate versions of the worksheet should be used for each mode. The first step in the appraisal is to assess the level on each security indicator both prior to and following the implementation of the project. The levels should be assessed according to Table 4.1 and recorded in the worksheet (which also requires an assessment of the relative importance of each of the security indicators). As indicated above, this will vary by mode and may also vary by location.

4.2 Assessment Guidelines

4.2.1 An overall assessment of the security impact can then be made by considering the changes in the level of the security indicators, the relative importance of the indicators, and the approximate numbers of users affected, given the following guidelines.

4.2.2 The overall assessment is likely to be neutral if, given the relative importance of each indicator, improvements on some security indicators are considered to be generally balanced by deterioration on other security indicators.

4.2.3 The overall assessment is likely to be slight where changes on most of the more important indicators is a shift between adjacent columns in Table 4.1 or the total number of travellers/freight users affected is low (less than 500 travellers per day, or 10 freight users per day, say). This is likely to be large where the shift is high or the total number of travellers/freight users affected is high (greater than 10,000 travellers or 100 freight users, say). The overall assessment is likely to be moderate in all other cases.

4.2.4 In addition to the overall security assessment it is recommended that further quantitative details may be entered in the AST including estimated number of users affected. This would also support any DI entry.

4.3 Distributional Impacts of Security

4.3.1 Initial screening is required in order to assess the requirements of an analysis of Distributional Impacts (DI) associated with security. The initial screening should consider impacts on women, younger people (teenagers), older people, people with disabilities and Black and Minority Ethnic (BME) communities, to ensure that all security impacts on those groups, adverse or beneficial, are accounted for in the appraisal. It is a requirement that the distributional effects are reported in the AST.

4.3.2 For detailed guidance into undertaking SDI analysis and the specific considerations that apply to appraising security impacts, see TAG Unit A4.2 – Distributional Impact Appraisal.

5. Severance Impacts

5.1 Introduction

5.1.1 Community severance is defined here as the separation of residents from facilities and services they use within their community caused by substantial changes in transport infrastructure or by changes in traffic flows. Severance will only be an issue where either vehicle flows are significant enough to significantly impede pedestrian movement or where infrastructure presents a physical barrier to movement.

5.1.2 Severance primarily concerns those using non-motorised modes, particularly pedestrians. To ensure a consistent approach, classification should be based on pedestrians only. The impact of severance on cyclists will differ for two reasons: they travel more quickly; and crossing facilities may not be available to them. Interpretation of these levels for individual modes is discussed below.

5.1.3 Severance may be classified according to the following four broad levels.

- **None** - Little or no hindrance to pedestrian movement.
- **Slight** - All people wishing to make pedestrian movements will be able to do so, but there will probably be some hindrance to movement.
- **Moderate** - Pedestrian journeys will be longer or less attractive; some people are likely to be dissuaded from making some journeys on foot.
- **Severe** - People are likely to be deterred from making pedestrian journeys to an extent sufficient to induce a reorganisation of their activities. In some cases, this could lead to a change in the location of centres of activity or to a permanent loss of access to certain facilities for a particular community. Those who do make journeys on foot will experience considerable hindrance.

5.2 Assessment Guidelines

5.2.1 To assess the impact of projects on severance, the difference in the level of severance for the without-scheme and with-scheme cases should be examined. Table 5.1 provides guidance for this.

Table 5.1 Assessment of Change in Severance

Without-scheme Severance Scoring	**With-scheme Severance Scoring**			
	None	Slight	Moderate	Large
None	None	Slight negative	Moderate negative	Large negative
Slight	Slight positive	None	Slight negative	Moderate negative

Moderate	Moderate positive	Slight positive	None	Slight negative
Large	Large positive	Moderate positive	Slight positive	None

5.2.2 It will usually be appropriate to assess severance at a number of locations across a network. This is likely to lead to a range of assessments. Some locations in a network may experience reductions in severance, others may experience increases.

5.2.3 For each level of change in severance, the numbers of people affected should be estimated to provide the entries required for the Severance Impacts Worksheet. An overall assessment for the option should then be based on the following guidelines (in each case, the assessment is: beneficial if severance is reduced; or adverse if severance is increased):

- the overall assessment is likely to be **Neutral** if increases in severance are broadly balanced by relief of severance;
- the overall assessment is likely to be **Slight** where change in severance is slight or the total numbers of people affected across all levels of severance is low (less than 200 per day, say);
- the overall assessment is likely to be **Large** where change in severance is large, and affects a moderate or high number of people or the total numbers of people affected across all levels of severance is high (greater than 1,000, say); and
- the overall assessment is likely to be **Moderate** in all other cases.

5.2.4 Where significant numbers of cyclists are affected, a comment should be made in the **Qualitative** section of the AST, indicating whether the impact of severance is more or less severe than for pedestrians.

DMRB Method

5.2.5 Guidance on the classification of new roads on the severity scale defined above is given in DMRB 11.3.8. The guidelines can readily be adapted to allow the classification of existing roads on the scale. The results obtained by application of the DMRB approach should be used to confirm the results provided by the application of the method outlined above.

5.2.6 The DMRB method identifies community facilities and routes affected by severance in several 'locations'. It also provides guidance on the assessment of relief of severance using proportional improvement to traffic flows/ walk times. Numbers of people affected are an additional requirement for the TAG appraisal. Two ways of estimating this are either to estimate the numbers potentially affected using the catchment area method or direct measurement of the actual numbers affected. In practice, it is likely to be a combination of survey results of actual pedestrian numbers using specified routes that may be affected and an estimate of people within the catchment areas of facilities that potentially are affected. Judgement should be used as to the most appropriate method, depending on the location and the community facilities affected.

Consideration of Public Transport Infrastructure

5.2.7 The advice in the DMRB is also considered to be broadly suitable for light rail or tramway systems using public roads. Such systems are unlikely to significantly add to overall traffic flows. However, where road space is restricted to accommodate them, there may be reductions in flows of other vehicles and thus a reduction in severance. On the other hand, light rail or tramway systems may require the provision of special crossing facilities. These systems may result in a higher level of severance than might otherwise be the case.

5.2.8 For rail systems employing dedicated tracks, severance is likely to be either moderate or severe, depending on the nature and location of the crossings provided. The assessment of the impact of crossings should be consistent with that specified in DMRB for roads. Where level crossings (including footpaths) are provided, the level of severance will also be dependent on the frequency and speed of trains. To ensure a valid assessment, it may also be appropriate to assess the level of severance caused by the existing earthworks and structures of disused rail routes.

5.3 Distributional Impacts of Severance

5.3.1 Initial screening is required in order to assess the requirements of a DI analysis. In the case of severance, this analysis looks primarily at impacts on no-car households, older people, children and people with disabilities, to ensure that all severance impacts on those groups, adverse or beneficial, are accounted for in the appraisal. It is a requirement that the distributional effects are reported in the Appraisal Summary Table.

5.3.2 For detailed guidance into undertaking DI analysis and the specific considerations that apply to appraising severance impacts, see TAG Unit A4.2 – Distributional Impact Appraisal.

6. Journey Quality Impacts

6.1 Introduction

6.1.1 Travellers don't normally travel for its own sake[21]. Travel is a derived demand that arises from people's desire to engage in activities. Therefore a high quality journey, when experienced, is often taken for granted. However, a poor journey quality, when experienced, can be easily recognised. Journey quality can be affected both by travellers and by network providers and operators.

6.1.2 Journey quality is a measure of the real and perceived physical and social environment experienced while travelling. This includes factors such as public

[21] Some forms of tourism, such as sightseeing tours, provide exceptions to this general rule.

information provision, perceptions of safety (e.g. street lighting, CCTV cameras, segregated cycle paths away from traffic), provisions for accessibility, physical crowding on public transport services, and so on. The journey quality impacts considered here are those aspects of quality not considered elsewhere in the appraisal (e.g. journey times, reliability).

6.1.3 Journey quality factors may be an important influence on the travel choices made by individuals. Poor quality may dissuade individuals from using certain modes and interventions that improve this quality may induce a different mode choice.

6.1.4 With increasing research in the field of transport user behaviour, quality factors are valued with more frequency and may be incorporated into appraisals in a more robust manner, particularly where quality factors are of significant importance.

6.1.5 Users may be willing to pay for some elements of journey quality and this affects the generalised cost of journeys. Where there are particular improvements targeted at quality, values for these may be derived from the research, or preferably from bespoke stated preference surveys and included in the appraisal and modelling work. Where quality is of a lower priority for a scheme, a proportionate qualitative assessment may be preferable. This Section discusses how both may be applied and presents some evidence of valuations for different modes.

6.2 Assessment Guidelines

6.2.1 Journey quality impacts can be sub-divided into three groups, according to their nature:

- traveller care: aspects such as cleanliness, level of facilities, information and the general transport environment;
- travellers' views: the view and pleasantness of the external surroundings in the duration of the journeys; and
- traveller stress: frustration, fear of accidents and route uncertainty.

Illustrative examples of each sub-factor are presented in Table 6.1.

Table 6.1 Classification and Examples of Journey Quality Factors

Factor	Sub-factor	Description
Traveller Care	Cleanliness	Internal and external cleanliness and graffiti; the condition of the seats; tables; brightness of internal lighting.
	Facilities	Types of seats, handles, luggage racks and storage, toilets, buffet/restaurant facilities and level of staff customer service, presence of service stations and facilities for motorists.

Factor	Sub-factor	Description
	Information	Audibility, frequency and usefulness of on-board PA announcements; the provision of general travel information and customer magazines; and the condition of advertising posters.
	Environment	Extent of overcrowding, ventilation; temperature; noise; overall condition and smoothness of ride, motor vehicle condition and driver capability.
Travellers' Views		Depth of cuttings or natural/ artificial barriers, the presence of which may block views of the surrounding countryside or townscape.
Traveller Stress	Frustration	Road layout and geometry; condition of the road network; ability to make good progress along a route.
	Fear of potential accidents	Presence of other vehicles, inadequate sight distances, possibility of pedestrians stepping into the road, presence of central reservation or safety barriers (or not); inadequate lighting; the width of the road/ carriageway/lane; presence of roadworks; the absence of lane markings, cats eyes, and hard shoulders.
	Route uncertainty	Timetables and network maps (e.g. available in public places, or on the Internet), provision of in-vehicle route signs. (NB actual time savings through better information should be assessed as a TEE benefit).

6.2.2 A new transport scheme can change travel conditions and hence journey quality, beneficially or adversely. This change must be assessed by comparing the without-scheme and with-scheme scenarios.

6.2.3 In assessing these journey quality factors, impacts that are assessed under other impacts should be excluded. For example, well-lit and patrolled public transport interchanges will add to journey quality but are also covered under security impacts and therefore should not be included here. As a principle, the analyst needs to ensure that there is no double-counting of impacts across the whole appraisal.

6.2.4 A qualitative approach to assessment is likely to be appropriate in many cases, where an intervention does not aim to directly influence quality factors, or where a scheme does not unduly alter the quality of journeys for users and non-users (as externalities).

6.2.5 Where a qualitative assessment of quality factors indicates that these impacts are significant, a quantitative assessment should be considered, following guidance later in this Section. A quantitative approach will enable more accurate forecasting, since quality improvements can be included as part of the generalised cost components of journeys and hence considered in standard modelling approaches. Guidance on modelling using quality factors can be found in TAG Unit M3.2 – Public Transport Assignment Modelling.

Qualitative Assessment

6.2.6 If a qualitative approach is deemed suitable, the analysis should assess whether the difference between the without-scheme and with-scheme cases will be better, worse or neutral, overall and for each sub-factor in Table 6.1.

6.2.7 To arrive at an overall impact score for quality of a journey use the following guidelines:

- the assessment is likely to be neutral, if the assessment is neutral for all or most of the sub-factors, or improvements on some sub-factors are generally balanced by deterioration on others;
- if the change in impact across the sub-factors is, on balance, for the better, the assessment is likely to be beneficial, and, conversely, it is likely to be adverse if there is an overall change for the worse;
- the assessment is likely to be slight (beneficial or adverse) where the numbers of travellers affected is low (less than 500 a day, say);
- the assessment is likely to be large (beneficial or adverse) where the numbers of travellers affected is high (more than 10,000, say);
- the assessment is likely to be moderate (beneficial or adverse) in all other cases.

6.2.8 The qualitative box on the AST should be used to provide any comments of particular significance about the appraisal of schemes against journey quality impacts.

6.2.9 For highway scheme assessments that have been undertaken using guidance in DMRB 11.3.9.2 (travellers' views) and 11.3.9.3 (traveller stress), these may be considered alongside traveller care elements and sub-factors that may influence other modes in order to ascertain the impact on each sub-factor and hence the overall assessment score.

Assessment Using Monetary Valuations

6.2.10 There are two important elements to appraising impacts on journey quality in monetary terms:

- Estimate of the number of individuals exposed to improved or reduced journey quality, using forecasting techniques or models to estimate the impact of the change in journey quality on users for different modes of transport;

- Estimate total benefits (or costs) considered under journey quality impacts, applying monetary values (bespoke local stated preference surveys or from published evidence) to trip forecasts.

6.2.11 Forecasts of trips made that benefit (or disbenefit) from a change in journey quality are clearly important when applying monetary valuations. This can be accomplished in different ways, depending on the scope of the scheme and the analytical tools available or to be developed.

6.2.12 Traditional four-stage transport models can incorporate the value of journey quality through part of the generalised cost formulation. This may be added into demand models in order to affect traveller choices. It can also be added to trip assignment models as components of cost (for example a reduced boarding penalty or proportionally reduced in-vehicle times where improvements in interchange facilities are made) that may feed into these demand models and also produce economic output for use in the appraisal (see TAG Unit M3.2 – Public Transport Assignment Modelling).

6.2.13 Where a formal transport model is used, journey quality valuations can be included as part of the overall generalised time inputs to TUBA, the Department's appraisal software. As journey quality impacts are not fed into TUBA as a separate input, their impact on the appraisal process will only be identifiable from the TUBA output if no other measures are being appraised. If this is not the case, consideration may need to be given to running TUBA twice: once with the other measures only and then again with the inclusion of soft measure inputs.

6.2.14 Where a formal transport model is beyond the scope of the appraisal exercise (e.g. the appraisal of small walking and cycling schemes), alternative forecasting methods may be used in order to provide an assessment of changes in journey quality. Guidance on walking and cycling scheme appraisal in TAG Unit A5.1 – Active Mode Appraisal suggests several methodologies that may be used.

6.2.15 It should be noted that new users of transport modes that have journey quality impacts will be subject to the "rule-of-half". That is, the total benefit received by new users is half of the actual change in benefit (see TAG Unit A1.1 – Cost Benefit Analysis for a full explanation). TUBA performs this calculation automatically. Where calculations are made outside of TUBA, it should be remembered to apply the rule-of-half to new users and the maximum benefit to existing users (see TAG Unit A1.1 for the rationale and further details of its application).

6.2.16 The following sections present some evidence for valuing journey quality on bus, active modes and rail respectively. These may be used as indicative values for modelling and appraisal purposes, noting that this is an area where the evidence base is being developed. Therefore sensitivity tests are encouraged to test the impact on the appraisal of differing values.

6.3 Valuation of Journey Quality Impacts

Bus Quality Valuation

6.3.1 Valuations for bus quality factors, often referred to as "soft measures", are presented in the TAG Data Book for bus users and car users[22]:

M3.2.1: Segmented Values of Bus Quality Interventions (generalised minutes)

Further description of these values is presented in TAG Unit M3.2.

6.3.2 These valuations are based on stated preference surveys but are presented in generalised minutes. They are behavioural values and therefore chiefly intended to be applied in modelling, in either mode choice models or in the assignment process. However, these values will represent a good starting point for use in an appraisal where bus quality factors are to be considered. For schemes where quality factors are of significant importance, the collection of bespoke local stated preference data should be considered, in order to allow a more accurate valuation in the appraisal.

Active Modes: Cycling and Walking Quality Valuation

6.3.3 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 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 quality on a route.

Active Modes: Estimating the Journey Quality Impacts for Cyclists

6.3.4 Assessing the impact on journey quality of particular improvement schemes is a challenging issue. The application of monetary values to improvement schemes is approximate, especially when comparing different schemes or individual interventions with each other. The analyst should use judgment and potentially a 'sliding scale' approach at assessing the monetary impact on journey quality depending on the perceived quality of an intervention relative to the existing situation, using published research figures as a guide to the potential maxima for an improvement. The analyst must ensure that when the benefits of schemes are compared against one another, consistent assumptions are made concerning journey quality monetary benefits.

6.3.5 These various research studies are summarised to give the values in the TAG Data Book:

A4.1.6: Summary of value of journey quality benefit of different types of cycle facility relative to no facilities

[22] Since users of the different modes value quality improvements on buses differently.

This gives an approximate monetary benefit of the introduction of cycling schemes and includes not only infrastructural changes, but facilities as well. These monetary values include all aspects of quality, including environmental quality, comfort and convenience and perceived improvements to safety. The limitation of these values is they that are derived from specific studies. Local values are of course preferred, but unlikely to be available without undertaking specific surveys at potentially disproportionate cost.

6.3.6 There is evidence to suggest that non cyclists value cycle facilities more highly than existing cyclists. It is suggested that the total journey quality benefits for cyclists can be calculated by:

1. Estimating the total time that existing cyclists will make use of the new facilities;

2. Multiplying this by the value of the benefits of the facility for existing cyclists (per hour) which gives the total benefits for existing cyclists;

3. Estimating the total time that new cyclists will make use of the new facilities;

4. Multiplying this by the value of the benefits of the facility for new cyclists (per hour) and halving[23] to give the total benefits for new cyclists;

5. Summing the two results.

6.3.7 The results from this process should be examined to check whether they are realistic. For example, if a greenway of ten kilometres is constructed, it will be unreasonable to assume all cyclists using the greenway will traverse the entire length of the scheme, as there will usually be numerous exit points and different origins and destinations.

6.3.8 The analyst should assess the types of trips being made from major origin and destination points, as well as collecting evidence to support these assumptions. Where it is not possible to obtain evidence for a specific scheme, a suitable alternative may be to use local or national figures of average journey length for walking and cycling trips, capping scheme use to this maximum value to avoid overestimation of quality and other benefits. This assumes that building cycling or pedestrian infrastructure will not induce longer or shorter trips in the locality.

Active Modes: Estimating the Journey Quality Impacts for Pedestrians

6.3.9 Quantifying and monetising the journey quality benefits of walking schemes is a developing research area. Heuman (2005) supplies some values for pedestrian features and amenities, which were used in the evaluation of the Strategic Walk Network in London. These are given in the TAG Data Book here:

[23] This is halved due to the application of the “rule of half” to new users; existing users derive the full benefit.

A4.1.7: Values of different aspects of the pedestrian environment used in the valuation of the London Strategic Walk Network

6.3.10 Studying the value of different aspects of the pedestrian environment is inherently difficult as walkers often do not regard their journey in a similar way to the users of other modes of transport. Valuations such as those in Data Book Table A4.1.7 should be treated with caution. Where comparisons are made with other schemes, consistent assumptions need to be made.

Rail Quality Valuation

6.3.11 Quality aspects of a rail journey include those experienced at stations (station quality and crowding and quality of interchanges) and the quality of the ride (rolling stock quality and on-board crowding). Valuations of these aspects are taken from the Passenger Demand Forecasting Handbook (PDFH). Application of these values for rail schemes is described in TAG Unit A5.3 – Rail Appraisal.

Highway Quality Valuation

6.3.12 Currently, there is limited evidence of monetary valuations of quality specific to road users. It is recommended that the analyst produces a qualitative appraisal following the guidelines in Section 6.2.

7. Option Values and Non-Use Values

7.1 Introduction

7.1.1 Option and non-use values should be assessed **if the scheme being appraised includes measures that will substantially change the availability of transport services within the study area** (e.g. the opening or closure of a rail service, or the introduction or withdrawal of buses serving a particular rural area).

7.1.2 Option and non-use values are often associated with rail services, particularly rail station closures, but in principle are equally applicable to other public transport modes (bus, coach, LRT, underground, air), road infrastructure and to freight facilities[24].

7.1.3 There is a limited evidence base associated with the valuation of option values and non-use values in the transport context. All applications of option and non-use value concepts in the transport field have been related to the impact on households of the removal of local bus or rail services. Given this limited evidence, **monetisation should be restricted to the opening or closure of**

[24] If option values exist for car ownership, they are already internalised in the car ownership decision.

local rail stations and the introduction or loss of good quality local bus services. Even in these cases, assessment on the qualitative seven-point scale will be adequate in the majority of cases. Indeed, the Railway Stations Closures Guidance (DfT, 2008), suggests that given that valuations are not robust in all circumstances, a qualitative scale of the impact of a scheme on option values is recommended. Further information on the likely scale of impact and indicative valuations are given in Appendix A:.

7.2 Definitions

Option Values

7.2.1 An option value is the willingness-to-pay to preserve the option of using a transport service for trips not yet anticipated or currently undertaken by other modes, over and above the expected value of any such future use.

7.2.2 Consider a scheme that includes the re-opening of a closed railway line, linking a series of rural towns and villages to a major town or city that already has a railway service. Even if a particular individual living in one of the villages along the route does not intend to use the rail service, they may still value having the option to use the service, if they choose. For example, a car-owner may value the ability to use the service when for whatever reason they cannot drive or their car is unavailable. A non-car-owning resident who generally does not travel beyond the village may value the knowledge that, should they need to reach the town or city, the facilities exist for them to do so, at reasonable cost and with a reasonable level of convenience. Whilst a full analysis of user benefits will include the expected value of any such occasional use, theory suggests that in circumstances where the lack of the transport facility would cause inconvenience, people may be willing to pay a premium over and above their expected use value to ensure that the service exists for unplanned trips, as a sort of insurance.

7.2.3 Important features to note of option values are as follows:

- They are associated with uncertainty about use of the transport facility;
- They may exist even if the option of using the transport service is never taken up;
- They are related to the individual's attitude to uncertainty.

Non-Use Values

7.2.4 Non-use values are the values that are placed on the continued existence of a service (i.e. transport facility), regardless of any possibility of future use by the individual in question.

7.2.5 The motivation for the desire for a transport service to continue to exist may vary from one circumstance to another. For example, individuals may value a transport facility for altruistic reasons, reasons of indirect use or because it has some existence, bequest or intrinsic value.

7.2.6 The analyst should consider exclusively non-use values that arise from altruistic motives (e.g. a resident in a village deriving benefit from the knowledge that the elderly can use public transport to access the facilities they need), to avoid double counting benefits that are attributable to other sources already covered in an appraisal. These include reductions of externalities (e.g. traffic reduction on a road due to introducing a new rail service), increased community vitality through greater economic activity (i.e. increased land values and profitability of business) and cultural values that may be held by some transport infrastructure.

7.3 Approach to Appraisal

Calculation of Scale of Impact

7.3.1 Where a step-change in transport service is expected (e.g. the removal or introduction of a new mode), an appraisal should include an assessment regarding the nature of the change in service and whether the change is beneficial or adverse in terms of option and non-use values.

7.3.2 It is necessary to calculate the number of households that will be affected by the proposals and to qualitatively score that impact[25]. Whilst much of the discussion below focuses on rail proposals the underlying principles are applicable to all modes of transport to which it is considered option and non-use values might be applicable.

7.3.3 The inclusion of option and non-use values in appraisal is very sensitive to the size of the population affected by the proposals. At present there is no evidence on how values vary with distance from access/egress points to the infrastructure/service (stations, bus stops, etc.). It does however seem reasonable to expect the population who hold an option and non-use value for a transport service to have a similar geographic spread to those who hold use values for the same service. Thus in the absence of further research catchment areas are considered to give a reasonable approximation to the size of population affected.

7.3.4 The Passenger Demand Forecasting Handbook (PDFH) (ATOC) offers the following indicative guidance on rail station catchment areas:

- That a catchment of 2km is appropriate for minor stations;
- That a larger catchment should be used for ‘free-standing’ towns; and
- That for ‘reasonably main stations’ in the South East, a catchment of 5km is appropriate.

7.3.5 Station catchment and associated option values will often differ from one scheme or location to another as a consequence of more specific factors, including frequency of trains, location (rural, suburban, urban), type of railway (mainline, branch line), and accessibility of the station. Ideally an appraisal

[25] In actuality it is the number of persons that are affected that is important; however, the evidence base covers the household level and hence this should suffice in the appraisal.

should be based on detailed local knowledge of the likely catchment area and the size of the population within it.

7.3.6 If two or more stations are in close proximity, then their respective catchments might overlap. For residents falling within this overlap, the option value should be regarded as present as long as at least one of the stations is available; only the closure of both would result in its loss. The population affected by the opening and closure of a line can be calculated by summing the population affected of each of the stations along the line.

7.3.7 For branch lines/services providing access to large conurbations values are only ascribed to those living in the catchment of the line outside the conurbation (e.g. near local stations). The rationale for this is that the provision of an additional service or loss of a service to those living in the conurbation will not materially affect their access to employment and services – this is particularly true for those living near a city centre and within the catchment of a mainline station which may also act as the terminus of a branch line/service.

7.3.8 It is recommended to restrict the measurement of option and non-use values to stations proximate to individuals' place of residence, and to consider more distant stations only in particular demonstrable circumstances. For example, stations that carry a relatively small resident origin population, but serve as important points of destination for commuting or leisure activities. At present, there is no supported evidence concerning the option and non-use values of destinations at a distance from the place of residence of individuals and it is expected to be small. Where deemed necessary, a bespoke survey in order to elicit potential values and size of population that would consider travelling to the destination may be useful.

7.3.9 Once the number of households considered to hold an option and non-use value to the proposals under consideration have been identified a qualitative score should be assigned as follows, with an adverse impact if a service is withdrawn and beneficial if added:

- >1,000 households: Large impact;
- 250-999 households: Moderate impact;
- 1-249 households: Slight impact;
- 0 households: Neutral impact.

7.3.10 Where more than one community is affected the total number of resident individuals should be added together (with a negative sign attached to communities losing their service). Services not providing reasonable opportunities for return travel on all days of the week should not be treated as services for these purposes. Withdrawal of rail services replaced by bus should be counted as a withdrawal of service, given the lower level of accessibility offered to significant groups of users, unless the bus service is demonstrably of comparable quality to rail.

Changes During The Appraisal Period

7.3.11 Forecasts of changes in the number of households should be consistent with those used in other parts of the appraisal, notably the modelling. They can be gleaned from local authorities' Unitary Development Plans, which include projections of additional domestic units by locality, or at a more strategic level from NTEM – the Department's trip end projection model that includes forecasts of population and households up to 2041. Where there are plans for significant infrastructure, appraisal of option and non-use values should be subject to rigorous forecasting and sensitivity analysis.

Valuation of Option and Non-Use Values

7.3.12 Appendix A discusses the use of monetary valuation of option values and non-use values where this is to be considered.

7.4 Assessment and Reporting Requirements

7.4.1 The following describes the information that should be recorded and presented in the Appraisal Summary Table (AST).

7.4.2 In the majority of cases, the entry in the **Overall Assessment** column of the AST should give a qualitative seven-point score (strong adverse to neutral to strong beneficial) as set out in paragraph 7.3.9. Where monetary values have been used the net present value (NPV) of the total change in option and non-use values between the with-scheme and without-scheme scenarios should be given. If scheme rankings are sensitive to the inclusion of option and non-use values a note to this affect should be also be included.

7.4.3 The **Quantitative** column should be used to indicate the number of households affected and the nature of the analysis used to determine the number of households affected.

7.4.4 The **Qualitative** column should be used to identify which group of transport services within a particular option are the source of any additional (or reduced) option and non-use value, the nature of the change in service and the sign of the change (i.e. option and non-use value gained or lost). Some indication of the alternatives available to households in the absence of the scheme under consideration should be given.

7.4.5 The NPV and other summary economic indicators of the scheme reported in the **Analysis of Monetised Costs and Benefits** (AMCB) table should exclude option and non-use values (where monetised) as the central estimate of the economic impact of the project. However, a secondary analysis using option and non-use values should be undertaken to examine whether or not the ranking of the options under consideration is affected by their inclusion.

8. Accessibility Impacts

8.1 Why is Accessibility Important?

8.1.1 Increasing car use has provided greater opportunity for people to travel and access the services they require. However, one in four households does not have access to a car for reasons including cost, disability and choice. These people rely on public transport, walking, cycling or lifts from friends, family or community organisations. The reliance on such 'networks', which are often limited, can lead to social exclusion.

8.1.2 Consideration of accessibility issues should take place throughout the appraisal process, commencing with the consideration of current and future transport challenges, in which the opportunity should be taken to consider options to tackle identified accessibility problems.

8.1.3 Accessibility issues should also be considered in the process of identifying options for intervention, and accessibility impacts should be taken into account in the analysis of specific transport interventions.

8.1.4 Intelligent design can therefore be implemented at an early stage in the process of considering issues and developing options to mitigate accessibility issues and to improve overall acceptance of the intervention.

8.2 What is Accessibility?

8.2.1 Accessibility is a term that has a multitude of meanings within the transport profession ranging from the physical access onto a public transport vehicle, the ability to get to a given place (for example a hospital), to the accessibility of information about a particular public transport service.

8.2.2 In some cases, accessibility benefits from transport interventions are the same as transport user benefits. However, transport user benefits are usually defined in a narrow way within the appraisal process and it is important to consider accessibility benefits in a more holistic way.

8.2.3 'Making the Connections' (Social Exclusion Unit, 2003) identified five key barriers impacting on accessibility:

- The **availability and physical accessibility of transport**: For some people in isolated urban and rural areas there are limited or no public transport services or the services are unreliable, or do not go to the right places or at the right times;
- **Cost of transport**: Some people find the costs of personal or public transport very high or unaffordable;

- **Services and activities located in inaccessible places**: Developments including housing, hospitals, business and retail are often located in areas not easily accessible to people without a car;
- **Safety and security**: Some people will not use public transport or walk to key services because of the fear of crime or anti-social behaviour; and
- **Travel horizons**: Some people are unwilling to travel long journey times or distances, or may not know about or trust transport services.

8.2.4 Building on this, accessibility may be presented as reflecting the range of opportunities and choices people have in connecting with jobs, services and friends and families. The level of access will depend on where people choose to live, where services are located, and the availability of 'home delivery' of goods or services. It is also about the availability and affordability of transport; providing journeys that are appropriate in terms of time and cost. Improving accessibility can be achieved through one or a combination of these elements.

8.3 Appraisal of Accessibility Impacts

8.3.1 Accessibility is a key distributional impact that needs to be considered in scheme appraisals. In order to derive a score for the AST, screening of accessibility impacts needs to be undertaken, followed by a Distributional Impact Analysis where there are impacts identified that may affect different groups of people either positively or adversely. The analyst is required to scope and potentially undertake an Accessibility Audit and a core analysis including completing a series of Accessibility Analysis Worksheets that is provided as supporting information for the overall AST score.

8.3.2 For the core guidance on the assessment of Accessibility Impacts, refer to TAG Unit A4.2.

9. Personal Affordability Impacts

9.1 Why is Personal Affordability Important?

9.1.1 There is a substantial body of research to demonstrate that the monetary costs of travel can be a major barrier to mobility for certain groups of people, with particularly acute effects on their ability to access key destinations.

9.1.2 Although poorer people spend less money on travel in absolute terms than the rest of the population, this often accounts for a far greater proportion of their income ('Making the Connections' (Social Exclusion Unit, 2003)). The low absolute spend reflects low average rates of car ownership, and low car running and high depreciation costs where a car is owned, but where budgets are very constrained, even these costs and public transport costs can account for a high proportion of that budget. Accordingly, changes to the transport network that

involve changes in user charges can have a particularly strong impact on people in low income groups.

9.1.3 Consideration of personal affordability issues should take place throughout the appraisal process. Affordability may be a central issue and accordingly it would be good practice to set one or more objectives relating to making travel more affordable. In considering whether affordability should be an objective, the analyst should make reference to existing policy documents and evidence to identify personal affordability challenges for different groups of people within the local area. This could include, for example, the Accessibility Strategy contained within the Local Transport Plan for the area under consideration.

9.1.4 In most cases, affordability impacts may arise as indirect consequences of an intervention. This is because transport interventions are usually conceived to improve transport efficiency, accessibility and/or safety; nonetheless, there may be cases where the overall effects are positive but some groups suffer adverse affordability impacts. Similarly, if among the other benefits such as highway time savings some low income or vulnerable groups enjoy positive affordability impacts, this should also be reported in the appraisal.

9.2 Appraisal of Personal Affordability Impacts

9.2.1 Personal Affordability is a key distributional impact that needs to be considered in scheme appraisals. In order to derive a score for the AST, screening of affordability impacts needs to be undertaken, followed by a Distributional Impact Analysis where there are impacts identified that may affect different groups of people either positively or adversely.

9.2.2 The analyst is required to scope and potentially undertake a Strategic Affordability Review and a core analysis including completing a Personal Affordability Worksheet that is provided as supporting information for the AST score. It may be possible to make use of TUBA outputs to inform this analysis if the model in use is sufficiently segmented.

9.2.3 For the core guidance on the assessment of Personal Affordability Impacts, refer to TAG Unit A4.2.

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11. Document Provenance

This topic manual forms part of the restructured TAG guidance, taking previous TAG units as its basis.

Accidents

Based on previous TAG Unit 3.4.1. Information in this TAG Unit replaces the twenty-eighth in a regular series of the Highways Economic Note No.1 (HEN 1) on Valuation of Accidents.

Physical Activity

Based on previous TAG Unit 3.3.12. Information in this TAG Unit is based on research and consultation to improve the Department's guidance on appraising walking and cycling (previously TAG Unit 3.14.1). This is an update to the previous guidance of April 2009, itself an update of June 2003 guidance.

Security

Based on previous TAG Unit 3.4.2. Information in this TAG Unit is based on Chapter 5, Section 3 of **Guidance on the Methodology for Multi-Modal Studies Volume 2** (DETR, 2000).

Severance

Based on previous TAG Unit 3.6.2. Information in this TAG Unit is based on former TAG Unit 3.6.2, which itself was based on Chapter 7 Section 3 of Guidance on the Methodology for Multi-Modal Studies Volume 2 (DETR, 2000), updated in January 2010 to reflect the guidance on Distributional Impacts.

Journey Quality

Journey quality impacts subsume the 'transport interchange sub-objective' that was previously considered separately to journey quality (then termed 'journey ambience').

Information in this TAG Unit is based on:

- former TAG Unit 3.7.1, which itself was based on Chapter 8 Section 2 of Guidance on the Methodology for Multi-Modal Studies (DETR, 2000); and
- former TAG Unit 3.3.13, which itself was based on Chapter 4 Section 13 of Guidance on the Methodology for Multi-Modal Studies (DETR, 2000).

The methodology builds and expands upon techniques:

- for assessing impacts on travellers contained in DMRB 11.3.9;
- developed by London Transport; and
- contained in the Institute of Highways and Transportation publication 'Cycle Friendly Infrastructure'.

This Unit incorporates research on Bus Soft Factors and takes in the journey quality valuations from the previous guidance on walking and cycling schemes (former TAG Unit 3.14.1)

Option Values and Non-Use Values

Based on previous TAG Unit 3.6.1. Information in this TAG Unit is based on Chapter 7 Section 2 of Guidance on the Methodology for Multi-Modal Studies Volume 2 (DETR, 2000) and the June 2003 TAG Unit. The guidance was updated in December 2006 to include advice on the inclusion of non-use values in addition to option values and more detailed advice on the calculation of monetary valuation for changes in option and non-use values.

Appendix A: Valuation of Option and Non-Use Values

A.1.1 The following TAG Data Book Table contains values that represent an aggregation of both option and non-use values and are an average of users' and non-users' values:

A4.1.8: Option and Non-Use Values (2010 prices and values)

These values relate to small communities and local bus and rail services. They do not relate to communities adjacent to mainline stations or stations that serve a predominantly long distance market. Additionally, these values represent household values for personal travel only and do not reflect the values that businesses may hold.

A.1.2 Clearly services of a different quality to those surveyed may have different option and non-use values to those recommended in Data Book Table A4.1.8. In particular, one would expect that low frequency services which have departure times that make commuting impossible might be expected to have radically lower values, as might services which do not serve major employment centres. However, the evidence base on how such values will vary is too small to make any recommendations regarding variations in service quality. The recommended values are therefore relatively broad-brush. Additionally, the recommended values relate to scenarios where there is no public transport alternative to the bus or train. Thus where a rail service is replaced by a bus, it is the difference in option values of the two services that is relevant.

A.1.3 Whilst the values presented have been adjusted using data from Humphreys and Fowkes research to prevent double counting with other benefits in a transport appraisal, it is still possible that the non-use value element may still include some elements of benefit that are double counted. There is uncertainty regarding the split between option and non-use value with Humphreys and Fowkes suggesting a low value and Geurs (2006) suggesting a much higher value. However, on the basis that the non-use component of the aggregate value may comprise 40% and this component may reflect substantial elements of double counting, we therefore recommend **sensitivity testing** the appraisal to values set at 60% of those recommended.

A.1.4 The values set out in Data Book Table A4.1.8 reflect the absolute level of option value and non-use value of a particular mode and level of service. Transport appraisal, on the other hand, is concerned with incremental changes in service provision. Therefore, it is the difference between the option and non-use values before and after the transport policy has been implemented that is important to an appraisal. Thus if a station along a high quality train service route, with an OV and NUV of £200 per household, was closed and replaced with a high quality bus service (4 services an hour and an acceptable travel time) with an option value of £110, the loss in welfare per household would be £90 per household per annum.

Assigning Monetary Values

A.1.5 Given that only one value for bus services and one value for rail services are available from the evidence base, some pragmatic assumptions are necessary when trying to assign monetary values to different combinations of services. The broad principles set out below should therefore be adopted when assigning monetary values.

- Monetary values are assigned to households in the without-scheme and with-scheme cases for each of the years in the appraisal. The values need to reflect the level of service provision in each of those scenarios.
- If the service/infrastructure facilitates commuting then an option and non-use value can be ascribed to households within the catchment of that service. Otherwise an option and non-use value of zero is assumed. Whilst services that allow return trips for non-commuting purposes (e.g. shopping or access to healthcare) may hold an option and non-use value there is no evidence as to what this value is and as we would expect it to be substantially lower than the values set out in Data Book Table A4.1.8. As such, a qualitative appraisal is recommended for services that do not facilitate commuting but provide access to other services.
- The same value is ascribed to services that offer different levels of service – providing that they both offer commuting opportunities. That is an hourly service has the same value as a half hourly service. Related to this the same value is ascribed to a 'package' of different train services or a package of different bus services as would be ascribed to single good quality service. Ultimately both the single service and the package of services provide accessibility to employment and service centres.
- For similar reasons the same value is ascribed to a package of train and bus services as is ascribed to the train service in isolation. The limited evidence on the value of packages of bus and train measures suggests that the presence of the bus service does not influence the value of the package significantly (if a train service is also part of the package). This assumption should however be sensitivity tested.

A.1.6 Clearly the above principles need to be interpreted on a case by case basis and departures may be necessary. It is therefore important for transparency and clarity that all assumptions in assigning monetary values should be set out.

A.1.7 For future appraisal years, option and non-use values are assumed to grow at 1.5% per annum in line with the OBR long-run growth forecast (see TAG Unit A1.1 – Cost Benefit Analysis and the Data Book Annual Parameters Table).