Department for Transport

Active Mode Appraisal Toolkit User Guide

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Contents

1. Introduction

1.1 This user guide provides advice on how to use the Active Mode Appraisal Toolkit (AMAT), a spreadsheet-based tool published by the Department for Transport (DfT) for assessing the overall benefits and costs of proposed walking and cycling interventions, ranging from capital investments to behaviour change programmes.

1.2 AMAT is designed to be consistent with UK Government guidance on policy appraisal including the HM Treasury Green Book and DfT Transport Analysis Guidance (TAG). By quantifying the key impacts of a proposed intervention, AMAT helps provide decision-makers with as full a view as possible about impacts on transport users, the environment, society and the economy. AMAT also provides a measure of the 'Value for Money' of a proposed intervention, in the form of a benefit-cost ratio (BCR).

1.3 AMAT quantifies a wide range of potential benefits of cycling and walking interventions including:

- **Health improvements** from increased levels of physical activity in terms of reduced mortality risk and lower work absenteeism;
- **Improvements to journey quality** as a result of providing the perception of a safer or pleasant journey whilst using walking and cycling infrastructure; and
- Impacts associated with **modal shift** away from cars and taxis including improvements in traffic congestion, greenhouse gas emissions, air quality, noise, accidents, infrastructure maintenance, and changes to indirect tax revenues as a result of a reduction in distance travelled by these modes.

1.4 Typically, health improvements represent over 50 percent of overall intervention benefits, with journey quality and mode shift impacts comprising around 30 and 20 percent respectively, although the proportions can vary considerably depending on an intervention's characteristics.

1.5 AMAT quantifies each of these benefits following the methods and assumptions set out in the Department's Transport Appraisal Guidance, in particular Unit A5-1 Active Mode Appraisal, Unit A4-1 Social Impacts Appraisal, Unit A1-1 Cost-Benefit Analysis and Unit A1-2 Scheme Costs. More technical detail on the impacts captured in AMAT can be found in these documents.

1.6 The user guide is structured as follows:

- Section 2 sets out the structure of AMAT;
- Section 3 explains how to use AMAT with an illustrative worked example:
  - Section 3a explains how to use the Area Lookup sheet to determine which area type should be inputted into the tool;
  - Section 3b explains what information is needed to complete an assessment, provides guidance on estimating intervention costs, and explains the assumptions that underpin AMAT; and

- Section 3c explains the Analysis of Monetised Cost and Benefits sheet - the main output of the tool.
- Section 4 provides guidance on undertaking sensitivity testing within AMAT;
- Section 5 provides guidance on the key known limitations with using AMAT.

1.7 The development of this user guide has been informed by a programme of stakeholder feedback, a summary of the process is available in **Annex A.**

1.8 A glossary of all the terms and acronyms is available in **Annex B.**

1.9 Illustrative examples of cycling and walking infrastructure types are outlined in **Annex C.**

2. Structure of AMAT

2.1 AMAT is an spreadsheet-based model with the following visible worksheets:

- **Cover** worksheet provides version control and contact details;
- **Guidance** worksheet provides a summary of the AMAT tool, instructions for its completion and its limitations;
- **Area Lookup** worksheet enables users to identify the area type where the proposed intervention is located;
- **User Interface Intervention** worksheet requires users to input various data about the intervention;
- **User Interface Costs** worksheet requires users to input data about the intervention's cost; and
- **Analysis of Monetised Costs and Benefits (AMCB)** worksheet reports the quantified costs and benefits of the proposed intervention.

2.2 A number of sheets are hidden by default: these include assumptions that should not be altered by users and calculations.

2.3 The model map in Figure 1 illustrates the layout, input, calculations and outputs of the AMAT. **The AMAT Calculations** box summarises the calculations that are undertaken based on the information input by the user into the **User Interface Intervention** and **User Interface Costs** worksheets. These in turn generate the model outputs shown on the **Analysis of Costs and Benefits worksheet**.

2.4 Further detail of the inputs required and how they are included in the calculations to provide the outputs are set out in the following chapters.

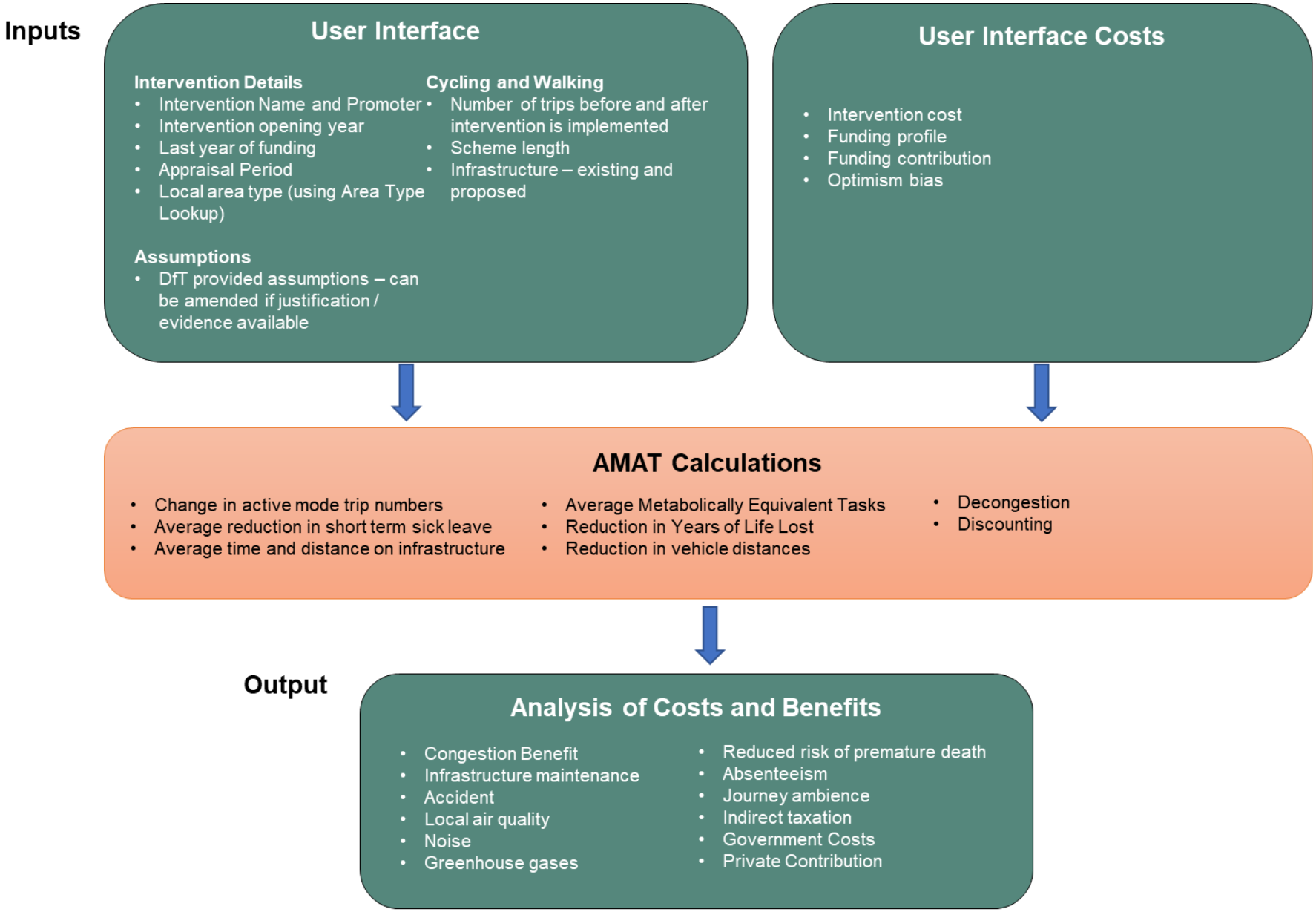


Figure 1: Active Mode Appraisal Toolkit Model Map

3. A Step-by-Step Guide to completing an assessment using AMAT

The process to be undertaken to complete an assessment in AMAT includes:

- Determining the area type where an intervention is located by using the **Area Lookup worksheet.**
- Completing the Intervention Details and Mode Information sections of **the User Interface Intervention worksheet.**
- Inputting the cost estimates by year in the **User Interface Costs** worksheet.
- Amending default assumptions already included within AMAT, where appropriate, in **the User Interface Intervention** and **User Interface Costs** worksheets – this should only be done if local evidence is available to justify any changes.

3a. The Area Lookup Worksheet

3.1 One of the required inputs into the User Interface Intervention worksheet is the area type for the location of the intervention. Users are required to select one of the following four categories that best corresponds to the intervention area:

- London
- Inner and Outer Conurbation
- Other Urban
- Rural

3.2 The area type category is used in the tool for the calculation of Marginal External Costs (MEC). MECs are the impacts associated with the shift in transport modes from the car to walking and cycling due to improved infrastructure for active modes.

3.3 The **Area Lookup** worksheet of AMAT enables users to identify the "area type" within which the intervention is located, based on Middle Layer Super Output Areas (MSOAs). There are around 7,000 MSOAs in England and Wales. Further detail regarding Census geography is available on the Office for National Statistics (ONS) website.

3.4 A map detailing the MSOAs across England and Wales is available here. This map enables users to select the area where an intervention is located and obtain its MSOA code.

3.5 There are two methods within the Area Lookup worksheet that can be followed to establish the area type.

Method 1 - Zone Code Search

3.6 If the user knows the MSOA zone code relating to the intervention (or has looked it up using the online map) this can be entered into the Zone Code search cell. The area type will then be displayed.

Worked Example – Improvements to cycling infrastructure are proposed along Clifton Road in Runcorn. Using the online map we can establish that the intervention is within MSOA E02002589. When this MSOA Zone Code is entered it returns the Area Type as "Other Urban", as illustrated below:

Area Lookup Table	
Search Bar - Please Enter MSOA Zone Code or Use Below Table to Filter	
Zone Code	**Area Type**
E02002589	Other Urban
For users to determine what area type their scheme is located in for mode-shift calculations. The categories are based on mapping of the National Transport Model. Users may use a different area type if they have evidence that the mapping does not represent the area of the intervention.	

Method 2 - Search for Zone Code using Lookup Table

3.7 The table within the Area Lookup worksheet displays all MSOAs in Great Britain. Each column heading has filters enabling the user to easily identify the appropriate area type.

Worked Example – An example of the table filtered by the relevant Local Authority area (using the Control Area Name column) is set out below, illustrating the MEC types within that particular location. Runcorn is within Halton Borough Council's administrative area.

Area Lookup Table

Search Bar - Please Enter MSOA Zone Code or Use Below Table to Filter

Zone Code	Area Type
E02002589	Other Urban

For users to determine what area type their scheme is located in for mode-shift calculations. The categories are based on mapping of the National Transport Model. Users may use a different area type if they have evidence that the mapping does not represent the area of the intervention.

MSOA Zone Code	MSOA Zone Name	LAD Code	Control Area Name	MECs Area Type
E02002574	Halton 001	E06000006	Halton	Other Urban
E02002575	Halton 002	E06000006	Halton	Other Urban
E02002576	Halton 003	E06000006	Halton	Other Urban
E02002577	Halton 004	E06000006	Halton	Other Urban
E02002578	Halton 005	E06000006	Halton	Other Urban
E02002579	Halton 006	E06000006	Halton	Other Urban
E02002580	Halton 007	E06000006	Halton	Other Urban
E02002581	Halton 008	E06000006	Halton	Other Urban
E02002582	Halton 009	E06000006	Halton	Other Urban
E02002583	Halton 010	E06000006	Halton	Other Urban
E02002584	Halton 011	E06000006	Halton	Other Urban
E02002585	Halton 012	E06000006	Halton	Other Urban
E02002586	Halton 013	E06000006	Halton	Other Urban
E02002587	Halton 014	E06000006	Halton	Other Urban
E02002588	Halton 015	E06000006	Halton	Other Urban
E02002589	Halton 016	E06000006	Halton	Other Urban

Interventions spanning two or more MSOAs

3.8 It is recognised that some interventions will span more than one MSOA.

3.9 If this is the case, it is recommended that all relevant MSOAs are identified within the Area Lookup Table to see if the area type category differs.

3.10 If each MSOA is the same area type, then that category should be used.

3.11 If the category differs, then the following should be considered:

- Estimate the scheme length and use the area type of the MSOA which contains the largest proportion of the scheme; and/or
- Consider which section of the proposed intervention would have the most users, and use the area type of that MSOA.

3b. AMAT Inputs

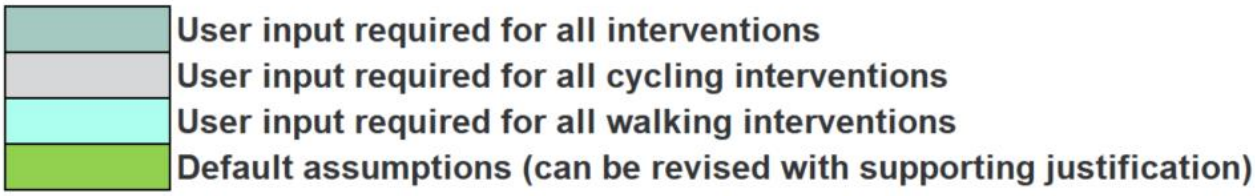
User Interface Intervention Worksheet

Overview

3.12 The **User Interface Intervention** worksheet is where the user enters details for the proposed intervention. The information entered in this worksheet informs the calculation of scheme benefits.

3.13 Guidance is provided in the worksheet on which cells need to be completed.

3.14 The input cells within the worksheet are colour coded as follows:



3.15 These are discussed in more detail further below.

Intervention Specific Information

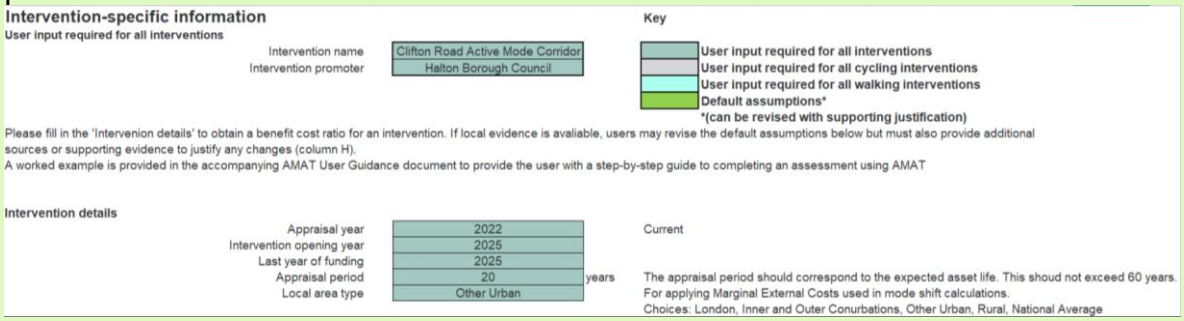
3.16 Details of the proposed intervention are entered in the Intervention Specific Information section of the User Interface Intervention worksheet. Required inputs include:

- Intervention Name.
- Intervention promoter – the name of the promoting/funding organisation, typically the Local Authority.
- Intervention opening year – the year it is anticipated that the intervention will be open for use or active. This is required to identify the first year in which the benefits of the proposal should be valued.
- Last year of funding – the year when it is anticipated that the funding for the proposed intervention will end.
- Appraisal Period - the number of years over which the benefits of the intervention are assumed to occur. Both the costs and benefits should be calculated over the lifetime of the intervention, which is expected to vary by intervention type. Although large-scale infrastructure schemes for other modes typically assume a 60-year appraisal period, this is generally not recommended for active modes interventions as they are more likely to have more finite project lives and increased uncertainty around the longevity of their impacts. Therefore, most appraisals of cycling and walking infrastructure schemes assume an appraisal period of 20 years. However, this may not be suitable for behaviour change interventions such as walk-to-school initiatives, where a shorter appraisal period (eg 10 years) is likely to be more appropriate. However, some infrastructure schemes may be justified in adopting a longer appraisal period (up to a maximum of 60 years), for example if they are considered to have a comparable design life to major road and rail capacity improvements. This is

not expected to apply to most active mode interventions. Any appraisal assuming a longer appraisal period must also provide an accompanying justification. Since this assumption has a significant impact for appraisal, sensitivity testing around different appraisal periods is recommended in all cases (see section 4). It is also vital that all maintenance and renewal costs during the appraisal period are included in scheme cost estimates (within the User Interface Costs worksheet).

- Local Area Type – the area type category identified in the **Area Lookup** worksheet as described in Section 3a.

Worked Example – A screenshot of the inputs based on our worked example is provided below.



Mode information - Cycling

3.17 The user should complete the required inputs in this section of the **User Interface Intervention** worksheet if the proposed intervention involves cycling infrastructure or behaviour change programmes promoting cycling.

3.18 It is expected that any data sources or assumptions used to complete this section are detailed in the Evidence/Source box located to the right of the input cells.

3.19 The following inputs are required:

- *Number of trips without the proposed intervention* – this is the current number of cycling trips (i.e. a journey from one place to another along the route of the scheme) being undertaken along the route per day. For behavioural change interventions this may be the total number of trips per day in the target area. This can be taken from local count or survey data if available. This should represent an average day, taking account of seasonality (trip numbers may be higher than average in summer and lower in winter). If the user does not have recent count data available they may use sources such as census travel to work data and tools such as Propensity to Cycle Tool can be used to help estimate trips numbers. More detail is given in TAG Unit A5-1.

- *Number of trips with the proposed intervention* – this is the number of cycling trips that are expected due to the proposed intervention being implemented. The change in the number of cycling trips due to the intervention can be estimated using methods such as a comparative study (examples are available here for cycling and walking interventions and here for cycling specific interventions), estimates from a disaggregated mode choice model or sketch plan methods. More detail is given in

TAG Unit A5.1 . The difference between the number of trips with and without the proposed intervention is used to calculate the majority of benefits for most cycling and walking interventions.

- *The average proportion of a trip which uses the scheme* infrastructure – a percentage figure should be input here indicating how much of an average cycling trip is using the scheme itself. This should be set to zero for behaviour change interventions. This can be calculated by dividing the length of the scheme by the length of an average cycling trip based on data from the National Travel Survey1 (NTS). This figure should not exceed 100%. This number is used to inform the estimated benefit from improved journey quality. The average cycling (and walking) distances from the NTS are provided in the "Default Assumptions" in AMAT (set out later in this chapter).

- *Current cycling infrastructure for this route* – the user should select the type of infrastructure currently in place along the route. This is required to calculate the impacts resulting from the proposed improvements. A list of the cycle infrastructure types available for selection in AMAT is listed in **Annex C**.

- *Proposed new cycling infrastructure for this* route - the user should select the type of cycling infrastructure proposed as part of the scheme. This should remain the same as the previous input for behaviour change interventions. The benefits estimated for the scheme are based on the change of infrastructure provided along the route. It is recommended that separate AMATs are produced for differing sections of schemes where the infrastructure proposed varies significantly. As a rule-of-thumb if the differences exist for greater than 25% of the total scheme length, separate AMATs should be filled out for each infrastructure type.

- *Are any additional shower facilities being added?* – the user should indicate whether the proposed intervention will result in the provision of new shower facilities. Provision of showers typically increases the perceived journey ambience of cycling trips.

- *Are any additional secure storage facilities being added*? – the user should indicate whether the proposed intervention will result in the provision of new cycle storage facilities. Provision of secure storage for cycles increases the perceived journey ambience of cycling trips.

[1] *The National Travel Survey (NTS) is a household survey collecting information on how, why, when and where people travel as well as taking account of factors that may affect travel choices (e.g. availability or access to a car).*

Worked Example – For the purposes of our Clifton Road Active Mode Corridor scheme we have assumed the following:

- Currently 200 cycle trips are undertaken per day on the corridor. A comparative study for a similar scheme has indicated the scheme could increase cycling trips by around 30%. Based on the assumption of 200 trips currently, a 30% increase would forecast 260 daily cycling trips with the scheme.
- Our Clifton Road Active Mode Corridor scheme is 1.0 km in length. The average length of a cycling trip in the NTS is 4.84km. Therefore, the average proportion of a trip using our scheme infrastructure is expected to be 20.66%, i.e. 1.0 / 4.84 = 0.2066).
- We have selected that there is currently no existing provision of any formal cycle infrastructure. Our scheme will involve the provision of off-road segregated cycle lanes.
- The scheme is not assumed to either provide showers or secure bike storage facilities.

Cycling			Evidence/Source
Number of trips without the proposed scheme	200	per day	Based on count data available
Number of trips with the proposed scheme	260	per day	30% uplift anticipated based on similar scheme elsewhere
The average proportion of a trip which uses the scheme infrastructure	20.66%	%	maximum 100%
Current cycling infrastructure for this route	No provision		Currently no provision along the route
Proposed new cycling infrastructure for this route	On-road segregated cycle lane		An on road segregated cycle lane is proposed
Are any additional shower facilities being added?	No		
Are any additional secure storage facilities being added?	No		

Mode information - Walking

3.20 The user should complete all the required inputs in this section of the User Interface Intervention worksheet if the proposed scheme involves providing new walking infrastructure or behaviour change programmes to promote walking.

3.21 It is required that any data sources or assumptions used to complete this section are detailed in the Evidence/Source box located to the right of the input cells.

3.22 The following inputs are required:

- *Number of trips without the proposed intervention* – the user should indicate the number of walking trips currently being undertaken along the route or the total number of trips in the target area for behaviour change interventions. As per cycling, potential sources of data might include walking counts or census travel to work data. For example the DataShine tool visually represents data for the percentage of commuting trips which are walked.

- *Number of trips with the proposed intervention* – this is the number of walking trips that are expected due to the proposed intervention being implemented. As per cycling, this should be estimated following methods set out in TAG Unit A5.1.

- *The average proportion of a trip which uses the scheme infrastructure* – as per cycling, a percentage figure should be input here indicating how much of an average walking trip is using the scheme itself. This should be set to zero for behaviour change interventions.

- *Current walking infrastructure for this route* – the user should select the type of infrastructure currently in place along the route from the options available. This is required to calculate the impacts, or change in benefits, resulting from the proposed improvements. For most behaviour change interventions this should remain the same in both the current and proposed inputs. If the infrastructure is already there, then select “Yes”. If not, then “No” should be selected. A list of the walking infrastructure types available for selection in AMAT is provided in **Annex C**.

- *Proposed new walking infrastructure for this route* – the user should select ”Yes” or “No” next to the list of walking infrastructure proposed as part of the scheme. The level of benefits estimated for the scheme is based on the change of infrastructure provided along the route. It is recommended that separate AMATs are produced for differing sections of schemes where the infrastructure proposed varies significantly.

Default Assumptions

3.23 The bottom section of the **User Interface Intervention** worksheet lists the pre-populated default TAG assumptions.

3.24 **The user should only update these values if they have supporting evidence, that reflects local circumstances**; the source of which should be detailed in the adjacent Evidence/Source cell.

3.25 The source of the default assumptions is referenced alongside the cell. Many of the assumptions are based on travel patterns revealed from the National Travel Survey (NTS). The screenshot, in the worked example, below presents the assumptions included for cycling and walking.

Worked Example – The default assumptions have been used for this worked example.

Assumptions - to be changed with local or modelling evidence if available

Default TAG assumptions have already been entered. Users should only revise these if they can provide supporting evidence.
Any additional evidence should be described in column H.

Decay rate	0.00%	%	

TAG A5.1 explains that the impact of a cycling scheme is likely to diminish year by year following investment.
The decay rate has been set at 0% for an infrastructure investment.
For revenue-funded initiatives, such as cycle training or personalised travel planning, the decay rate may be positive.
The default assumption is that 0% of new users are already active. This means all new users experience scheme-related health impacts.

Cycling

Average length of trip	4.84	km	National Travel Survey Data 2012-14
Average speed	15	km/h	National Travel Survey Data 2016
Proportion of cyclists who are employed	56.40%	%	National Travel Survey Data 2018
Proportion otherwise using a car	11.00%	%	Literature Review carried out by RAND Europe/Systra for DfT
Proportion otherwise using a taxi	8.00%	%	Literature Review carried out by RAND Europe/Systra for DfT

Walking

Average length of trip	1.1	km	National Travel Survey Data 2012-2014
Average speed	5	km/h	National Travel Survey Data 2016
Proportion of pedestrians who are employed	56.40%	%	National Travel Survey Data 2018
Proportion otherwise using a car	11.00%	%	Assumed to be the same as cycling diversion factors
Proportion otherwise using a taxi	8.00%	%	Assumed to be the same as cycling diversion factors

3.26 Each of these assumptions is described in turn below:

- *Decay rate* – refers to how the impact of an active mode intervention may change over time, following investment. A positive decay rate would represent the number of cyclists or walkers reducing year on year, whereas a negative decay rate indicates that there would be an increasing uptake of active modes beyond the background growth rate in trips. The default assumption is 0% decay for capital investment meaning the uptake due to the scheme remains constant for the appraisal period. If an intervention is anticipated to result in an initial upturn in active mode use, for example through promotion of a behavioural change intervention with extensive marketing, it may be expected that once investment and the promotion has ended the uptake in use of active modes would reduce. As such a positive decay rate could be entered in this cell. Table 2 of the CWIS Active Travel Investment Models report lists decay rates for different intervention types.

Cycling or Walking-specific Assumptions

- *Average length of trip* – the default national value is based on analysis from the NTS. This distance feeds in to the calculation of the health benefits of the intervention, changes in work absenteeism and the calculation of the distance travelled on the new infrastructure for capital investments, as discussed earlier in this chapter.

- *Average speed* – default values for average cycling or walking speeds is based on national values estimates from the NTS. The speed is used to estimate health benefits, changes in work absenteeism and journey quality benefits.

- *Proportion of cyclists or walkers who are employed* – default values are estimated using data from the NTS and are used to estimate changes in work absenteeism. This ensures that the benefits resulting from reduced short-term illness related absences from work are only applied to the proportion of trips associated with those in employment.

- *Proportion otherwise using a car* – the default percentage provided is based on research undertaken on behalf of DfT and included in TAG Databook A5.4.7. This value indicates the proportion of new cyclists or walkers that are expected to switch from travelling by car because of the intervention. A diversion factor of 11% between cyclists and cars means that if a new cycle intervention results in 100 new cycle trips there would be expected to reduce the number of car trips by 11. The diversion factor may be higher in areas where certain modes (such as light rail) are not available so it is expected that more trips divert from cars. This can be done by taking out not available modes and 'normalising' the set to 100% Table A5.4.7. This assumption informs calculations for an intervention's impacts associated with lower car usage including reduced traffic congestion, fewer road accidents, reduced greenhouse gas emissions, improved local air quality, reduced noise, changes in infrastructure maintenance costs and a reduction in the Government's indirect tax revenue. These impacts are monetised in AMAT using the DfT's Marginal External Cost (MEC) methodology set out in TAG Unit A5.4.

- *Proportion otherwise using a taxi* – as in the above bullet point, the percentage provided (8%) is based on research undertaken on behalf of DfT and indicates the proportion of new cyclists or walkers that would switch from travelling by taxi to cycling or walking because of the intervention.

Additional Information

3.27 In addition to the assumptions listed above, the screenshot in the worked example below sets out additional default assumptions set out in the **User Interface Intervention** worksheet.

Worked Example – The default assumptions have been used for this worked example.

Additional Information

Return journeys	90%	%	Assumption from illustrative case study in TAG

A return journey involves going to and from your destination using the same route.Trips that make up return journeys will appear twice in the daily trip count (opposite directions).

Background growth rate in trips	0.75%	%	National Travel Survey Data 2006-2016
Period over which this growth rate applies	20	years	Assumption based on TAG

This is an annualised growth rate for increases in active travel trips. This could be due to a increase in population, changes in demographics or travel trends.

Number of days for which scheme data is applicable per year	253	per year	Number of working days per year (365 minus weekends minus
Car occupancy rate	1.6		Source: National Travel Survey 2002-16
Taxi occupancy rate	2.4		Source: TAG Data Book 2010

Promoters may want to change this depending on the intervention. For example, if the scheme is designed to shift modes from car to walking or cycling the occupancy rates may be higher.

- *Return Journeys* – The proportion of journeys which are 'return' journeys is required to estimate the number of individuals as a result of the intervention. The default

assumption in TAG Unit A5.1 is that 90% of all cycling trips result in a return cycling trip that same day, informed by data from the NTS.

- *Background growth in trips* – It is assumed that changes in walking and cycling trip numbers may occur even without further spending. AMAT therefore includes a default assumption of 0.75% for the rate of growth of walking and cycling based on England-level growth rates from the NTS. The rates of growth of an intervention are incorporated from the year the intervention opens and continues over a defined period (see next bullet point). There may be local evidence to suggest this is either an over or underestimation in the level of new cycling and walking trips; where this is available this should be used here.

- *Period over which this growth applies* – the number of years entered in here determines how long the background growth, referred to bullet point above, is included in the appraisal. A default assumption of 20 years is included which therefore assumes that for 20 years there will be a 0.75% increase in the number of cycling trips beyond the initial uplift. This assumption may be seen as a 'demand cap', i.e. demand is assumed to not increase after 20 years.

- *Number of days for which intervention data is applicable per year* – the number used here will be dependent on the type of the intervention being implemented, for example a leisure or commuting scheme. The purpose of this is to account for the fact that some the purpose of active mode interventions may differ and count data may not be relevant for every day of the week. The default assumption in AMAT is the average number of working days per year excluding bank holidays (253 days), which is appropriate for schemes primarily aimed at increasing active commuting. Alternatively, for interventions that are aimed at increasing cycling or walking to school we may want to change the assumption to the typical number of school days per year (195). This number feeds into calculations relating to total time users would spend on the infrastructure such as absenteeism, journey ambience and health benefits, to establish the total time-period the associated benefits would occur. The number used can be amended if local evidence or scheme context suggests this is appropriate or when available count data is applicable to a different time-frame, for example, use of an average daily over a year.

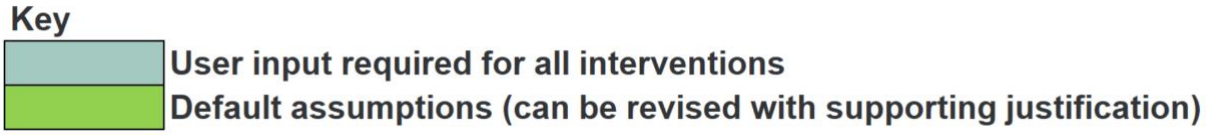
- *Car and Taxi Occupancy Rate* – the default numbers included here are based on NTS data. This value feeds into the calculation of the number of vehicle kilometres that may be reduced from people switching from travelling by car or taxi to active modes. It takes account of the fact that some people switching modes may have previously travelled together in a single car or shared a taxi.

User Interface Costs Worksheet

Overview

3.28 The **User Interface Costs** worksheet is where the user should input details of the proposed intervention costs.

3.29 The input cells within the worksheet are colour coded relating to types of data required.



3.30 The inputs required are discussed in more detail below.

Intervention Costs

3.31 AMAT requires an estimate for the initial, upfront costs of implementing the intervention **and** any on-going maintenance costs for capital infrastructure schemes.

3.32 In many cases AMAT may be used in an intervention's feasibility stage at which point intervention costs may not have been estimated. Given this information is required in AMAT, cost estimates may be informed by similar interventions constructed elsewhere in the country or using 'per metre' costs of similar infrastructure types - examples for cycling infrastructure can be found here.

3.33 The following data should be input into the **User Cost Interface**:

- *Total Intervention Costs* – Cost estimates, including any future maintenance costs for capital infrastructure schemes, should be entered in units of thousands of pounds (e.g. £10,000 should be inputted as 10), for the year(s) in which they are expected to be incurred. The **cost values should be inserted in current nominal prices**, which means that they have **not been adjusted for inflation**.
- *Private sector contributions* – These represent intervention costs that are attributable to private sector bodies such as local businesses. A private contribution may be made when, for example, a housing developer may have a requirement to make a financial contribution towards the completion of a cycle route near the development site. This should be entered in the same format as the total intervention cost. Private sector contributions are not additional to the total intervention cost.

Default Assumptions

3.34 The only default assumption in the **User Interface Costs** worksheet is the assumption for optimism bias.

Optimism Bias

3.35 Optimism bias is a proportional increase applied to cost estimates to reflect the extent to which the true cost of an intervention is likely to be greater than the estimated cost. It also accounts for the tendency to underestimate the length of time for intervention development and delivery. Accounting for the likelihood of optimism bias is essential for the robust economic appraisal of a proposal. As interventions progress through detailed design the level of optimism bias to be applied reduces; reflecting the increased confidence and awareness of risks associated with the intervention costs. Further details are available in TAG Unit A1.2 Scheme Costs. For example, TAG recommends that the level of optimism bias should reduce from 46% to 20% as intervention development progresses (see Table 1). Scheme costs may be split into investment and operating costs within AMAT, and the default optimism bias

rate for investment costs is 23%. TAG does not currently have a recommended optimism bias uplift for operating costs.

Category	Stage 1	Stage 2	Stage 3
Local Authority and Public Transport Schemes	Strategic Outline Business Case	Outline Business Case	Full Business Case
Optimism bias level	46%	23%	20%

Table 1 Stage of scheme development and relevant Optimism Bias

Worked Example – The Clifton Road Active Mode Corridor scheme is assumed to have a total investment cost of £400,000 with spend between 2023 to 2025 as set out, in the screenshot below, with operating costs of £10,000 being incurred every 5 years from opening. Default assumptions for optimism bias are used in this example.

Costs

Please provide estimates for the upfront costs, as well as any future maintenance costs in the table below.
Please enter the full costs of the intervention across columns D and E, and note any private sector contributions in column F.
All costs should be in nominal prices (unadjusted for inflation).
Unless specified otherwise, all funding sources are assumed to derive from local or central government.

Default assumptions (can be revised with supporting justification)
Optimism bias 23% applicable to investment costs only

Key
User input required for all interventions
Default assumptions (can be revised with supporting justification)

User input required for all interventions

Year	Investment costs £000	Operating costs £000	Private sector contributions
2020			
2021			
2022			
2023	100		
2024	200		
2025	100		
2026			
2027			
2028			
2029			
2030		10	
2031			
2032			
2033			
2034			
2035		10	
2036			
2037			
2038			
2039			
2040		10	
2041			
2042			
2043			
2044			
2045		10	

Note on costs
Scheme costs may be split into investment and operating costs.
The default optimism bias rate for investment costs is 23%.
No optimism bias is applied to operating costs.
Scheme maintenance costs should be classified as investment costs if they are related to traffic or demand.
All other maintenance costs should be classified as operating costs.
See TAG Unit A1.2 (Scheme Costs) for further details.

3c. AMAT Outputs

Analysis of Monetised Costs and Benefits (AMCB) worksheet

3.36 The AMCB worksheet summarises the quantified costs and benefits of your proposed intervention for the benefit categories listed in Table 2. Benefits are grouped in terms of total benefits those contributing towards from mode shift, health and journey quality improvements.

Cost / Benefit Type	Benefit metrics	Description
Mode Shift	Congestion Benefit	Traffic congestion improvements as a result of a reduction in vehicle kilometres.
	Infrastructure maintenance	Reduced wear and tear on the roads, and therefore reduced maintenance costs, due to fewer vehicles travelling on the road infrastructure.
	Accident	Reduced road traffic accidents due to a reduction in car kilometres. Note that AMAT does not currently estimate changes in accidents from changes in numbers of cyclists or walkers or changes in infrastructure type e.g. introduction of segregated cycle lanes.
	Local Air Quality	Improvements in air quality from a reduction in car kilometres including changes in nitrous oxide (NOx) and particulate matter (PM).
	Noise	Improvements in noise pollution as a result of a reduction in car kilometres
	Greenhouse gases	A reduction in emissions of greenhouse gases due to a reduction in car kilometres.
Health	Reduced risk of premature death	Increased active travel delivers health benefits by reducing the risk of premature death.
	Absenteeism	Increased physical activity of individuals improves their health and therefore reduces their number of ‘sick days’, resulting in increased economic activity.
Journey quality	Journey Ambience	Benefits to new and existing cyclists or walkers as a result of improvements to infrastructure can relate to a perception of improved safety and/or environmental conditions.

Cost / Benefit Type	Benefit metrics	Description
Government impact	Indirect taxation	Typically, a reduction in car kilometres is associated with a reduction in fuel duty
	Government Costs	The cost to central and local government from the intervention. Note – these costs are different from those input into the User Cost Interface as they have been adjusted to 2010 prices and discounted to reflect the fact people prefer costs to occur later in the future.
Private Costs	Private Contribution	Business contributions to the intervention if appropriate.

Table 2 Summary of impacts estimated in AMAT

3.37 The values for the metrics set out in Table 2 are then used in the calculation of the following:

- Present Value of Benefits (PVB) – this is the total benefits the intervention is expected to deliver over the appraisal period. These values are discounted and deflated to 2010 values and prices – these adjustments are explained in TAG Unit A1-1 and at the end of this section.
- Present Value of Costs (PVC) – This is the total cost of the intervention to central and local government, including any additional costs associated with maintaining the infrastructure. Nevertheless, if the intervention reduces maintenance costs these are included in the PVB rather than subtracted off the PVC. As per the PVB this is discounted and deflated to 2010 values and prices.

- Benefit Cost Ratio – this is the ratio of the PVB and the PVC, indicating the relative costs and benefits of the proposed intervention. A BCR of greater than 1 implies that every £1 spent delivers at least £1 worth of benefits. Table 3, sets out the categories used by the Department to assess value for money.

VfM Category	Implied by….
Very High	BCR greater than or equal to 4
High	BCR between 2 and 4
Medium	BCR between 1.5 and 2
Low	BCR between 1 and 1.5
Poor	BCR between 0 and 1
Very Poor	BCR less than or equal to 0

Table 3 Value for Money Categories

3.38 Further detail on value for money calculations can be found in the DfT Value for Money Framework.

3.39 It should be noted that an intervention's value for money rating should be informed not just by those impacts which can be quantified but by all of an intervention's expected impacts. For example, there are a number of potential impacts of cycling and walking interventions which cannot currently be quantified in AMAT but nevertheless might constitute a material benefit of interventions such as improvements to landscape, townscape and heritage.

Worked Example – The results of the Clifton Road Active Mode Corridor scheme assessment are presented in the AMCB table below (in 2010 prices and values).

The scheme resulted in a PVB of £485,420.

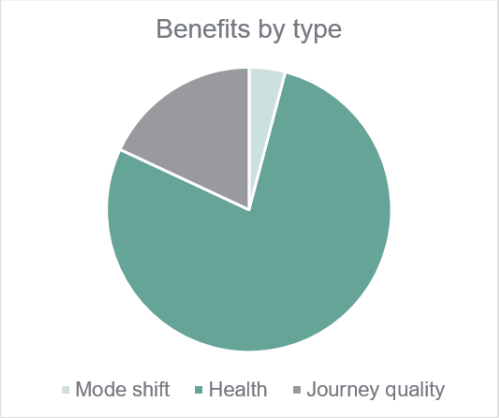
The scheme resulted in a PVC of £282,140

Scheme BCR of £485,420 / £282,140 = 1.72

This therefore means that to implement this proposal, for each pound of spending by central and local government, the scheme is expected to deliver £1.72 of benefit representing medium value for money.

Analysis of Monetised Costs and Benefits (in £'000s)	
Congestion benefit	16.73
Infrastructure maintenance	0.09
Accident	2.84
Local air quality	0.38
Noise	0.19
Greenhouse gases	1.24
Reduced risk of premature death	336.43
Absenteeism	41.45
Journey ambience	87.63
Indirect taxation	-1.47
Investment costs	271.43
Operating costs	10.80
Private contributions	0.00
PVB	485.42
PVC	282.14
BCR	**1.72**

Benefits by type:		
Mode shift	20.00	4.1%
Health	377.88	77.8%
Journey quality	87.63	18.0%



Deflating and Discounting of Costs

3.40 To compare the quantified costs and benefits of different interventions they need to be reported in a common price base and adjusted to reflect people's preferences to bring forward benefits and delay costs. These adjustments to the quantified costs and benefits are known as 'deflating' and 'discounting' respectively:

- Deflating – this is the term used for accounting for inflation, the general increase in prices and incomes over time i.e. £100 today may be worth £102 next year in terms of what it can buy assuming 2% inflation rate. Cost and benefit estimates are 'deflated' using the Government's deflation index (provided in the TAG Data Book) to ensure cost and benefits are comparable. TAG recommends converting to 2010 prices.

- Discounting – this refers to converting values to ‘present’ values based on evidence that shows people prefer to consume goods and services now, rather than in the future. The costs and benefits calculated in AMAT are presented in monetary terms forecast into the future, over the appraisal period, and therefore need to be adjusted to take account of this. A discount rate is applied from the year of appraisal (3.5% for a 30-year period and 3% for remaining years thereafter). For example, this assumes someone is indifferent between receiving £100 today or £103.50 next year. This is the standard HM Treasury Green Book discount rate schedule. Further details are available here.

4. Sensitivity Testing

4.1 Uncertainty in the inputs and outputs in appraisal are expected. Sensitivity analysis is one way to mitigate risk by exploring how the results of the appraisal are affected by changing the inputs. **It is expected that sensitivity analysis is undertaken for all active mode interventions around key uncertainties**. For most interventions these would include the demand uplifts and appraisal periods. There may also be intervention-specific uncertainties such as when using different parameters to those recommended in TAG.

4.2 Sensitivity analysis in AMAT involves altering the relevant parameters in the user input sheets to demonstrate the change in benefits that result. The simplest approach to do this is to increase and decrease parameters by a given percentage. Nevertheless, where evidence is available it is preferable to determine this range empirically; for example, using the high and low estimates for the cost per additional stage from Appendix 6 of the published Cycling and Walking Investment Strategy (CWIS): active travel investment modes.

4.3 Changing the input values used as part of the intervention appraisal will enable a range of BCRs for a proposed intervention to be obtained, helping illustrate uncertainty associated with the intervention's value for money rating.

4.4 Alterations to the following inputs should be considered:

- Length of appraisal period – if a intervention has a core appraisal period of 20 years, sensitivity testing could be undertaking using appraisal periods of 10 and 30 years respectively.

- Level of change – if the comparative study approach is used to estimate future growth in cycling and walking trips (i.e. a percentage uplift of the base number of trips is used to estimate the future situation), lower and higher uplifts should also be used to see how it affects the resulting BCR. This would illustrate a range of benefits that would result if the initial assumption was either overly optimistic or pessimistic.

- Rate of decay of users and benefits – if this value is changed it is recommended sensitivity testing is undertaken to see what would happen to the BCR if the level of use changes at differing rates.

- Intervention costs – sensitivity testing should be undertaken around intervention costs where these are particularly uncertain; for example if they are estimated by benchmarking against other interventions. For instance, sensitivity testing could be undertaking to assess how a 25% or 50% increase in the costs would affect the intervention's value for money rating.

5. Limitations

Overview

5.1 AMAT is designed to allow a wide range of users to undertake appraisals of active mode interventions. However, users should also be aware of the known limitations of the tool:

Model Limitations

- Scheme length – in some circumstances issues arise in the calculation of benefits where shorter walking and cycling routes are introduced. For example, where a scheme proposes a new shorter link, the scheme may encourage new walking and cycling trips due to an improved route option. However, these benefits may be partially offset if they reduce the time people spend cycling or walking by providing a more direct route choice.
- Missing Infrastructure types – the infrastructure options available for selection in AMAT are limited to those that have been monetised in previous research.
- Multiple Infrastructure types - only one type of infrastructure can be selected in AMAT for a given assessment, where typically routes may comprise a mix of infrastructure types. It is recommended that users select the main infrastructure type available for assessment using AMAT or produce separate AMATs for each type of infrastructure where it varies significantly along a proposed scheme. As a rule of thumb, if the different infrastructure type is 25% (or greater) of the scheme length or is a substantially different infrastructure type, multiple AMATs should be used to appraise the scheme.
- Use of default values – many of the default values are based on NTS data, and therefore reflect national averages and so may not always be appropriate. It is recognised that each intervention will be affected by local factors, as such, the default values can be amended if relevant local data is available.
- Robustness of the tool's outputs depend on the tools inputs for example the estimates for the uplifts in cycling and walking.

Excluded Impacts

- Cyclist and pedestrian specific accident changes resulting from the intervention i.e. AMAT only calculates safety impacts related to changes in car kilometres not from other factors such as the increase in cycling or adjustments based on infrastructure types such as segregation;
- Journey time impacts for active modes e.g. provision of a new bridge;
- Journey time impacts relating to changes in road space for other road users for example, cars and buses;
- Morbidity-related health impacts;
- Health impacts for children;
- Impacts relating to natural surveillance and lighting; and
- Impacts on the economy including agglomeration benefits or labour supply impacts from allowing people to access more jobs TAG Unit A2.1.

Annex A: Stakeholder Engagement

The production of the Active Mode Appraisal Tool (AMAT) User Guide has been informed by a comprehensive programme of stakeholder engagement to ensure that it meets the needs of users.

Feedback has been sought from a diverse range of stakeholders with varying levels of experience in active mode appraisal; ranging from novices to experts. This has helped to produce a user guidance that is technically correct but also clear and accessible, written in a non-technical manner.

Engagement Programme

The stakeholder engagement programme was undertaken from January to March 2020 with the aim of capturing perceptions of the 'usability' of the tool, to better understand where specific guidance or clarity is required and to gain feedback on the format for the user guide.

The engagement programme was led by Phil Freestone and David Stannard of WSP and consisted of several key strands, including:

- An online user survey issued to over 400 active travel contacts across the country;
- Feedback from the DfT Local Cycling and Walking Infrastructure Plan support programme;
- A Stakeholder Workshop held in Manchester on 14th February 2020; and
- A programme of quality assurance testing of the guidance.

Stakeholders involved in the engagement process included local government authorities (including combined authorities, county councils, district councils and unitary authorities), consultancies, universities and third sector organisations

Summary

The programme of stakeholder engagement was an essential component in the development of the AMAT User Guide. The process has enabled the identification of common issues experienced by existing users of AMAT, and where further guidance or explanation is required to complete an assessment. The feedback received have been used to develop the content, format and style of the user guidance document.

Contributors

We are grateful to the following organisations for their contributions:

WSP, Mott MacDonald, West Yorkshire Combined Authority, Merseytravel, Liverpool City Region Combined Authority, Leicester City Council, Transport for Greater Manchester,

PJA, Sustrans, Warwickshire Council, Halton Borough Council, Leeds University, St Helens Council, Sheffield City Region, Systra and Liverpool City Council.

Annex B: Glossary of Terms and Acronyms

Absenteeism – absences from work i.e. sick days.

Active Modes – walking and cycling mode of travel.

AMAT – Active Mode Appraisal Toolkit.

Appraisal – assessment of proposed transport interventions

Area type – classification of an intervention's location as either London, Inner and Outer Conurbation, Other Urban or Rural. This is used in the mode shift calculations

Benefit Cost Ratio (BCR) - the level of benefits relative to costs.

Decay – in this context it is referring to the change in the uplift of cycling and walking due to an intervention over time. A positive decay rate means the number of trips reduces year on year. Conversely a negative decay rate means the number of trips increases.

DfT – Department for Transport.

Green Book - The Green Book is guidance issued by HM Treasury on how to appraise policies, programmes and projects.

Impacts – in this context it is referring to the effects of the proposed intervention, either positive or negative.

Indirect tax impacts – Indirect taxes are those imposed on suppliers of certain commodities, such as fuel. These are essentially passed on to the consumer. In this case it is referring to changes in fuel use relating to mode shift.

Intervention - either a capital investment scheme regarding new active mode infrastructure or a behavioural change initiative.

Journey Ambience – this refers to quality of route, and reflects perceptions of safety including fear of potential accidents.

Marginal External Costs (MEC) – these refer to benefits from people shifting from car to other modes such as improved traffic congestion, greenhouse gas emissions, air quality, noise, accidents and infrastructure maintenance.

Middle Layer Super Output Areas (MSOA) – a particular census geography as defined by the Office for National Statistics (ONS): https://www.ons.gov.uk/methodology/geography/ukgeographies/censusgeography#super-output-area-soa

Mode shift – relates to people changing their primary mode of travel e.g. switching from car to cycle.

Monetisation – this is the process of calculating a benefit e.g. improved health, and converting it into a monetary value. This is required to compare an intervention's costs and its benefits in the same units.

Mortality Rate - the number of deaths in a given area for a given time period.

National Travel Survey (NTS) – a household survey run by the Department for Transport collecting information on how, why, when and where people travel.

Stage - A stage is the unit of measurement of a journey. For example, walking from home to a station would be one stage. A new journey stage is defined when a trip starts, or when there is a change in the form of transport (or a change of vehicle requiring a separate ticket)

Transport Appraisal Guidance **(TAG)** – DfT's best practice guide for transport appraisal.

Transport Appraisal Process **(TAP)** – this is DfT's process for assessment of transportation interventions and includes a number of stages including identifying the need for intervention, objective setting and assessment of potential options.

Trip - an instance of cycling or walking from one location to another. Return journeys would be counted as two trips.

Value for Money – an assessment of whether each pound spent will deliver sufficient benefits to make it a good use of public money.

Annex C: Infrastructure Type Illustrative Examples

Examples of Cycling Infrastructure Types

Off-road segregated cycle track	This is a path or track with right of way for pedal cycles that is separate to the road, typically with a level difference (that may or may not also be useable for pedestrians).

Examples:

Stepped cycle track separate from the road

Off road cycle track

On-road segregated cycle lane	This is a cycle lane that forms part of a carriageway/road but is physically segregated e.g. by kerbing or light segregation such as raised markers and/or wands.

Examples:

Light segregated cycle lane - with wands

Light segregated cycle lane - with kerbing

On-road non- segregated cycle lane	This is a cycle lane that forms part of a carriageway/road and is designated by road markings such as painted lines.

Examples:

On road non-segregated cycle lanes - with painted cycle lanes

Wider lane	This relates to a wider carriageway lane affording more space for cyclists. There may not be formal designation or road markings for cyclists. For AMAT inputs, users should consider the current width of the carriageway lanes and how this may change with the proposed scheme, for example whether the scheme provides more space for vehicles to safely pass cyclists.

Example:

Wide road lanes, showing sufficient space for vehicles to pass cyclists in the same lane

Shared bus lane	Provision of a bus lane that cyclists can use within and outside of its hours of operation.

Examples:

Shared bus and cycle lane

Shared bus lane with advisory cycle lane within it

Examples of Walking Infrastructure Types

Street lighting	Provision and quality of street lights along the route is to be considered. Application in the AMAT: Is the new infrastructure providing new lighting to a route which previously did not?

Examples:

Path with no lighting

Path with lighting provision.

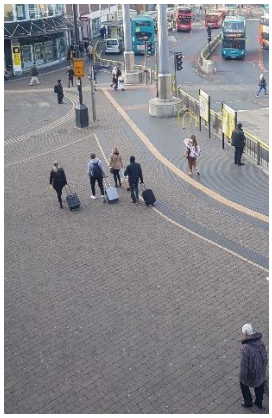
Kerb level	Availability of level access road crossing points. Application in the AMAT: Does the scheme provide a continuous surface at one level, for example, raised street level or lowered footway at crossings?

Examples:

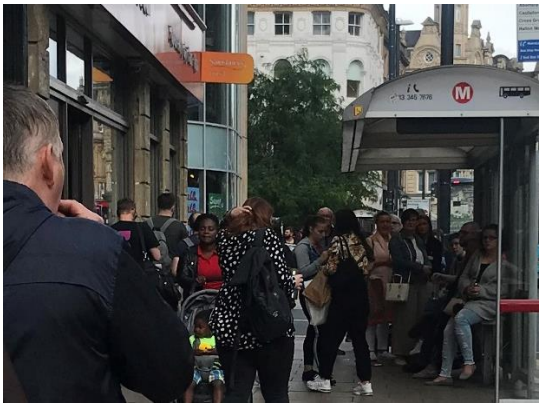
Level transitions at pedestrian crossings.

Crowding	This refers to typical levels of pedestrian congestion in area(s) targeted by the scheme. Application in the AMAT: As it is challenging to quantify pedestrian crowding outside enclosed spaces, users are advised to only select 'Yes' for crowding when alleviating pedestrian congestion is a primary objective of the scheme.

Examples:



Uncrowded footway



Crowded footway

Pavement evenness	This relates to how even the pavement surface is. Application in the AMAT: A judgement should be made about the percentage of pedestrian infrastructure which is uneven; for example: More than 50% of pavement uneven – select No. Less than 50% of pavement uneven – select Yes.

Examples:

Even footway/pavement

Uneven footway/pavement

Information panels	Information boards/panels displaying location information, including maps of key facilities, landmarks, venues and attractions in the area. Application in the AMAT: Have information panels available with details of maps & attractions been provided?.

Examples:

Information board for leisure walking route

Information totem/boards

Benches	This considers the provision of new or improved seating and rest areas along the proposed route. Application in AMAT: Does the scheme provide seating facilities where currently there is none or improvement to existing seating provision?

Examples:

Benches in public areas

Directional signage	Provision of signage along the route that directs people to the main attractions, facilities and services in the location. Application in AMAT: Have directional signs been provided?.

Examples:

Directional signage for walking/cycling

Directional signage to key locations and facilities

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