10. ACCESSIBILITY AND SOCIAL INCLUSION

10.1 Introduction

10.1.1 Improving accessibility is one of Government's five key policy objectives, identifying the extent to which proposals help people and businesses access goods, services, people and opportunities. Accessibility is such a broad concept that its application within appraisal can at first appear complex. It is therefore important to start by clarifying the main dimensions of accessibility:

- ***Expressed accessibility*** or revealed accessibility, i.e. travel demand. This is covered under the economy criterion since a monetary value can relatively easily be given to observed and forecast travel demand (see Chapter 8).
- ***Community accessibility*** or potential accessibility allows standards of accessibility to be defined in absolute terms based on an assessment of basic needs. Different communities have different needs, and the term "option value" is sometimes used to describe the value a community places on accessibility even though it does not express this through use.
- ***Comparative accessibility*** looks at the fairness of the distribution of access opportunities. The impacts on different groups in society can be compared by gender, geographical location, income, mobility characteristics etc.

10.1.2 All accessibility measures describe the impacts of projects on people and places. This user focus is therefore particularly important when considering the public acceptability of proposals. Members of the public often describe the changes they would like to achieve in terms of accessibility change as reduced journey times or travel costs for particular trip purposes. Consistency of project proposals with these **stated accessibility** issues are therefore relevant in the implementability section of the AST.

10.1.3 This Chapter concentrates on the qualitative and quantitative assessments of community and comparative accessibility issues needed in STAG appraisals as follows:

- Community accessibility – access to work, education and training, health, and shopping using public transport, walking and cycling.
- Comparative accessibility – the distribution of impacts by people group, particularly socially excluded groups relative to the population as a whole, and social impacts by location.

10.1.4 The scope and detail required in the accessibility analysis needs to be commensurate with the planning objectives. If there are specific planning objectives to improve access for unemployed people then more detailed analysis of this user group and trip purpose will be needed than for other groups for which there is no specific objective.

10.1.5 Before discussing the detailed calculation methods for accessibility measures, the elements within comparative and community accessibility are set out in more detail.

10.2 Community Accessibility

10.2.1 There are two main strands to community accessibility. The first relates to public transport network coverage and the second relates to local accessibility.

Public Transport Network Coverage

10.2.2 The need for all groups in society to have the option to travel using public transport is a key element of community accessibility. For rail investment, the appraisal guidance from the Strategic Rail Authority (SRA 2003) uses the concept of transport option value to assess network coverage. A company decision to locate near a railway station may be partly to give potential customers and suppliers the option of using rail but will be influenced by many other factors. The option value is therefore difficult to isolate and partly for this reason transport option values are poorly researched.

10.2.3 The guidance from the Government's Social Exclusion Unit on accessibility planning (SEU 2003) widens the concept of option value to ensure that all groups in society have public transport travel options to access key services for work, training, food shopping, and health. The coverage of the transport system therefore needs to be assessed in relation to key patterns of land use.

10.2.4 The public transport network coverage appraisal therefore needs to consider the impact that transport proposals have on access to jobs, training, health, shopping and other trip purposes of local significance.

Local Accessibility

10.2.5 Although for motorised modes most of the benefit is captured under the economy criterion, this is not the case for most appraisal of walking and cycling where little is known about demand. For walking and cycling appraisal, local accessibility impacts act as a useful proxy for the economic analysis.

10.2.6 Lack of access by walking, cycling, etc. is sometimes also called severance. However transport investment can improve access by walking and cycling rather than simply mitigate problems, so it is more meaningful to measure changes in access rather than reductions in severance.

10.2.7 For access to local services it is necessary to define a small selection of local services which are frequently reached by walking and cycling such as post offices, health centres, shops, and perhaps more complex opportunities such as leisure facilities, parks, and the countryside. If walking and cycling to public transport have not been considered under the public transport network coverage criterion they can be considered under local accessibility as for other local services.

10.3 Comparative Accessibility

10.3.1 Comparative accessibility, or the distribution of accessibility impacts, has become more central in appraisal in recent years. It has been recognised that some investment decisions have discriminated against particular groups in society, and

that the geographical distribution of transport investment has not always reflected policy aims such as for regeneration or rural development.

10.3.2 Most obstacles to promoting transport projects relate to distributional issues, since not all groups benefit equally from improvements. Understanding who benefits and who loses from any individual transport project and policy is therefore central to understanding how to overcome potential opposition to each option. Where it is recognised that there are disbenefits for some people or areas, then mitigation measures can be taken e.g. increased traffic flows and congestion may decrease accessibility by car for some people, and compensating public transport improvements can be implemented to maintain standards of accessibility for those people who are adversely affected.

10.3.3 Comparative accessibility findings in STAG should generally be presented for people and places independent of travel mode. However all modes should be included in the analysis where possible, including non motorised modes such as walking and cycling. There are two main appraisal requirements to assess:

- The distribution of impacts by people group e.g. by gender, age, mobility impairment, income group, car ownership, etc.
- The distribution of impacts by geographical area e.g. Social Inclusion Partnership Areas, Development Areas, Rural Areas, Peri-Urban Areas, Urban Areas etc. In general the choice of areas of interest will be defined in relation to particular policy objectives for these areas.

10.3.4 In practice the analytical approach for looking at the distribution of impacts is similar for both people and areas or for the EALI assessment as discussed in Chapter 8.

10.4 General Approach to Calculation

10.4.1 As highlighted above, the accessibility and social inclusion findings in the AST should comprise:

Community accessibility

- Public transport network coverage
- Access to local services

Comparative accessibility

- The distribution of impacts by people group
- The distribution of impacts by location

10.4.2 For each of these the criteria the Part 1 appraisals should rely on a qualitative assessment as described in Table 10.4. For the Part 2 appraisals both qualitative and quantitative appraisals will be needed with the accuracy of the analysis being commensurate with the policy sensitivity of the accessibility issues.

10.4.3 The focus is on people and places rather than modes of transport. All measures of accessibility include some representation of the opportunities which people want to reach, and the deterrent effect of distance or transport availability in reaching them.

10.4.4 To calculate accessibility to an appropriate level of accuracy for the needs of the STAG appraisals there are therefore three main areas to consider:

- The people groups to be included and the places, services and opportunities which they want to reach.
- The representation of the transport system
- The types of measure required

10.5 Public Transport Network Coverage

10.5.1 A key benefit of the accessibility appraisal is that by looking at impacts on people, rather than transport systems, minority groups in society can be considered. Majority groups will have defined the current network coverage, since their needs are expressed through the demand for travel, and they create a market which will generally be catered for. Accessibility analysis is not restricted in this way and is equally appropriate for looking at the impacts of transport and land use changes on minority groups. Social inclusion policy can therefore be informed by accessibility measures to ensure that all relevant people groups and trip purposes are considered.

10.5.2 There are potentially many hundreds of combinations of people groups, time of day, trip purpose and travel behaviour preferences which could be relevant to the analysis. It is not practical to look at all of these but rather to concentrate on those sections of society or those trip purposes that demonstrate the key impacts. Of particular importance is to optimise the choice of population sectors, geographical coverage, spatial detail, and trip purposes to reflect policy issues, which are sensitive locally. To ensure that social exclusion issues are fully considered analysis should consider:

- Access to work for all people
- Access to learning for unemployed people
- Access to health for all people
- Access to food shops for all people

10.5.3 In many circumstances (such as the Newcastle example shown) access to local centres can act as a proxy for all these trip purposes obviating the need for separate analysis of each purpose. However, where there are local policy issues in relation to any of these trip purposes, such as local concern about access to an non centrally located hospital, then separate analysis of the trip purpose will be needed.

Public Transport Network Coverage in the Tyne and Wear Area

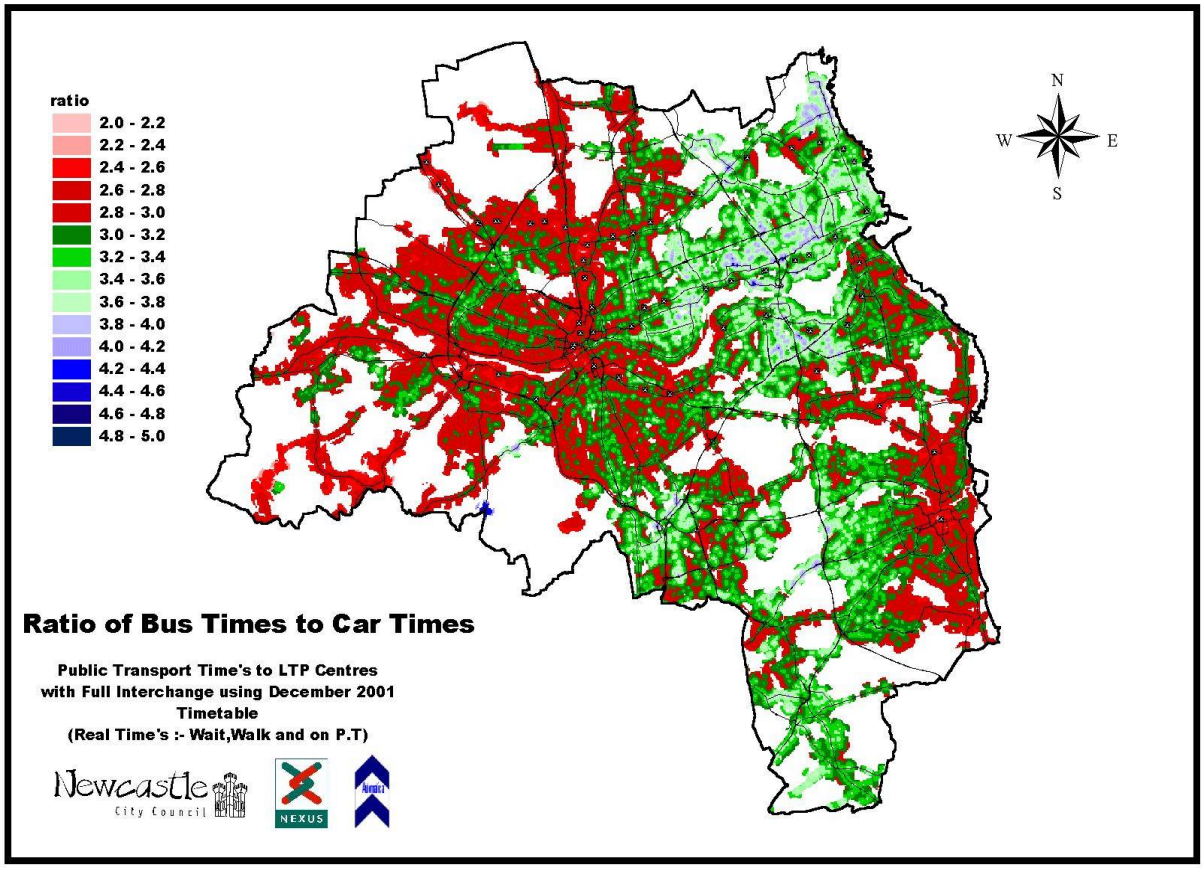
The database of registered public transport services was queried to extract the shortest trip times between each of the 6200 stops for public transport in the area. Travel times were calculated from the walk time from properties to each stop location, the wait times at the stop and at interchanges during the journey and the in vehicle times.

Key local centres were identified based on the services available in centres such as Gateshead, Jarrow, North Shields, South Shields, Newcastle city centre and other key locations where specified services were available.

This produced a matrix of journey times from each of the local centres to stop locations across the area. These techniques are also being used to look at particular trip types such as access to education to identify best value approaches to supported services.

Indicators of public transport network coverage developed from this analysis included:

- Number of properties within specified time band of local centres
- Average travel times to local centres
- Ratios of car travel times to public transport travel times.



Courtesy of Tyne and Wear PTE and Newcastle City Council

10.5.4 The level and detail of the analysis needs to be commensurate with the scale of the problem and the extent to which the proposals are likely to impact on network coverage. To undertake the analysis there are four main steps:

(a) Obtain information on the locations where work, education, shopping, health and leisure facilities are available as appropriate.

(b) Estimate perceived travel times by public transport across the potential area of impact for the do-minimum situation and for each proposal.

(c) Calculate and map how effectively the public transport system meets people's needs including comparisons with car travel times for the do-minimum situation and for each proposal. The results of the do-minimum analysis should be included in the background information section of the AST under "Social Context".

(d) Present results of changes in accessibility in terms of number of people affected, aggregate changes in indices, or for more sophisticated analysis, changes in utility (see Appendix B)

Representing People and Locations

10.5.5 A wide range of datasets on the locations where work, education, shopping, health, and leisure facilities are available are now held on GIS databases in most Council areas. Data on employment by market sector and postcode can be purchased cheaply from commercial data suppliers and there is a growing portfolio of national data covering shopping, health and other opportunities (Appendix A).

10.5.6 Often work, shopping and other opportunities are located in local centres allowing the analysis to be simplified. The case study shown illustrates the steps followed in Tyne and Wear to consider public transport network coverage. The accuracy of the analysis can be improved by using measures of activity where possible. For example the existence of a hospital or college does not describe what treatments or training courses are available or how large the centre is, so using number of treatments, consultations, courses etc. within the analysis is more useful.

10.5.7 One of the strengths of accessibility analysis is that it can look at minority groups or specific trip purposes. Aggregation of results can easily obscure the primary benefits of undertaking the analysis, i.e. to investigate the distribution of benefits. To avoid these problems, map based presentation is a powerful way to show the distribution of impacts and highlight locations with poor public transport provision for particular trip purposes. However it is also sometimes helpful to have a single or limited range of summary indicators which can be incorporated in the AST. In these circumstances ratios can be particularly helpful at comparing the overall impacts of changes on, for example, unemployed people when compared with the population as a whole (see Table 10.4).

Estimating perceived travel times

10.5.8 The accuracy with which transport systems can be represented should be consistent with the approach adopted under the economy criterion. The approach to demand modelling should have adopted a level of detail and accuracy appropriate for the proposal, and the accessibility analysis requirements should match this level

of detail. The main distinction in analytical approach will be between situations where a demand model has been adopted and situations where simpler approaches to estimating demand have proved adequate.

Defining Transport Supply Where Demand Modelling Results are not Available

10.5.9 For many projects it may be that the economic analysis will have been undertaken using estimated rather than modelled levels of travel demand. In these cases it is important that the accessibility analysis accuracy is consistent with this sort of approach being rigorous, but not unduly complex.

10.5.10 Estimates of travel times and costs can be made as follows:

- Public transport – Paper based timetable information, journey planning software, or using structured queries of electronic databases of public transport information. The Traveline database for Scotland can be made available to local authorities as a common source of electronic information.
- Walking and Cycling – GIS systems allow a variety of approaches based on network distances, or alternatively changes in walking and cycling routes can simply be analysed on paper maps.
- Roads (to allow comparisons to be made between public transport accessibility and car accessibility) – Options include: proprietary GIS drivetime software, road journey planning software packages, or using OSCAR road centreline data directly for more complex networks with structured queries using GIS systems or databases.

10.5.11 To assess the impacts of the alternative transport proposals, estimates need to be made of the impacts the changes will make on travel time by each mode for relevant origins and destinations. This should follow the same process as for the base situation and, as for the economic analysis, both positive and negative influences should be considered.

Defining Transport Supply Where Demand Modelling Results are Available

10.5.12 Where demand modelling results are available a zoning system will have been defined, and the accessibility analysis can use the demand model results. As part of the demand modelling process, generalised travel times or costs between each modelled zone will have been calculated. These are used in the economic analysis to calculate aggregate accessibility benefits for all travellers. Where multi-routing assignments have been used, the travel time by each route can be weighted by the flow on each route to estimate the average perceived cost. However in most cases an acceptable degree of accuracy is possible by considering only the minimum generalised time route.

10.5.13 For inter-zonal non car available trips the PT assignment will be the starting point, but checks need to be made that if walking options have a lower generalised cost they should supersede the modelled value. Similarly for car travel, car available trips include park and ride and park and walk trips. The car available travel time matrix is calculated by simple logical checks on the demand model output to identify the minimum cost option.

10.5.14 Other issues to consider are that:

- Most PT models will include an assessment of walk access time and wait time and it is important to ensure that if these access times are affected by the proposal appropriate adjustments are made to the generalised time.
- Experience shows that there will often be insufficient information available about access for mobility impaired groups to allow a meaningful quantitative analysis, so the appraisal may be restricted to qualitative considerations with a detailed audit of new proposals to ensure that they are accessible to all groups.

Perceived travel times

10.5.15 Regardless of how the travel time between locations is calculated it is also necessary to add monetary components such as fares, operating costs and parking charges, to the travel time to calculate the perceived travel time for use in the accessibility analysis.

Perceived time = travel time in minutes + money cost/ value of time

10.5.16 Suitable values of time for the relevant people group and trip purpose can be found in Transport Economics Note (TEN) published by DfT.

Calculating Accessibility Measures and Presenting Results

10.5.17 There are three main methods available for weighting the perceived travel time to calculate the accessibility measures:

- Thresholds defining appropriate travel time cut off points
- Weighting opportunities using factors according to time bands representing the perceived deterrence of travel.
- Using a deterrence function to weight the available opportunities

10.5.18 The complexity of the calculation approach needs to be appropriate for the policy decisions needed. Thresholds can greatly simplify calculation, but it needs to be noted that thresholds will not generally be representative of real travel behaviour. This can be overcome by the use of multiple thresholds with a narrow banding between them. The example above from Tyne and Wear shows how travel time can be banded narrowly according to the number of properties which can be reached.

10.5.19 Mapping of thresholds provides a powerful visual representation of the impacts of transport proposals, which can support qualitative comments within the AST.

10.5.20 For quantitative measures it is necessary to weight opportunities within each threshold to derive composite measures. The weights used need to reflect the perceptions of different people groups for travel for different trip purposes. Table 10.1 shows the factors which can be used. These factors have been on an analysis of Scottish Household Survey data for Strathclyde Passenger Transport Executive covering the SPT area. Local surveys should be used in preference to these values where practical. This will be of particular importance in remote areas where perceptions of travel time may differ substantially from national averages.

10.5.21 It can be seen from the Table 10.1 that for travel to work by public transport about 75% of people would be prepared to travel 20 perceived (i.e. including fares, effort) minutes, but only 40% would be willing to travel 60 perceived minutes. By weighting the opportunities that fall within each time band by the relevant factor, the accessibility index can be calculated for the total number of opportunities. Changes in these indices for the relevant people groups and trip purposes can then be included in the appraisal summary table.

Table 10.1 – Weighting Factors by Time Band

Travel time (mins)	Weighting Factor by Trip Purpose (Mode/Gender)			
	Work (PT) education (PT)	Shop (PT) leisure (PT) health (PT)	Work (Car/men)	Work (Car/women) Shop (Car) leisure (Car), health (Car)
0-5	1	1	1	1
5-10	0.93	0.92	0.91	0.89
10-15	0.84	0.81	0.77	0.73
15-20	0.77	0.70	0.65	0.59
20-25	0.71	0.64	0.57	0.51
25-30	0.66	0.58	0.50	0.44
30-35	0.61	0.52	0.44	0.38
35-40	0.57	0.47	0.39	0.32
40-45	0.53	0.43	0.35	0.28
45-50	0.49	0.39	0.30	0.24
50-55	0.45	0.35	0.27	0.21
55-60	0.42	0.32	0.24	0.18
60-65	0.39	0.29	0.21	0.15
65-70	0.36	0.26	0.18	0.13
70-75	0.34	0.23	0.16	0.11
75-80	0.31	0.21	0.14	0.10
>80	Extrapolate as appropriate			

10.5.22 The third method represents the deterrence of travel as a continuous function eliminating the need for any thresholds or banding. The accessibility measures are therefore calculated as follows:

$$\text{accessibility}_i = \sum opportunity_j \cdot f\left(t_{i,j}\right)$$

where accessibility_i is the calculated level of accessibility at location i., $opportunity_j$ describes the opportunities available in zone j, $t_{i,j}$ is the measure of perceived cost between zones i and j, and $f(t_{i,j})$ is a function representing the proportion of people willing to accept that cost.

10.5.23 This approach has been automated within accessibility modelling as discussed in Appendix B. Once indices have been calculated for the relevant locations or zones the results are best plotted on maps using GIS approaches. Changes in accessibility measures as a result of transport investment can then be easily observed.

10.5.24 The cumulative accessibility change for all locations should be reported in the AST for the relevant trip purposes and people groups.

10.6 Access to Local Services

10.6.1 Local accessibility by walking and cycling can be significantly affected by transport investment, particularly where walking routes are severed by roads or railways, or when pedestrian priority, or new walking and cycle routes, are proposed. These changes can be measured as indices of walking and cycling access to local services are as follows:

- *Origin accessibility* – Assessment of the opportunities for an individual or a small groups of households for access to local schools, shops, health centres or other facilities. Origin accessibility will usually be measured using indicators such as floorspace, or numbers of jobs, or numbers of facilities of a particular type.
- *Destination accessibility* – Determining the walk in catchment to a facility such as a local shop, health centre, employment centre, school or for public transport. Destination accessibility will usually be measured as the number of people or households affected, sometimes taking account of different population sectors.

10.6.2 Quantitative assessment of impacts can relatively easily be undertaken by using GIS mapping techniques. Capacity is rarely an issue for these routes but the quality of the routes, particularly where crossings of busy roads are involved, is an important factor. Accessibility measures based upon simple thresholds give a good indication of the opportunities available. The drive time calculation facilities in most GIS systems can be used to calculate walking times on roadside footpaths by setting the travel speed to an appropriate speed for walkers. Default networks in most GIS packages cover only roads so off road routes need to be added. Other factors can be added to modify the networks or network speeds such as time penalties for road crossings based on the road traffic flow, and reductions in this where pedestrian crossing facilities are installed. A similar approach applies for cycling but the speeds are faster.

10.6.3 Where more refined analysis is needed, effort is best directed at qualitative analysis working with local people, including existing and potential pedestrians and cyclists, to identify how problems or perceived problems can be overcome. Such approaches are becoming increasingly common within modern community planning agendas, such as safer routes to school initiatives, healthy living centres, and social inclusion partnerships and transport scheme appraisal can usually draw from the issues identified as part of these processes.

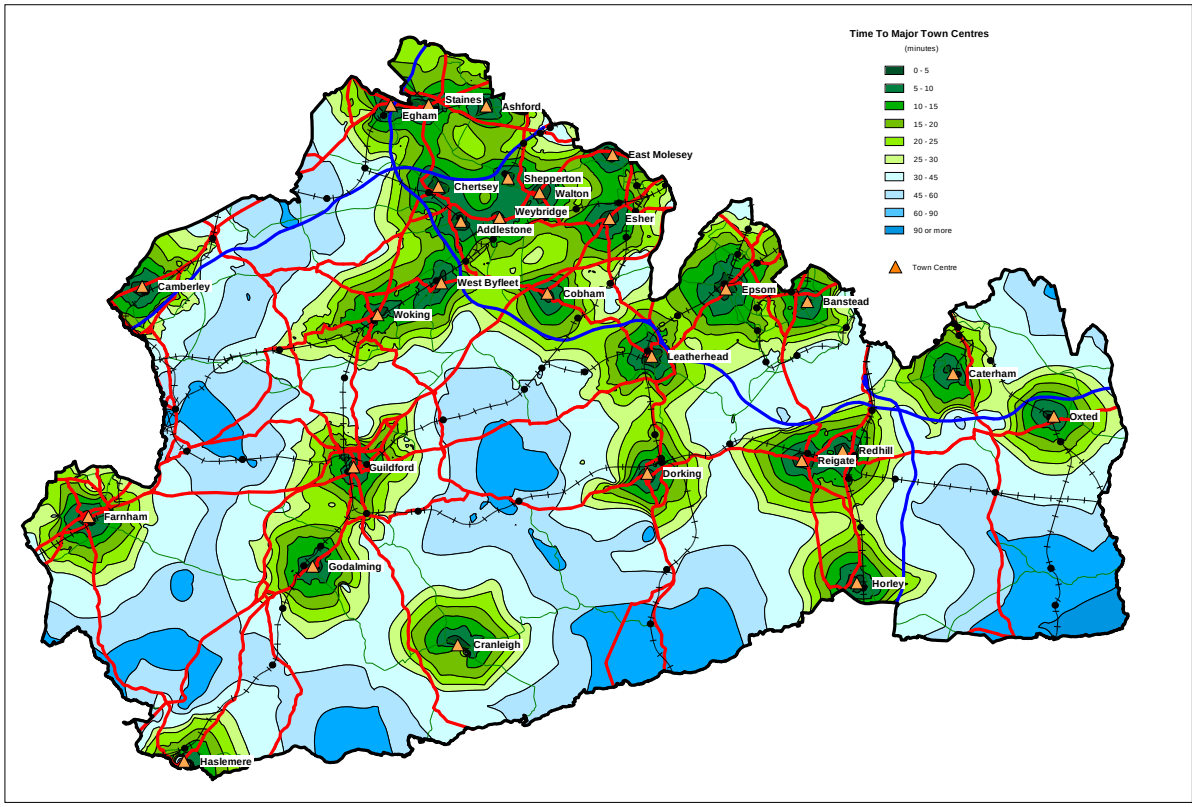
10.6.4 In determining catchments for the calculation of the walking and cycling measures the criteria in Table 10.2 can be used as a general guide.

Local Accessibility - Surrey Local Accessibility Models

Surrey County Council set a target in their local transport plan to increase the proportion of the population who have good cycling and walking access to town centres. Areas within 20 minutes walk or cycle were classed as having good accessibility.

To assess the impact of alternative policies and projects to deliver the accessibility targets walking and cycling accessibility models were created. Using a 50metre grid on the GIS systems a cost surface was developed reflecting the walking and cycling opportunities and barriers.

Priorities could then be developed in the local transport plan which optimised the investment towards delivery of the targets.



Courtesy of Surrey County Council 2002

Table 10.2 - Indicative criteria for acceptable walking distance

Aspect of travel	***Time and (Distance)***
Walking to facilities	20 mins (1.4 - 1.6kms walk)
Walking to bus stop (urban)	5 mins (300-500 metres walk)
Walking to bus stop (rural)	10 mins (600-1000 metres walk)
Walking to railway station	10 mins (600-1000 metres walk)

10.6.5 For cycling thresholds and times the distances will be typically two or three times the values for walkers. However these aspects of cycle behaviour are not as widely researched as for walking so if observed local behaviour is different this should be used in preference. Acceptable walking times will be lower where there is no dedicated footway. Walking distances will also be highly dependent on topography and other factors.

10.6.6 The main barriers to walking and cycling include crossing major roads, local topography, or passing through areas perceived to be dangerous. Table 10.2

suggests criteria that could be used in calculating accessibility measures, but local expectations vary. The consultation on transport proposals should therefore seek to identify traffic flow levels perceived as barriers and local topographic and local community safety barriers.

Table 10.3 – Traffic Barriers to Walking and Cycling	
Barrier	**Value for significant barrier**
Walking	
Significant traffic barrier (traffic flow)	Above 9000 - 12,000 vehicles per day
Slight barrier	2,000 to 9,000 vehicles per day
Quiet road	Below 2,000 vehicles per day
Cycling	
Road considered unsafe (2 lane <3m width)	10,000 vehicles per day
Road considered unsafe (wider road)	20,000 vehicles per day
Road speed considered too fast (2 lane <3m width)	40 mph limit
Road speed considered too fast (wider road)	50 mph limit

10.7 The distribution of impacts by people group

10.7.1 The need to consider the distribution of impacts is emphasised by the challenges faced in delivering transport investment. Most objections to transport change are from people who feel that they are not being treated fairly or that their needs are not being met in some way. Accessibility measures describe transport provision as it is viewed by users, so measures of the distribution of impacts by people group are helpful in demonstrating that planned transport changes impact fairly on all sections in society by: age group, socio-economic status, gender, ethnicity, and mobility status.

10.7.2 The exact choice of people groups will depend on the local policy sensitivity but for all proposals a comparison should be made between car available and non car available trips.

10.7.3 It will also be important to compare impacts for unemployed people/job seekers relative to the total population in many cases. Appraisals should also confirm that there is no bias in the balance of investment by age, ethnicity, religion, or gender.

10.7.4 Indices of accessibility should have been calculated for the public transport network coverage appraisal so the distributional appraisal should use this analysis to compare accessibility change for different people groups.

10.7.5 By using ratios or maps to compare changes in accessibility measures for specified population groups or geographical areas the findings of the accessibility analysis can be quantified. For example:

- The change in the aggregate ratio of car accessibility to PT accessibility helps to show whether public transport investment encourages efficient mode choice within multi-modal plans.

- Ratios of the impacts on socially excluded groups to the population as a whole can show whether proposals are consistent with social inclusion policy.

10.7.6 It should be noted that the ratio of car available accessibility to non car available accessibility will always be greater than 1. Non car available trips have higher perceived travel times than for car available trips since the car available people have an additional mode available to them (i.e. the car) which can be used when it is faster than public transport. In the same way, mobility impairments will increase perceived travel times relative to fully mobile people. The purpose of the STAG appraisal will be to demonstrate that the implications for all people have been considered, and that interventions are consistent with policies for social inclusion.

10.8 The distribution of impacts by location

10.8.1 It is important to understand the locus of impact of transport investment. This is particularly important when assessing packages of schemes such as local transport strategies, major network changes, forward investment programmes, or the impacts of generic policies such as for fares subsidies or fuel cost changes.

10.8.2 Calculation of accessibility location impacts can help to inform the appraisal in Chapter 8 for the economic location impacts. However to avoid double counting, reporting of results under the accessibility appraisal should be confined to social rather than economic factors.

10.8.3 The choice of sensitive locations will depend on the projects or policies being considered but as a minimum the analysis should compare the impacts on designated areas of deprivation such as social inclusion partnership (SIP) areas or priority partnership areas.

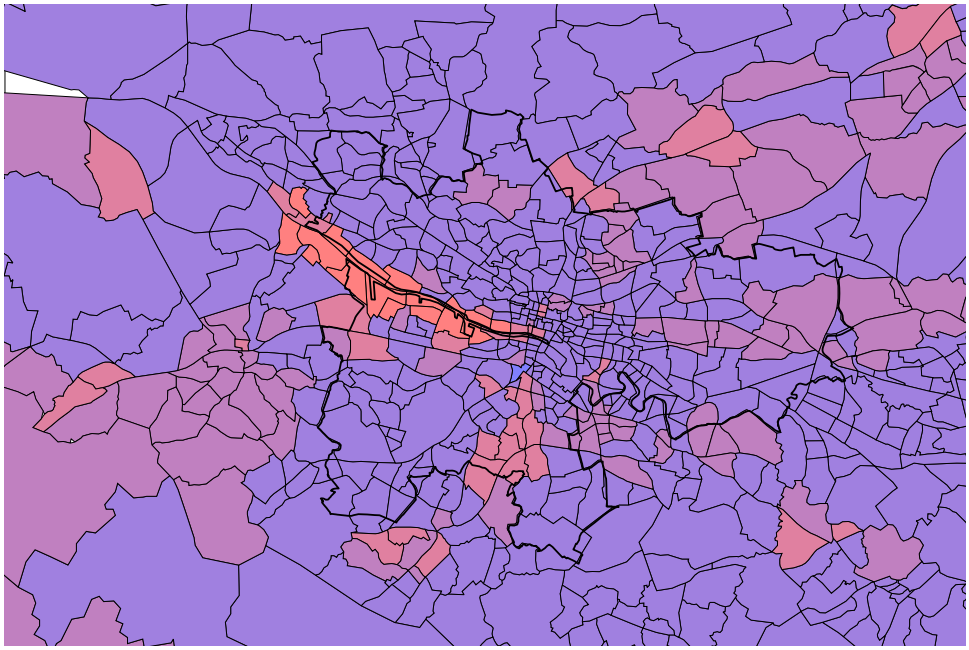
10.8.4 Weighting accessibility measures by the affected population is often needed where modal shift is anticipated. For example, when looking at the impacts of road charging, accessibility analysis can identify the accessibility disbenefits for car available households in each location from paying the charge. This can be compared with the accessibility benefits for all households from the associated public transport investment package, funded by the road charging revenue. By looking at the impacts on people rather than modes, this process can be used to identify whether or not all locations are being treated fairly in the design of the charging scheme and associated public transport investment.

10.8.5 The results of the social location impacts can be presented on maps, graphs or as composite indices for different categories of location. In the case of the Clyde Corridor work shown above, the impact on SIP areas was compared with the impact on all areas, to ensure that the selected strategy could target improvements at those in greatest need.

Impacts on Places - Clyde Corridor Glasgow

The Clyde Corridor Study is seeking to identify the transport changes needed to support regeneration proposals along the banks of the River Clyde in Glasgow, Renfrew and West Dunbartonshire.

Transport demand model results using the Central Scotland Transport Model were available for each option test. Generalised time skims from each test were extracted to allow the distribution of impacts to be considered for different people and places. The map shows changes in accessibility to jobs using public transport from each CSTM model zone. The impacts are greatest in the vicinity of the Clyde Corridor infrastructure proposals and for rail connected zones further afield.



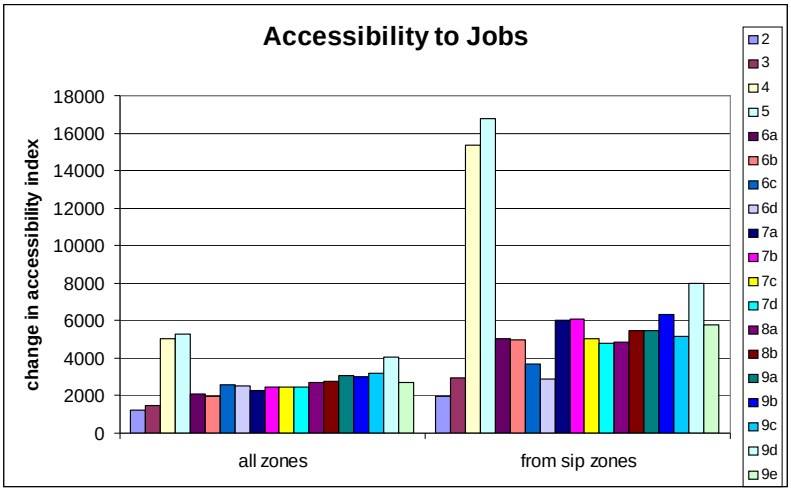
To calculate these indices the following procedure was adopted:

- The employment in each zone in the model was factored by a deterrence function based on the generalised time extracted from CSTM for a traveller reaching each job from each other zone by public transport. Therefore a job that involved no travel will count as a full job, but a job that involves 30 generalised minutes travel will count as only about half a job.

- The calculated accessibility index for any zone is the sum of all the components of accessibility provided by each of the 1296 zones.

- The calculations can be undertaken easily using standard query procedures in GIS systems and databases or automated within software solutions (see Appendix B)

The maps for each test show the geographical distribution of the impacts of the proposal. It is also possible to present these results in a more aggregate way by comparing for example the aggregate impacts on Social Inclusion Partnership areas or development areas. Since the populations in each zone are not the same it is necessary to work in terms of affected populations rather than zones when summing the impacts.



Courtesy of Glasgow City Council

10.9 Summary of Accessibility Measures in AST

10.9.1 The range and flexibility of the alternative analysis approaches brings an even wider range of potential ways to present the results. In some circumstances a single value in the appraisal summary table will be possible for each strand of the accessibility and social inclusion appraisal. In other circumstances map based presentation will be the only useful way to present the results.

10.9.2 Table 10.4 summarises the main accessibility measures required in the AST.

Table 10.4 – Presenting Accessibility and Social Inclusion Results

Criterion	*Qualitative Information*	*Quantitative Information*
Community Accessibility		
Public transport network coverage	• Describe changes in accessibility provided by PT system..	• Measured changes in utility/accessibility for each option • Summarise changes on maps of network coverage e.g. contours of catchment population.
Access to local services	• Describe changes in accessibility by walking and cycling to local services (post offices, shops, parks etc.)	• Measured changes in population catchment by local service category in AST.
Comparative accessibility		
The distribution of impacts by people group	• Compare impacts for different population groups relevant to local policy objectives.	• Change in ratio of non car available population/total population for access to town centres, jobs, learning, food shops, and health as appropriate. • Include changes in ratios for other population groups if appropriate including disabled people, women, ethnic minority groups, unemployed people, etc. • Use maps in analysis reports to show changes.
The distribution of impacts by location	• Compare impacts for policy sensitive locations such as SIP areas with impacts on all areas.	• Change in ratio of accessibility for SIP areas (and/or other policy sensitive locations) compared with all areas. • Use maps in analysis reports to show changes.

10.10 References and Further Reading

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