

The Severance Sub-Objective

TAG Unit 3.6.2

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Department for Transport

Transport Analysis Guidance (TAG)

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1 The Severance Sub-Objective

1.1 Introduction

1.1.1 This sub-objective is concerned with severance as it affects those using non-motorised modes, especially pedestrians - cyclists and equestrians are less susceptible to severance because they can travel more quickly than people on foot, although there may still be significant impacts on these groups.

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

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

1.1.3 To ensure a consistent approach, classification should be based on pedestrians only. The impact of severance on cyclists and equestrians will differ for two reasons: they travel more quickly; and crossing facilities may not be available to them. Interpretation of these levels for individual modes is discussed below.

1.1.4 The following steps are required to enable the assessment of the impact of projects on severance:

- estimate the level of severance for the do-minimum case;
- estimate the level of severance for the do-something;
- by comparison of the level of severance for the do-minimum and do-something cases, estimate the change in severance (reductions and increases) - Table 1 provides guidance (for example, where the do-minimum severance is moderate and the do-something severance is slight a 'slight positive' score should be recorded); and
- estimate the numbers of people likely to be affected by changes in severance.

Table 1: Assessment of Change in Severance				
	Do Something Severance Scoring			
Do Minimum Severance Scoring	None	Slight	Moderate	Severe
None	None	Slight negative	Moderate negative	Large negative
Slight	Slight positive	None	Slight negative	Moderate negative
Moderate	Moderate positive	Slight positive	None	Slight negative
Severe	Large positive	Moderate positive	Slight positive	None

1.1.5 It will usually be appropriate to assess severance at a number of locations across a network. This is likely to lead to a range of assessments. Some locations in a network may experience reductions in severance, others may experience increases. Some locations may experience greater changes in severance than others. For each level of change in severance, the numbers of people affected should be accumulated to provide the entries required for Worksheet 1. An overall assessment for the option should then be based on the following guidelines (in each case, the assessment is *beneficial* if severance is reduced, *adverse* if severance is increased):

- the overall assessment is likely to be **Neutral** if increases in severance are broadly balanced by relief of severance;
- the overall assessment is likely to be **Slight** where change in severance is slight or the total numbers of people affected across all levels of severance is low (less than 200 per day, say);
- the overall assessment is likely to be **Large** where change in severance is large, and affects a moderate or high number of people or the total numbers of people affected across all levels of severance is high (greater than 1000, say); and
- the overall assessment is likely to be **Moderate** in all other cases.

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

1.1.7 Guidance on the classification of new roads on the four point scale defined above is given in the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3, Part 8, Pedestrians and Others and Community Effects. The guidelines can readily be adapted to allow the classification of existing roads on the scale. Note also that DMRB provides guidance on the assessment of relief of severance. The results obtained by application of the DMRB approach should be used to confirm the results provided by the application of the method outlined above.

- 1.1.8 The advice in the DMRB is also considered to be broadly suitable for light rail or tramway systems using public roads. Such systems are unlikely to significantly add to overall traffic flows. However, where road space is restricted to accommodate them, there may be reductions in flows of other vehicles and thus a reduction in severance. On the other hand, light rail or tramway systems may require the provision of special crossing facilities. These may result in a higher level of severance than might otherwise be the case.
- 1.1.9 For rail systems employing dedicated tracks, severance is likely to be either moderate or severe, depending on the nature and location of the crossings provided. Analysts should ensure that their assessment of the impact of crossings is broadly consistent with that specified in DMRB for roads. Where level crossings (including footpaths) are provided, the level of severance will also be dependent on the frequency and speed of trains. To ensure a valid assessment, it may also be appropriate to assess the level of severance caused by the existing earthworks and structures of disused rail routes.
- 1.1.10 Guidance on the estimation of the numbers of people (pedestrians, cyclists or equestrians) affected by severance is given in the Design Manual for Roads and Bridges (DMRB) Volume 11 Environmental Assessment, Section 3, Part 8, Pedestrians and Others and Community Effects. Broadly speaking, there are two alternatives: estimation of the numbers *potentially* affected, using the catchment area method; or direct measurement of the numbers *actually* affected. Estimating the numbers *potentially* affected is likely to be of particular relevance where existing severance is severe. It is important to note that estimates of the numbers *potentially* affected will usually include those *actually* affected. Where estimates have been made using both methods, the results should *not* be added together.
- 1.1.11 The methods outlined above are designed for use at the project level. They assume a level of detail which may not be appropriate for the appraisal of strategies. Where this is the case, the methods should be adapted to suit the level of detail that is available. Suggested adaptations include:
- attention could be focused on parts of the network where significant change in severance is likely;
 - assessment of the level of severance could be less reliant on the indicators suggested in DMRB and more on expert judgement; and
 - assessment of the numbers of people affected could be based on the catchment area method applied at a relatively coarse geographical level and using a greater degree of expert judgement.

2 Application of TAG to Highway Schemes

- 2.1.1 This section provides advice on the links between TAG's treatment of the physical severance sub-objective and the advice given in Volume 11 of the **Design Manual for Roads and Bridges** (DMRB), which deals with the environmental assessment of highway projects. An explanation of the correspondence between the advice set out in TAG and DMRB is given in **Applying the multi-modal new approach to appraisal to highway schemes** (TAG Unit 2.6).

2.2 Methods and Worksheets

- 2.2.1 In general, the guidance on assessment in this TAG Unit should be followed. The worksheet in this TAG Unit shows the information that should be reported for the sub-objective.
- 2.2.2 The assessment is based on non-motorised modes, i.e. pedestrians, cyclists and equestrians. The level of severance is estimated for each 'location' where severance is considered to be an issue, on a 4-point scale given above for the Do Minimum and Do Something. This applies to new severance. The number of people likely to be affected by a change in severance is calculated based on pedestrian movements and entered into the worksheet. The comparison of DM and DS is in the opening year and the change in severance is estimated using Table 1.
- 2.2.3 For new roads and relief in severance, the DMRB 11.3.8 method should be used. The guidance in DMRB should be used to classify the level of severance.
- 2.2.4 Overall assessment of the options is based on the guidelines in this TAG Unit.
- 2.2.5 To take account of cyclists and/or equestrians, a qualitative comment needs to be made in the AST to indicate whether the impact is greater or less severe than for pedestrians.

Data Transformation from DMRB to TAG

Data Requirements	Modify DMRB Output?	Data Source
Worksheet Number of people either potentially or actually affected by severance at a location	Yes	DMRB 11.3.8
DM level of severance	No	DMRB 11.3.8
DS level of severance	No	DMRB 11.3.8
<i>AST</i> Net change in severance	-	Worksheet 1 and Table 1 in this TAG Unit
Number of people affected	-	TAG Worksheet in this TAG Unit

- 2.2.6 The DMRB 11.3.8 assessment method considers community facilities and their catchment areas and the routes which people take to access these facilities. It also estimates the change in journey length/time with a proposal and the number of people affected. This information and information about the change in traffic volumes (AADT) on existing and new roads is then used to classify 'new severance' or 'relief in severance' into Slight, Moderate or Severe. This can be used to classify severance at 'locations' across the transport network as required by TAG, on a 4-point scale.
- 2.2.7 For the parameter 'Numbers of People affected', TAG refers to DMRB and states that there are two ways of estimating the number of people; one is to estimate the numbers *potentially* affected, using the catchment area method; or direct measurement of the *actual* numbers affected. In practice, it is likely to be a combination of survey results of actual pedestrian numbers using specified routes that may be affected and an estimate of people within the catchment areas of facilities that potentially are affected. Judgement should be

used as to the most appropriate method, depending on the location and the community facilities affected.

2.3 DMRB Stages 1 and 2/ TAG

2.3.1 DMRB Stage 1 identifies community facilities and routes affected and assesses in broad terms whether journey lengths will be lengthened or shortened. DMRB Stage 2 develops the work further and includes pedestrian/cyclist/equestrian counts where necessary. Some estimate of level of severance in the DM and DS will be possibly based on the DMRB assessment but numbers of people affected may not be available for the TAG appraisal.

Worksheet 1: Accessibility - Severance

Change in Severance	Population Affected			
	location a	location b	location.....	Total Affected
Large negative				
Moderate negative				
Slight negative				
Neutral				
Slight positive				
Moderate positive				
Large positive				

Reference

Source(s): _____

Assessment

Score: _____

Qualitative comments: _____

3 Social and Distributional Impacts of Severance

3.1 Introduction

3.1.1 This section provides additional advice on the technical and qualitative processes to be considered in the assessment of the potential social and distributional impacts of changes in severance resulting from transport interventions. The analyst should, in addition, make reference to **Detailed Guidance on Social and Distributional Impacts of Transport Interventions** (TAG Unit 3.17) in undertaking this work.

3.2 Which groups of people are potentially more vulnerable to severance?

3.2.1 Literature has highlighted those groups that are potentially vulnerable to severance effects of the transport network, including people that are forced to take longer journeys resulting from mitigation measures such as footbridges and underpasses (refer to Section 5 for information on the evidence). These groups often experience longer journey times or are

often required to use pedestrian routes that are inappropriate and difficult to use. Such groups include people without access to a car, older people, people with disabilities and parents with pushchairs. Children are also considered to be potentially vulnerable to severance as they are more likely to cross the road at dangerous crossing points and put themselves at risk of road accidents.

3.2.2 There are, therefore, social impacts (in severance terms) from transport projects, and consideration should be given to children, older people, people with disabilities, and people with no access to a car.

3.3 Process to be followed

3.3.1 The approach to the assessment of the social and distributional impacts should follow the process described in **Detailed Guidance on Social and Distributional Impacts of Transport Interventions** (TAG Unit 3.17). In terms of severance, this follows the following steps:

- Step 0: an initial screening process to identify any likely positive impacts or negative impacts that cannot be eliminated through design or mitigation
- Step 1: identification of the area impacted by changes in severance;
- Step 2: analysis of the demographic profile in the area impacted by changes in severance;
- Step 3: a screening process, to determine if it is appropriate to undertake further analysis of the changes in severance and the approach to be taken;
- Step 4: the analysis of the severance impacts; and
- Step 5: the collation and presentation of the outputs from the severance analysis.

3.3.2 The process to be followed for Steps 0-3 is described in TAG Unit 3.17.

3.3.3 In the event of severance impacts being identified from the screening process in Step 3, the sections below should be used to guide the technical analyses required in Steps 4 and 5 of this process.

3.3.4 The following section refers to the full appraisal process. TAG Unit 3.17 also notes that alternative approaches can be taken when impacts are neither significant nor concentrated. These are intended to be more proportionate and are more qualitative than the full appraisal. TAG Unit 3.17 sets out the principles that can be applied.

3.3.5 For both the full appraisal and the more proportionate qualitative appraisal, the promoter should develop a specification for the appraisal and agree this with the Department (or equivalent) before proceeding with the appraisal.

3.4 Analysis of Social and Distributional Impacts (Step 4)

3.4.1 Overview

3.4.2 As discussed in the Design Manual for Roads and Bridges (DMRB) Section 11.3.8 it is important that the appraisal considers the changes in severance to the local community

and considers the axes of movement that are likely to be affected by an increase or decrease in severance following the introduction of a transport intervention.

3.4.3 Where required the analyst should follow the technical guidance in DMRB Section 11.3.8 to assess:

- The change in the level of severance;
- Associated changes in journey length;
- Existing and alternative routes used; and
- Possible mitigation measures.

3.4.4 However the assessment should also specifically consider the likely impacts of severance on the potential vulnerable groups, using the datasets and mapping approach as described in Steps 1 and 2 of TAG Unit 3.17. Analysis of these groups should take place at an Output Area level and geographical concentrations of the potential vulnerable groups mapped for the affected area.

3.4.5 The analyst should use judgement in identifying the most appropriate process for assessing the social and distributional impacts of severance for the transport intervention, ensuring the process is proportionate to the likely impacts of the intervention and concentrations of identified potential vulnerable groups including older people, children, people with disabilities and no-car households.

3.4.6 Desktop Analysis

3.4.7 Building on the mapped concentrations of the potential vulnerable groups within the affected area, the analyst should undertake desktop research to examine the location of community facilities of importance to such groups, including the following:

- GP surgeries;
- Community centres;
- Schools;
- Local shops;
- Churches and other places of worship; and
- Parks, playgrounds and sport centres.

3.4.8 GIS mapping should be used to plot these community facilities, concentrations of potentially vulnerable groups and a series of walking distance catchments for the facilities.

3.4.9 These walking catchments should be based on, where possible, established walking routes used by the community and not 'crow-fly' distances. Furthermore the distances should take account of the needs of the groups who are particularly vulnerable to severance effects and the practical limitations on how far different groups of people can walk. For example, shorter catchments should be used for older people.

3.4.10 The analyst should then use the existing walking catchments to inform the analysis of the impacts of the transport intervention. Examples include:

- The introduction of a new footbridge to replace a pedestrian crossing could potentially significantly add to the effective walking distance to cross the road (taking into account ramps) and will also involve a climb that could affect the effective distance travelled (affecting older people in particular);
- The introduction of new pedestrian crossings will significantly reduce severance effects by enabling pedestrians to cross a road in locations where the opportunities did not previously exist (however, if pedestrian crossings are relocated, the impacts on walking routes should be assessed);
- Other changes to road layout in the urban environment could include the introduction of bus lanes, bus rapid transit or light rail: impacts on walking routes will depend on the design of the scheme – impacts should in particular be considered if there are changes to pedestrian crossing provision; and
- The severance of existing rights of way (including public footpaths) by a new transport corridor will require particular attention, particularly in cases where traffic flows and speeds are forecast to be high, or where footbridges or subways are being considered.

3.4.11 The analyst should then plot the revised walking distance catchments with the intervention in place. The final stage involves the calculation of the numbers of people in the defined potential vulnerable groups likely to be positively or negatively affected with and without the intervention.

3.4.12 Site Visit / Audit

3.4.13 The analyst is encouraged to visit the affected area to gain insight into the dynamics of the community and highlight any specific severance issues that could impact on the potential vulnerable groups. This information should be fed into the desk-top analysis described above.

3.4.14 The audit could take place together with the designer to consider the elements of the intervention that may cause severance and how these could be mitigated, which could include elements such as signalised crossings, pedestrian guardrails, footbridges and subways.

3.4.15 Primary Research

3.4.16 Primary research should **only be considered** in the case of complex interventions that will have significant impacts on severance for a large number of people within potentially vulnerable groups, or for transport interventions which have an explicit objective to reduce severance.

3.4.17 This research should be specifically targeted at the potential vulnerable groups identified in the previous steps, to gain insight on how the intervention is likely to affect them. Options for primary research include discussion groups (qualitative research) or surveys of these groups of people (quantitative research). The analyst should use judgement in determining the most appropriate approach to be used, which should be appropriate to the scale of the intervention and the number of potential vulnerable groups identified.

- 3.4.18 This research should identify specific severance concerns, and the extent to which people will change their journeys in response to these concerns. The research and evidence gathered from the desk-top analysis and site visit/audit described earlier should assist discussions and form the basis for research, for example, difficulties faced by older people in crossing busy roads without pedestrian crossings or refuges.
- 3.4.19 This should include consideration of both diversion and suppression of trips resulting from any increase in severance. Conversely, it should also consider re-routing and 'generation' of trips in a local area resulting from a reduction in severance.
- 3.4.20 The research should systematically consider the local access needs of key facilities of relevance to each group of people. For example, primary schools should be considered in discussions with parents of young children, while GPs and other community facilities should be discussed with groups from the wider community as a whole.
- 3.4.21 Report to Project Manager and Design Team
- 3.4.22 Findings from the assessment of severance impacts should be used to inform the appraisal process. It should also be used to identify the scope to improve the design to better tackle particular severance problems amongst the potential vulnerable groups under consideration. For example, it is necessary to consider if the provision of footbridges instead of at-grade crossing points could exacerbate severance issues for older or people with impaired mobility.

3.5 Outputs from Appraisal of Social and Distributional Impacts (Step 5)

- 3.5.1 The main outputs from the appraisal of severance impacts will be through a series of mapping, statistical outputs and qualitative reviews.
- 3.5.2 The statistical outputs of this indicator will identify the proportion of people in potential vulnerable groups that will potentially be at risk of severance due to the implementation of the intervention. The mapping outputs will support the statistical findings to illustrate where the issues exist for the different potential vulnerable groups. This mapping can also be used to compare before and after situations.
- 3.5.3 A qualitative commentary of the severance issues for the potentially vulnerable groups should also be provided to detail the issues behind the statistics and can highlight where measures should be considered to mitigate against the potential severance impacts identified for these groups.
- 3.5.4 The outputs from the appraisal process can be used to produce severance analysis for the identified potential vulnerable groups. The precise content of the analysis will be dependent on the types of services and locations (both existing facilities and alternatives that might instead be used), and the needs of users, but it should include, as a minimum:
- Local community facilities - including community centres, GPs, places of worship, primary schools, parks, play areas and local shops within a 800 metre local walking journey; and
 - Bus stops - within a 400 metre walking journey.

- 3.5.5 It may also be necessary to consider other significant facilities, including secondary and further education if they lie within 1km walking distance from the community.
- 3.5.6 The outputs from this appraisal should then be converted into a format that can be used to inform the social and distributional impacts analysis. **Worksheet 2** should be used to inform this analysis. Table 2 provides an example of a completed worksheet that presents the differences in the severance impacts experienced by different groups. It takes into account the locations of community facilities, the population served and the roads that need to be crossed, which is shown in the worksheet as locations a, b, c....n.

Table 2 – Example of a Completed Worksheet for Assessment of Severance Social and Distributional Impacts															
	All social groups			No-car households			Young people			Older people			People with disabilities		
	Change in severance [A]	No of people affected [B]	Overall effect [A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]
Location a	Slight +ve. (+1)	500	+500	+1	200	+200	+1	200	+200	+1	200	+200	+1	50	+50
Location b	Mod. +ve (+2)	1000	+2000	+2	500	+1000	+2	300	+600	+2	400	+800	+2	200	+400
Location c	Large. +ve (+3)	400	+1200	+3	250	+750	+3	100	+300	+2	100	+200	+2	80	+160
Location d	Neutral (0)	600	0	0	200	0	0	200	0	0	350	0	0	240	0
Location e	Slight -ve. (-1)	2000	-2000	-1	900	-900	-1	900	-900	-2	700	-1400	-2	630	-1260
Location f	Mod. -ve. (-2)	400	-800	-2	300	-600	-2	150	-300	-3	200	-600	-3	130	-260
Location n	Slight -ve. (-1)	500	-500	-1	100	-100	-1	100	-100	-2	100	-200	-2	180	-180

Reference Source(s): GIS analysis of locations and number of people in potential vulnerable groups likely to be affected by severance as a result of Scheme X - See GIS Plan 001 for locations *a, b, c* / GIS Plan 002 for locations *d, e, f* / GIS Plan 005 for location *n*.

Assessment Score: For 'All social groups' overall (net) score is +400 with a positive impact = Moderate Beneficial. No car households = Moderate Beneficial, Young People = Slight Adverse, Older People = Moderate Adverse, People with Disabilities = Moderate Adverse:

Qualitative comments: Severance problems identified in location e - include increase in walking distance and slope caused by new pedestrian foot bridge 'A' –impacting on older people and people with disabilities.

- 3.5.7 The left-hand part of the table shows the overall severance assessment, which has been derived from the core work undertaken within this Unit. The changes in severance at each location have been determined from the approach set out in the earlier sections of this Unit, based on the level of severance in the Do Minimum and Do Something cases. It also shows the number of people affected at each location, and the base of table concludes that the overall effect is 'moderate beneficial' amongst the community at large.
- 3.5.8 The right-hand part of the table presents the severance assessment for the identified vulnerable groups. The important difference in this case is that the severance assessment, in each location, varies depending on the specific issues that are faced by each social group. When looking at people living in no-car households, it is assumed that their levels of mobility are identical to the wider population, so the severance scores are consistent with the overall scores.
- 3.5.9 However, there are significant differences for older people and people with disabilities, due to the specific problems that have been identified on certain parts of the network for these groups. This could, for example, be due to the introduction of a pedestrian bridge with long ramps that significantly add to the distance that must be travelled, which has particularly serious impacts on older people or people in wheelchairs.
- 3.5.10 It can be seen the summary assessments for each of the social groups are different to the overall severance assessment that is taken forward as the summary score in the Appraisal Summary Table. It can also be seen that the overall severance assessment is not necessarily equal to the 'sum' of the individual scores for each social group. This is because the individual groups in the table have specific needs and challenges, which are highlighted in much greater detail than the overall severance assessment.
- 3.5.11 This demonstrates the importance of considering the needs of these individual social groups through the social and distributional analysis.
- 3.5.12 The scores for each of the groups under consideration should then be reported in the matrix of social and distributional impacts, described in Step 5 of **Detailed Guidance on Social and Distributional Impacts of Transport Interventions** (TAG Unit 3.17).

4 Further Information

- 4.1.1 The following documents provide information that follows on directly from the key topics covered in this TAG Unit.

For information on:	See:	TAG Unit number:
Appraisal Summary Table	Transport Appraisal and the Treasury Green Book	TAG Unit 2.7
The background and overall approach to the Social and Distributional Impacts of transport interventions	Detailed Guidance on Social and Distributional Impacts of Transport Interventions	TAG Unit 3.17

5 References

- Department of the Environment, Transport and the Regions (DETR), Design Manual for Roads and Bridges, Environmental Assessment, Volume 11, London, The Stationary Office
- Atkins and MVA (Autumn 2009) Assessing Social and Distributional Impacts in Transport Scheme Appraisal

6 Document Provenance

- 6.1.1 This Transport Analysis Guidance (TAG) Unit is based on Chapter 7 Section 3 of **Guidance on the Methodology for Multi-Modal Studies Volume 2** (DETR, 2000).
- 6.1.2 This document has been updated in January 2010 to reflect the guidance on Social and Distributional Impacts. It is now in 'In Draft' status.
- 6.1.3 Technical queries and comments on this TAG Unit should be referred to:

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Worksheet 2 – Assessment of Social and Distributional Impacts for Severance															
	All social groups			No-car households			Young people			Older people			People with disabilities		
	Change in severance [A]	No of people affected [B]	Overall effect [A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]	[A]	[B]	[A]*[B]
Location															
Location															
Location															
Location															
Location															
Location															
Location															

Reference Source(s): _____

Assessment Score: _____

Qualitative comments: _____