

# TRANSPORT IMPACT ASSESSMENT GUIDELINES

---

VOLUME 3  
SUBDIVISION

REVISED  
AUGUST 2016



Department of  
Planning



Western  
Australian  
Planning  
Commission

# TRANSPORT IMPACT ASSESSMENT GUIDELINES

## Disclaimer

This document has been published by the Western Australian Planning Commission. Any representation, statement, opinion or advice expressed or implied in this publication is made in good faith and on the basis that the Government, its employees and agents are not liable for any damage or loss whatsoever which may occur as a result of action taken or not taken, as the case may be, in respect of any representation, statement, opinion or advice referred to herein. Professional advice should be obtained before applying the information contained in this document to particular circumstances.

© Western Australian Planning Commission

Published by the  
Western Australian Planning Commission  
Gordon Stephenson House  
140 William Street  
Perth WA 6000

Locked Bag 2506  
Perth WA 6001

Published August 2016

website: [www.planning.wa.gov.au](http://www.planning.wa.gov.au)  
email: [corporate@planning.wa.gov.au](mailto:corporate@planning.wa.gov.au)

tel: 08 6551 9000  
fax: 08 6551 9001  
National Relay Service: 13 36 77  
infoline: 1800 626 477

The Department of Planning owns all photography in this document unless otherwise stated.

Cover image courtesy of CLE Town Planning and Design.

This document is available in alternative formats on application to Communication Services.

## Contents

<b>Part A – The assessment process</b>	<b>4</b>
1 Introduction	5
2 The subdivision assessment stage	5
3 Prior transport impact assessments	6
3.1 Introduction	6
3.2 Structure plan assessment consistent with TIA guidelines	6
3.3 Structure plan assessment not consistent with TIA guidelines	7
3.4 No prior structure plan assessment	7
4 Policy context	8
5 Transport impact assessment components	9
6 Level of assessment	10
6.1 Size of subdivision	10
6.2 Assessment levels	10
6.3 Vehicle trips versus person trips	11
6.4 Advice from approving authority	12
6.5 Application of table 1	13
6.6 Detailed guidance	13
<b>Part B – Transport impact statement</b>	<b>10</b>
1 Introduction	14
2 Prior structure plan assessment	15
3 Extent of assessment	15
4 Checklist	15
5 Content	16
5.1 Introduction	16
5.2 Proposed subdivision	16
5.3 Vehicle access and parking	16
5.4 Provision for service vehicles	17
5.5 Daily traffic volumes and vehicle types	17
5.6 Traffic management on the frontage streets	17
5.7 Public transport access	17

5.8 Pedestrian access	17
5.9 Cycle access	18
5.10 Site specific issues	18
5.11 Safety issues	18
<b>Part C – Transport impact assessment</b>	<b>19</b>
1 Introduction	19
2 Prior structure plan assessment	19
3 Background	20
4 Extent of assessment	20
5 Liaison with the relevant authorities	22
5.1 Introduction	22
5.2 Scope	22
5.3 Parameters	22
6 Format of assessment	23
6.1 Introduction	23
6.2 Structure	23
6.3 Checklists	24
7 Details of content	24
7.1 Introduction	24
7.2 Summary	24
7.3 Introduction and background	24
7.4 Subdivision proposal	25
7.5 Existing situation	25
7.6 Proposed internal transport networks	25
7.7 Changes to external transport networks	26
7.8 Integration with surrounding area	26
7.9 Analysis of transport networks – general advice	27
7.9.1 Introduction	27
7.9.2 Assessment years	28
7.9.3 Time periods for assessment	28
7.10 Analysis of internal transport networks	29
7.10.1 Introduction	29
7.10.2 Assessment parameters	29

7.10.3	Subdivision generated traffic	29
7.10.4	Non subdivision traffic	31
7.10.5	Design traffic flows	31
7.10.6	Roads and intersections	32
7.10.7	Access to frontage properties	33
7.10.8	Pedestrian/cycle networks	33
7.10.9	Safe walk/cycle to school assessment (residential subdivisions only)	35
7.10.10	Pedestrian permeability and efficiency	35
7.10.11	Access to public transport	36
7.11	Analysis of external transport networks	36
7.11.1	Introduction	36
7.11.2	Extent of analysis	37
7.11.3	Design traffic flows on external road network	37
7.11.4	Impact on external roads	37
7.11.5	Impact on external intersections	38
7.11.6	Pedestrian/cycle networks	39
7.12	Safety issues	40
7.13	Conclusions	40
Appendix A1: Checklist for subdivision transport impact statement		41
Appendix A2: Checklist for structure plan transport impact assessment		44

## Part A – The assessment process

### 1 Introduction

**Volume 3** of the guidelines is intended for use by both land use planners and transport planning professionals.

It provides advice on the scale and content of the transport information that should be submitted to the approving authority in support of a subdivision application. It also provides detailed technical advice on how to undertake the transport impact assessment (TIA).

Volume 3 should be read in conjunction with **Volume 1**, which provides general guidance on the TIA process; **Volume 5** which provides additional technical guidance; *Liveable Neighbourhoods* and WAPC development control (DC) policies, which set out the transport related objectives, measures and requirements for subdivisions.

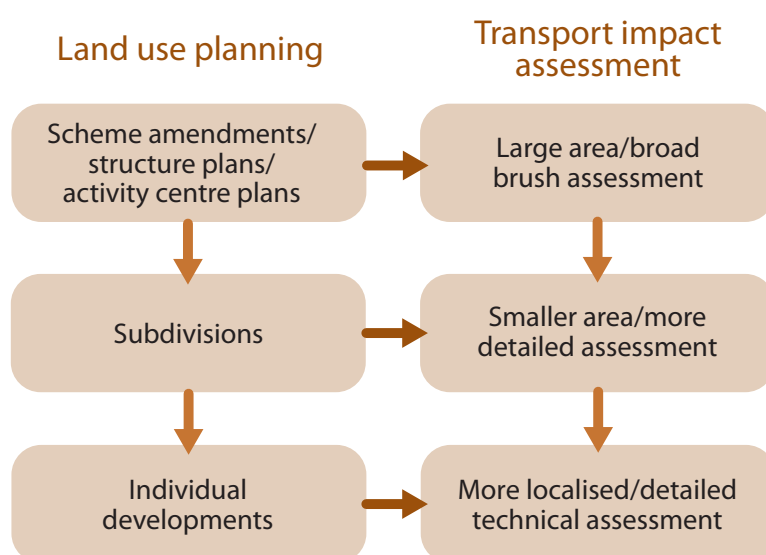
### 2 The subdivision assessment stage

The subdivision assessment is the second stage of the land use/TIA process, as illustrated in **Figure 1**. It provides more detail over a smaller area compared to the structure plan, for both the land use and transport proposals.

The intent of the subdivision TIA is to:

- demonstrate that the proposal is consistent with the overall structure planning;
- provide a greater level of detail on the subdivision and its more immediate surrounds; and
- provide details of any transport planning issues specific to the subdivision not covered in the structure plan.

**Figure 1: The land use/transport planning process**



For residential subdivisions with no individual lot having more than 10 units (dwellings), this stage is likely to be the final TIA stage. For non-residential subdivisions, and for residential lots with more than 10 units, a further TIA is likely to be required at the development application stage. (Further advice on individual development assessments is provided in **Volume 4** of these guidelines).

## 3 Prior transport impact assessments

### 3.1 Introduction

Most current or recent structure plans include some form of TIA. As these TIA guidelines have now been in use for some years, most existing assessments are quite likely to be in the format required under the guidelines, or at least provide the same level of information.

However, if the existing TIA does not meet the requirements of the guidelines, the applicant is recommended to follow the approaches identified in **Sections 3.3 or 3.4**, as appropriate.

### 3.2 Structure plan assessment consistent with TIA guidelines

The majority of subdivisions should be part of a structure plan for which a TIA has been carried out in accordance with these guidelines. (**Volume 2** provides details of TIA for structure plans).

In these cases reference should be made to the structure plan TIA when preparing the TIA for the subdivision. The relevant information should generally be extracted

from the prior structure plan assessment and expanded as required; the prior assessment having been carried out at a broader brush level and most likely covering a potentially larger area at a lower level of detail than is required for the subdivision.

On some limited occasions it may be sufficient to briefly summarise the relevant information and provide a reference back to the prior assessment. It may also be appropriate to provide a copy of the prior assessment when submitting the subdivision application.

### 3.3 Structure plan assessment not consistent with TIA guidelines

Where the TIA provided at the structure plan stage fails to meet the requirements of the guidelines, the subdivision assessment should draw on any appropriate information and expand as required.

Where the required information is not available from the structure plan assessment, it should be provided at the subdivision stage. This may require expansion of the area of assessment beyond that normally required for a subdivision.

In other words, the first stage of the subdivision assessment may be to expand the existing structure plan assessment to provide the information required for structure plans under these guidelines. This information can then be used to prepare the subdivision assessment.

This expansion of the existing structure plan assessment may not need to be as comprehensive as a full TIA guidelines structure plan assessment. It should concentrate on those parts of the surrounding structure plan area that

would impact most on the subdivision and the modal priority should be identified. For example, the surrounding land uses may generate traffic that would use the subdivision roads and there may be the potential, or need, for bus routes and pedestrian/ cycle networks to pass through the subdivision.

This approach is recommended to ensure that individual subdivisions within a structure plan area are not developed in isolation but are consistent with the overall structure planning.

When the previous structure plan assessment is more than five years old it may be appropriate to review those parts of the assessment relevant to the subdivision, to ensure that they are still current and valid. It is recommended that the proponent discuss this with the approving authority prior to commencing the subdivision assessment.

### 3.4 No prior structure plan assessment

In the cases where no previous structure plan assessment has been undertaken, it is recommended that a structure plan TIA be undertaken prior to undertaking the subdivision assessment.

Again, this assessment may not need to be as comprehensive as a full structure plan assessment as it should concentrate on those parts of the surrounding structure plan area that would impact most on the subdivision.

For subdivisions in built up areas not covered by structure planning, this preliminary structure planning assessment may not be required. The subdivision assessment must, nevertheless, address the context of the subdivision with respect to, and its integration with, the surrounding land uses.

## 4 Policy context

Current WAPC development control policy requires subdivision applications to be supported by transport information. The requirements are contained within a number of DC policies, including:

- DC1.1 Subdivision of Land - General Principles (June 2004);
- DC1.2 Development Control – General Principles (August 2004);
- DC1.5 Bicycle Planning (July 1998);
- DC1.6 Planning to Support Transit Use & TOD (January 2006);
- DC1.7 General Road Planning (June 1998);
- DC2.2 Residential Subdivision (August 2013);
- DC2.6 Residential Road Planning (June 1998);
- DC4.1 Industrial Subdivision (July 1988);
- DC5.1 Regional Roads (Vehicular Access) (June 1998).

Key transport objectives within these policies include:

- the facilitation of appropriate access and movement systems for all modes of transport;
- the integration of the development with the surrounding land uses and transport networks;



- the provisioning of high quality pedestrian and cycle networks both within the development and connected to the surrounding area; and
- ensuring adequate consideration is given to public transport access.

The requirements under the WAPC's operational policy, *Liveable Neighbourhoods*, are similar to those for structure plans but at a greater level of detail, reflecting the more detailed planning aspects of a subdivision.

The level of transport information required in support of subdivision applications to satisfy the above policy objectives is detailed in the following sections.

## 5 Transport impact assessment components

The key components of a TIA for a subdivision are essentially the same as those for a structure plan, namely to:

- assess the proposed internal transport networks with respect to accessibility, circulation, safety and priority for all modes, i.e. vehicles, public transport, pedestrians and cyclists;
- assess the level of transport integration between the subdivision area and the surrounding land uses;
- determine the impacts of the traffic generated by the subdivision on the surrounding land uses; and
- determine the impacts of the traffic generated by the subdivision on the surrounding transport networks.

The assessment will, however, provide greater detail at a more localised level.



## 6 Level of assessment

### 6.1 Size of subdivision

Subdivisions can range from very large scale with either a single land use (for example, residential) or a range of land uses, (for example, mixed use residential/commercial/retail) down to the subdivision of a single residential lot into two lots. Obviously, each would have widely different transport implications and a “one size fits all” assessment process would not be appropriate.

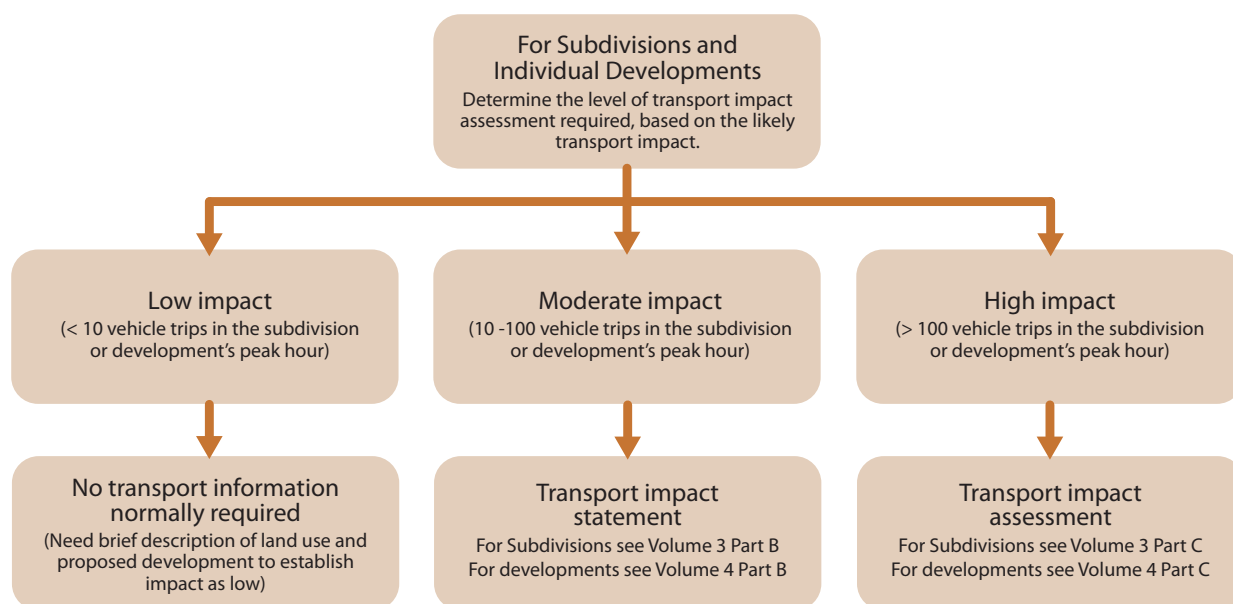
Therefore, under these guidelines, the level of TIA required is related to the level of transport impact the proposed subdivision would be likely to have on the surrounding land uses and transport networks.

This depends upon a number of factors including type and quantities of land uses, catchment and location, the surrounding road and public transport networks and accessibility for pedestrians, cyclists and people with disabilities.

### 6.2 Assessment levels

A three level assessment process has been developed to accommodate this diversity. The process for determining the level of assessment required is illustrated in **Figure 2**.

**Figure 2: Level of assessment required**



**Table I** presents the three assessment levels in terms of land use units, (for example, number of dwellings or retail floor space), for the main land use categories, based on indicative trip generation rates.

See **Volume 5, Part B** for the derivation of the threshold values in **Table I**.

Note that the level of traffic generated relates to the number of vehicle trips generated by the subdivision during its busiest hour(s) of operation. This peak hour(s) may or may not occur at the same time as the peak periods on the surrounding roads.

## 6.3 Vehicle trips versus person trips

The use of vehicle trips generated to determine the level of assessment required should be seen as a proxy for person trips as there are no land use types that generate high volumes of non-car trips but very low volumes of car trips.

There may be a specific development in a specific location that would generate high person trips but low car trips, for example, a retail development in the CBD. Typically, however, retail land uses generate high levels of car trips.

Take, for example, two retail subdivisions of 2,000m<sup>2</sup>, one in the suburbs and one in the Perth CBD. Both would require a full assessment under the guidelines. The

**Table I: Level of TIA required by land use and size**

LAND USE	MODERATE IMPACT	HIGH IMPACT
	Transport Impact Statement required	Transport Impact Assessment required
	10 – 100 vehicle trips in the peak hour	> 100 vehicle trips in the peak hour
Residential	10–100 dwellings	> 100 dwellings
Schools	10–100 students	> 100 students
Entertainment venues, restaurants, etc.	100–1000 persons (seats) OR 200–2000 m <sup>2</sup> gross floor area	> 1000 persons (seats) OR > 2000 m <sup>2</sup> gross floor area
Fast food restaurants	50–500 m <sup>2</sup> gross floor area	> 500 m <sup>2</sup> gross floor area
Food retail / Shopping centres with a significant food retail content	100–1000 m <sup>2</sup> gross floor area	> 1000 m <sup>2</sup> gross floor area
Non-food retail	250–2500 m <sup>2</sup> gross floor area	> 2500 m <sup>2</sup> gross floor area
Offices	500–5000 m <sup>2</sup> gross floor area	> 5000 m <sup>2</sup> gross floor area
Service Station	1–7 refuelling positions	> 7 refuelling positions
Industrial/Warehouse	1000–10,000 m <sup>2</sup> gross floor area	> 10,000 m <sup>2</sup> gross floor area
Other Uses	Discuss with approving authority	Discuss with approving authority

suburban subdivision would be likely to generate mainly car trips and (in most cases) typical retail car trip rates would be used in the TIA.

The CBD subdivision would be likely to generate a (much) lower number of car trips but a (much) higher number of public transport trips and walking trips (from people already in the CBD). The CBD subdivision TIA would adopt a lower car trip rate and would also need to address the higher than normal non-car mode share.

By applying standard vehicle trip generation rates for the land use within the subdivision, (retail in this case), the appropriate level of assessment required will be identified.

## 6.4 Advice from approving authority

While the level of assessment should generally be in accordance with these guidelines, it is recommended that the level required be **confirmed with the approving authority**.

Advice from the approving authority on the level of assessment required is to be given, and taken, on a 'without prejudice' basis. This does not preclude the approving authority requesting further information, at its discretion.

This particularly applies to transport impact statements, where the information provided may indicate that specific issues require more detailed assessment or that the impact is greater than initially anticipated and a full TIA is required.

While this may result in a degree of uncertainty for the proponent, it is considered that some flexibility is required for approving authorities to ask for

further information, particularly when the preliminary assessment raises additional issues or concerns.

If approving authorities were to be bound by their initial advice on the level and extent of assessment and the parameters for the assessment, they would be likely to use a conservative approach. For example, they may ask for a larger study area just in case the impacts extend beyond what would normally be expected. This would result in unnecessary work for the proponent in many cases.

By allowing approving authorities some powers to request additional information after the initial assessment it is considered that their initial requests for assessment will be more reasonable, thereby reducing the level of unnecessary work required to be undertaken by proponents.

## 6.5 Application of table 1

The level of assessment required under **Table 1** is to be based on the size of the ultimate subdivision so that the full potential impact is assessed. For large subdivisions where staging is proposed, it may be appropriate to also assess each stage individually to determine when various transport infrastructure elements may be required.

For subdivisions smaller in size than those in the transport statement column, no transport information would generally be required. The applicant is nevertheless recommended to confirm this with the relevant approving authority prior to submitting the application.

For mixed use subdivisions a pro rata approach should be used to determine the level of assessment required. For example, a subdivision with 70 dwellings and 500m<sup>2</sup> of retail would be likely to generate more than 100 trips in the peak hour, requiring a full TIA.

## 6.6 Detailed guidance

Detailed guidance on how to undertake the two levels of assessment above is provided in this volume as follows:

**Part B – Transport impact statement;**

**Part C – Transport impact assessment.**





## Part B – Transport impact statement

### I Introduction

A *transport impact statement* is required for those subdivisions that would be likely to generate moderate volumes of traffic and therefore would have a moderate overall impact on the surrounding land uses and transport networks, (as per **Table I**).

A transport impact statement is a brief statement outlining the transport aspects of the proposed subdivision. The intent of the statement is to provide the approving authority with sufficient transport information to confirm that the proponent has adequately considered the transport aspects of the subdivision and that it would not have an adverse transport impact on the surrounding area.

Of particular relevance is the accessibility of the subdivision by non-car modes, in accordance with Government's sustainable development objectives, and its integration with the surrounding area. It is essential that planning for pedestrians and cyclists is still well assessed at this level. For further technical guidance on Level of Service for pedestrians and cyclists **see Volume 5 – Technical Guidance**.

The transport impact statement should also address any issues specific to the particular subdivision. This allows these specific issues to be assessed in detail without requiring a full TIA to be undertaken - an unnecessary requirement for most subdivisions of this size.

The site specific issues to be assessed should be discussed and agreed with the approving authorities prior to commencing the transport impact statement and may include:

- the generation of traffic past sensitive uses such as schools or hospitals;
- the generation of traffic on low volume residential roads;
- particular intersections or sections of road that may be adversely affected;
- the potential for rat-running, especially through residential areas;
- issues associated with the heavy vehicles generated by the development;
- developments operating outside normal business hours in/near residential areas;
- subdivisions with a potentially high non-car mode share; and
- subdivisions close to major transport nodes.

It is envisaged that the transport impact statement will generally be from two to three pages up to several pages in length, but this will depend upon the number and nature of any specific issues that need to be addressed.

It is expected that most of the information to be provided, if not all, will be of a non-technical nature, that is, will not require input from a specialist in transportation planning or traffic engineering. This will, however, depend upon the nature of the specific issues to be addressed and specialist technical input may be required on occasions.

## 2 Prior structure plan assessment

The subdivision may be part of a larger structure plan for which a TIA has already been undertaken. If this is the case, the transport impact statement should extract the relevant information and revise or expand as appropriate.

Where there is no prior TIA, the transport impact statement may need to provide additional information on the surrounding land uses and transport networks.

Further advice on prior assessments is provided in **Part A, Section 3** of this volume.

## 3 Extent of assessment

The area to be covered by the transport impact statement is to include, as a minimum:

- the proposed subdivision;
- all roads fronting the subdivision, for the extent of the site frontage plus 100 metres beyond the boundaries of the subdivision;
- pedestrian routes to the nearest bus stops (for all bus routes passing within 400 metres of the boundaries of the subdivision);
- pedestrian routes to nearest train station(s) (if within 800 metres);
- pedestrian/cycle routes to any major attractors within 400 metres, (five minutes' walk) of the boundaries of the subdivision, for example, for a small residential subdivision attractors could be a corner shop, the primary school and the nearby park; and
- the area likely to be affected by the site specific issue(s).

## 4 Checklist

A checklist of the typical information required for a transport impact statement is provided in **Appendix A1** of this volume. This checklist is to be filled out, signed by the proponent, (and transport specialist where appropriate), and submitted with the transport impact statement, as part of the subdivision application.

The level of information sought and the format for providing the information are set out in the following sections.

## 5 Content

### 5.1 Introduction

The statement is intended to be an informal, non-technical statement of the transport aspects of the subdivision. Its format is therefore relatively flexible but should include the following sections;

- Proposed subdivision;
- Vehicle access and parking;
- Provision for service vehicles;
- Daily traffic volumes and vehicle types;
- Traffic management on frontage streets;
- Public transport access;
- Pedestrian access;
- Cycle access;
- Site specific issues; and
- Safety issues.

The information required for each section is outlined below. *Note that some of the information may be better provided graphically on a map and/or plan rather than by a text description. Examples are given in **Volume 5**.*

## 5.2 Proposed subdivision

- Describe/show the proposed subdivision land uses and their quantities (for example, retail floorspace, no. of dwellings etc.);
- Comment on any existing uses or changes of use;
- Describe/show the subdivision's relationship/context with the surrounding land uses.

## 5.3 Vehicle access and parking

- Describe/show the vehicle access arrangements to the subdivision from the frontage road(s) and the road layout within the subdivision;

- Indicate the number of public and/or private car and disabled parking spaces proposed and provision for set down, pick up and taxis (if appropriate).

For many subdivision proposals, little or no information on parking is likely to be available. In these cases, the required information should be provided at the next planning stage, that is, at the individual development application stage.

## 5.4 Provision for service vehicles

- For the non-residential subdivisions (or the non-residential components for mixed use subdivisions), briefly describe/show the access arrangements and on-site loading or unloading facilities for service vehicles.





Again, for many subdivision proposals, little or no information on servicing is likely to be available. In these cases, the required information should be provided at the next planning stage, that is, at the individual development application stage.

## 5.5 Daily traffic volumes and vehicle types

- For non-residential subdivisions only and where possible, provide a rough estimate of the likely daily, and/or peak, traffic volumes generated by the subdivision and the types of vehicle, for example, car, light commercial or heavy commercial.

Note this is not intended to be a comprehensive assessment carried out by a transport specialist but a rough guide only to the amount and type of traffic likely to be generated.

## 5.6 Traffic management on the frontage streets

- Describe/show the existing traffic management on the roads fronting the subdivision and for 100 metres either side of the subdivision.

Information to include:

- road width/number of lanes;
- footpaths/cycleways;
- any parking provision or restrictions;
- posted traffic speed;
- intersections and type of control (for example, give way, roundabout etc.); and
- accesses/driveways to properties.

## 5.7 Public transport access

- Identify/show the nearest bus and train routes to the subdivision and the locations of the nearest bus stops and train stations;
- Describe/show briefly the pedestrian and cycle links between the subdivision and the bus stops and train station.

See **Section 3** for advice on the extent of the area to be covered.

## 5.8 Pedestrian access

- Describe/show the existing pedestrian facilities, for example, footpaths, signalised crossings, within the subdivision (if any);
- Describe/show any proposed pedestrian facilities within the subdivision;
- Describe/show the pedestrian facilities on the roads surrounding the subdivision; and
- Outline any proposals by the applicant to improve pedestrian access.

See **Section 3** for advice on the extent of the area to be covered.

## 5.9 Cycle access

- Describe/show any existing cycle facilities, (for example, dual use paths, cycle lanes) within the subdivision;
- Describe/show any proposed cycle facilities within the subdivision;
- Describe/show any existing cycle facilities on the roads surrounding the subdivision; and
- Outline any proposals by the applicant to improve cycle access.

See **Section 3** for advice on the extent of the area to be covered.

## 5.10 Site specific issues

- Provide details of any site specific transport issues.

Some flexibility is required here to address these specific issues, as they will be different for each site. The general approach should be along the lines of:

- Describe any transport issues specific to the subdivision, as discussed and agreed with the approving authority;
- Demonstrate that these will not have an adverse impact on the surrounding area, or, if they may, propose remedial measures to redress these impacts.

Alternatively, the specific issues may relate to demonstrating that the subdivision satisfies a certain policy objective, for example, that a subdivision close to a major train station provides a high level of access to the station and would encourage increased use of the train.

## 5.11 Safety issues

- Identify and discuss any existing or potential safety issues. Where appropriate suggest remedial measures.

The previous sections may have identified existing or potential safety issues that should be expanded upon. Examples of possible safety issues include:

- a new access to the subdivision crossing a busy footpath, especially one used by school children;
- the subdivision increasing traffic through a busy priority intersection; and
- the need for pedestrians/cyclists to cross a busy road to access the subdivision.

This section should also include a discussion of possible measures to address these issues.



## Part C – Transport impact assessment

### I Introduction

A *Transport Impact Assessment* (TIA) is a detailed assessment of the transport aspects of a subdivision. It is to be submitted as part of all larger subdivision applications, in accordance with **Table 2** and **Figure 1** of **Part A** of this volume.

It is a detailed technical assessment and is therefore likely to require input from a transportation specialist. The intent of a TIA is to clearly demonstrate to the approving authority that the subdivision would:

- provide safe and efficient access for all modes;
- be well integrated with the surrounding land uses;
- not adversely impact the surrounding area; and
- not adversely impact the surrounding transport networks or the users of those networks.

It should also demonstrate that the proposed subdivision is consistent with the transportation aspects of the structure planning for the area.

Where residential subdivisions contain lots with potential for 10 dwellings or more (e.g. grouped housing sites) further TIA may be required at the development application stage. Otherwise the subdivision assessment will most probably be the final level of TIA and a high level of detail addressing all issues is therefore required.

For non-residential subdivisions, and the non-residential components of mixed use subdivisions, a further level of assessment is likely to be required at the development application stage.

### 2 Prior structure plan assessment

The subdivision may be part of a larger structure plan for which a TIA has already been undertaken. If this is the case, the subdivision TIA should extract the relevant information and revise or expand it as appropriate.

Where there is no structure plan TIA, the subdivision transport assessment may need to provide additional information on the surrounding land uses and transport networks.

Further advice on prior assessments is provided in **Section 3** of **Part A** of this volume.

### 3 Background

Historically, TIAs were carried out on a somewhat ad hoc basis, mainly for large subdivisions and concentrating on the vehicular traffic impacts, often with little or no consideration of the accessibility by, or impact on, non-car modes.

The current approach is to consider and cater for all transport modes. The term 'transport impact assessment' has been adopted to differentiate between this multi-modal approach and the previous vehicular focused approach 'traffic impact assessment'.

The TIA therefore encompasses all modes of transport, that is, public transport, walking and cycling as well as private motor vehicles and freight movements.

## 4 Extent of assessment

The TIA should cover, as a minimum:

- all sections of road where the subdivision traffic would be likely to increase traffic on any lane by more than 100 vehicles per hour (See explanatory note 1);
- all intersections where flows on any leg would increase by 10 per cent, or any movement by 20 per cent;
- Existing and proposed public transport routes.
- pedestrian routes to the nearest bus stop (for all bus routes passing through, or within 400 metres of the boundaries of, the subdivision);
- pedestrian routes to the nearest train station(s), (if within 800 metres of the boundaries of the subdivision);
- pedestrian routes to any major attractors within 400 metres, (five-minute walk), of the boundaries of the subdivision;
- cycle routes to any major attractors within 1,200 metres, (five-minute cycle), of the boundaries of the subdivision.

### Explanatory Note 1

*The 100vph threshold equates to around 10 percent of the mid-block capacity of an urban arterial lane (Austroads GTM Part 3).*

The TIA should cover all parts of the transport network that would be likely to be materially affected by the proposed land uses.

The study area will typically be larger than just the area of the subdivision. It should include, at the very least, all abutting roads and is likely to extend significantly further along particular roads or other transport corridors.

As a general guide, an increase in traffic of less than 10 per cent of capacity would not normally be likely to have a material impact on any particular section of road, but increases over 10 per cent may. All sections of road with an increase greater than 10 per cent of capacity should therefore be included in the analysis.

For ease of assessment, an increase of 100 vehicles per hour for any lane can be considered as equating to around 10 per cent of capacity. Therefore, any section of road where the structure plan traffic would increase flows by more than 100 vehicles per hour for any lane should be included in the analysis.

For sensitive areas, (for example, past schools), or where a significant proportion of the subdivision traffic is likely to be heavy commercial vehicles, a lower threshold than the above might trigger the need for assessment.

An intersection would generally be considered to be materially affected if flows on any leg increase by more than 10 per cent or any individual movement would increase by more than 20 per cent. For already congested intersections, lower thresholds may again trigger the need for assessment.

Other factors that should be taken into consideration when determining the study area include:

- change of intersection control type (for example, from priority to traffic signals);
- new or modified intersections or crossovers;
- new or widened roads, shared paths, etc.; and
- new or modified bus routes or bus stop locations.

For pedestrian and cycle routes, the area to be assessed is based on five-minute walk and cycle times to bus stops and major attractors/generators and a 10-minute walk to train stations. The objective of this component of the assessment is to identify how well the subdivision is integrated with the surrounding area and would encourage non-car modes.

The above criteria are guidelines only and the extent of the initial study area should be discussed with the approval authority prior to commencement of the assessment.

The study area may need to be revised, in agreement with the approving authority, during the course of the assessment. For example, the initial assessment may indicate that a development would have a wider impact than initially thought requiring expansion of the study area, or conversely less impact allowing a reduction in the study area.

It should be noted that inclusion of a particular road, intersection or other feature in the study area does not necessarily imply that the proponent will be responsible for all improvements that the assessment might recommend at that location.

Such decisions are beyond the scope of the guidelines. They are subject to other policies and current practice and may require detailed negotiation with the approval authority. For further information see WAPC Policy DCI.7 General Road Planning and State Planning Policy 3.6 Developers Contributions for Infrastructure.

## 5 Liaison with the relevant authorities

### 5.1 Introduction

Prior to commencement of the assessment, the proponent is **strongly encouraged** to contact the appropriate approving authority or authorities to discuss and where possible agree its scope. This is particularly important for subdivisions where no prior transport assessment has been undertaken. However, it is also important when there is a structure plan assessment, as some of the assessment parameters are likely to be different. For example, a different assessment year may be appropriate and the subdivision may generate its peak traffic outside the period adopted for the overall structure plan assessment.

It is also possible that there have been changes to the structure planning since the prior assessment, and these should be accounted for at this subdivision stage.

It should be noted that any agreements on the scope of the assessment given by the approving authority will be on a 'without prejudice' basis. The approving authority thereby reserves the right to require the proponent to amend or expand the scope or to amend the parameters used depending upon the outcomes of the initial assessment. (See also **Section 6.4 of Part A**).



## 5.2 Scope

Issues to be discussed in determining the scope of the assessment include:

- extent of the area to be assessed;
- intersections to be assessed in detail;
- assessment years;
- assessment time periods;
- issues specific to the subdivision and/or location that need to be addressed;
- any specific safety issues to be addressed;
- any committed or proposed developments in the area that need to be taken into consideration; and
- any committed or proposed improvements to the surrounding transport infrastructure that need to be taken into consideration.

## 5.3 Parameters

Parameters to be discussed include:

- trip generation rates;
- proportions of pass-by, diverted and new trips;
- directional distribution of trips;
- future year base flows; and
- traffic growth rates.

## 6 Format of assessment

### 6.1 Introduction

This section details the information that would normally be included in a TIA. The assessment should follow the general format and sequence identified in the guidelines. When reports follow a standard format, processing by the assessing officers is simplified and the time required for approval is likely to be reduced.



The assessment should be written in a clear and simple style as some of its readers may not be familiar with technical terminology. Where appropriate, technical details should be provided in appendices with the main findings and conclusions summarised in the body of the report. **Maps, plans and diagrams should be used wherever possible** for clarity of presentation and to avoid the need for lengthy descriptions.

The analysis should be fully explained to allow the reviewer to trace the steps followed in the process. Conclusions should follow logically in the order in which issues were addressed so that they can be reviewed easily, based on the information provided.

Data sources should be referenced, to allow retrieval of relevant information if required at a later date. Results of data collection and related detailed analyses should be attached as technical appendices. Electronic copies of data and/or analyses should be provided as part of the report where appropriate.

## 6.2 Structure

While there is scope for some flexibility in preparing a subdivision stage TIA, the recommended general structure is along the lines of the following:

- Summary;
- Introduction and background;
- Subdivision proposal;
- Existing situation;
- Proposed internal transport networks;
- Changes to external transport networks;
- Integration with surrounding area;
- Analysis of internal transport networks;
- Analysis of external transport networks;
- Conclusions.

## 6.3 Checklists

A checklist of the typical information required in a TIA is provided in **Appendix A2** of this volume. This checklist may be used by the proponent and/or the person undertaking the TIA as a method of ensuring that all items have been addressed and submitted with the transport information. In the case that revision of the TIA or further information is required by the approving authority a checklist is included to ensure requested information is provided.

While it is not mandatory for the checklist to be submitted with the application/TIA report, this may assist the assessors in identifying any further information required to process the application.

The level of information sought in a TIA and the required format of that information, are set out below.

# 7 Details of content

## 7.1 Introduction

This section details what should be provided in each of the items in Section 6.2. The key information to be provided is shown initially, followed by further guidance on what should be provided and how to undertake the assessment, as appropriate.

Where appropriate, references are given to additional information and guidance which can be found in **Volume 5 – Technical guidance**.

## 7.2 Summary

- Provide a summary of the TIA including a brief description of the subdivision proposal, the key transport issues, potential transport impacts and any proposed modifications to the surrounding transport networks.

## 7.3 Introduction and background

- Provide a brief description of the subdivision and the purpose and contents of the transport report including any appropriate background information.

The introduction should include the following information:

- the name of the applicant/agent/proponent and the consultant who prepared the TIA;
- a description of the subdivision location and a location map showing the site area in context;
- a brief description of the proposed land uses;
- whether or not there is a current structure plan TIA covering the area;
- a summary of key issues to be addressed;
- background information, for example, previous reports or earlier planning proposals for the site.

## 7.4 Subdivision proposal

- Provide details of the proposed subdivision including:
  - its regional/structure plan context;
  - the proposed land uses;

- a table of the quantum of each land use type proposed (for example, number of dwellings, hectares of industrial land etc.);
- major attractors and generators of traffic;
- any specific issues.

## 7.5 Existing situation

- Describe (and, where appropriate, show on a plan) the existing situation, including:
  - existing land uses within the subdivision area (if any);
  - existing land uses surrounding the subdivision;
  - existing road network within the subdivision (if any);
  - existing road network surrounding the subdivision;
  - available traffic counts on existing roads within the subdivision;
  - available traffic counts on roads surrounding the subdivision;
  - existing pedestrian/cyclist networks within the subdivision;
  - existing pedestrian/cyclist networks surrounding the subdivision;
  - existing public transport routes and bus stops/train stations within the subdivision;
  - existing public transport routes and bus stops/train stations surrounding the subdivision.

See **Part C, Section 4** for advice on the extent of the area to be covered.

The traffic counts should be for the AM and PM peak hours and by direction, where available. (See **section 7.9.3** for further guidance).



## 7.6 Proposed internal transport networks

- Describe (and, where appropriate, show on a plan) the proposed internal transport networks including:
  - changes/additions to the existing road network;
  - road reservation widths in accordance with *Liveable Neighbourhoods*;
  - road cross-sections to assess multi modal transport outcomes, congestion management and sustainable transport outcomes ) & speed limits;
  - intersection controls;
  - pedestrian/cycle networks and crossing facilities, for example, signalised pedestrian crossings;
  - public transport routes and bus stops/ train stations.
- Provide details of any discussions/ agreements with the local authority, Main Roads Western Australia (MRWA) or the Public Transit Authority (PTA), with respect to the above proposals.

This includes any discussions/agreements with:

- the local authority over local road networks and pedestrian and cycle facilities;
- MRWA regarding intersections with, or direct access onto, roads under their jurisdiction; and
- PTA on new bus services or extensions/alterations to existing bus services to serve the subdivision and ensure alignment with Transperth's Service Development Plan.

## 7.7 Changes to external transport networks

- Describe (and, where appropriate, show on a plan) any committed or proposed changes or additions to the external transport networks including:
  - the road network;
  - intersection controls;
  - pedestrian/cycle networks and crossing facilities;
  - public transport routes and bus stops/ train stations.

These changes could be those committed to or proposed by others, for example, MRWA or the local authority, or by the proponent, as part of the subdivision.

- Provide details of any discussions/ agreements with the local authority, Main Roads Western Australia (MRWA) or the Public Transit Authority (PTA), with respect to any such proposals put forward by the proponent.

Discussions are likely to be required with the affected local authority, MRWA and PTA to determine any proposed or potential changes.

## 7.8 Integration with surrounding area

- Describe the level of integration with the surrounding areas by:
  - identifying the major attractors and generators within 800 metres of the boundaries of the subdivision (See explanatory note 2);
  - identifying any proposals for major changes to the land uses within 800 metres of the boundaries of the subdivision;

- determining the main desire lines between the subdivision land uses and these external attractors and generators;
- assessing whether the existing transport networks, plus any proposed changes, would adequately match these desire lines, particularly for pedestrians, cyclists and public transport users (See explanatory note 3);
- identifying any deficiencies in the surrounding transport networks and/or areas where improvements could be made (See explanatory note 3); and
- proposing/suggesting remedial measures to address these deficiencies.

Consideration may also be required of the impact of **traffic noise** on both the subdivision area itself and the surrounding area. Further advice on this requirement is provided in *State Planning Policy 5.4 Road and Rail Transport Noise and Freight Considerations in Land Use Planning* and **Volume 5 – Technical guidance**.

See **Section 4** for advice on the extent of the area generally to be covered.

The intent of this section is to identify how well the proposed subdivision integrates with the surrounding land uses with respect to transport links and accessibility. This is to be a qualitative assessment of the level of accessibility and integration between the subdivision and the surrounding land uses. A quantitative analysis of the transport networks is to be undertaken later, in **Section 7.11**.

## Explanatory Note 2

*Major generators would be those external land uses, primarily residential, from which people would be attracted to land uses within the subdivision, for example, to schools, shopping centres or sports facilities.*

*Major attractors would be those external land uses (for example, schools, shopping centres or sports facilities) that would attract people from within the subdivision, that is, primarily from the residential areas.*

## Explanatory Note 3

*The assessment should consider the directness of the route(s) and the quality of the connecting pedestrian and cycle networks. It should identify whether there are any existing public transport services or whether any are proposed.*

*Potential deficiencies, or areas for improvement, could include missing or substandard sections of footpath and/or cycle path, the absence of safe crossing facilities where major roads need to be crossed and the absence of public transport links.*

## 7.9 Analysis of transport networks – general advice

### 7.9.1 Introduction

The assessment to date has provided a description and an inventory of the subdivision proposal and surrounding area with respect to land uses and transport networks. The next two sub-sections (**7.10 and 7.11**) require a more detailed quantitative analysis of the proposed internal and external transport networks to demonstrate that they will provide a high level of accessibility and safety for all modes.

Much of this analysis should already have been undertaken as part of the process of determining and designing the required transport networks. It should therefore be

more a matter of presenting this design assessment than undertaking a new assessment.

### 7.9.2 Assessment years

The assessment years will generally be the year of full development of the subdivision plus the assessment year adopted for the structure plan. If there is no structure plan assessment, then 10 years after full opening of the subdivision is suggested for the post full subdivision development assessment.

It is recommended that the **applicant discuss and agree the appropriate years for assessment with the approving authority** in advance of undertaking the assessment.

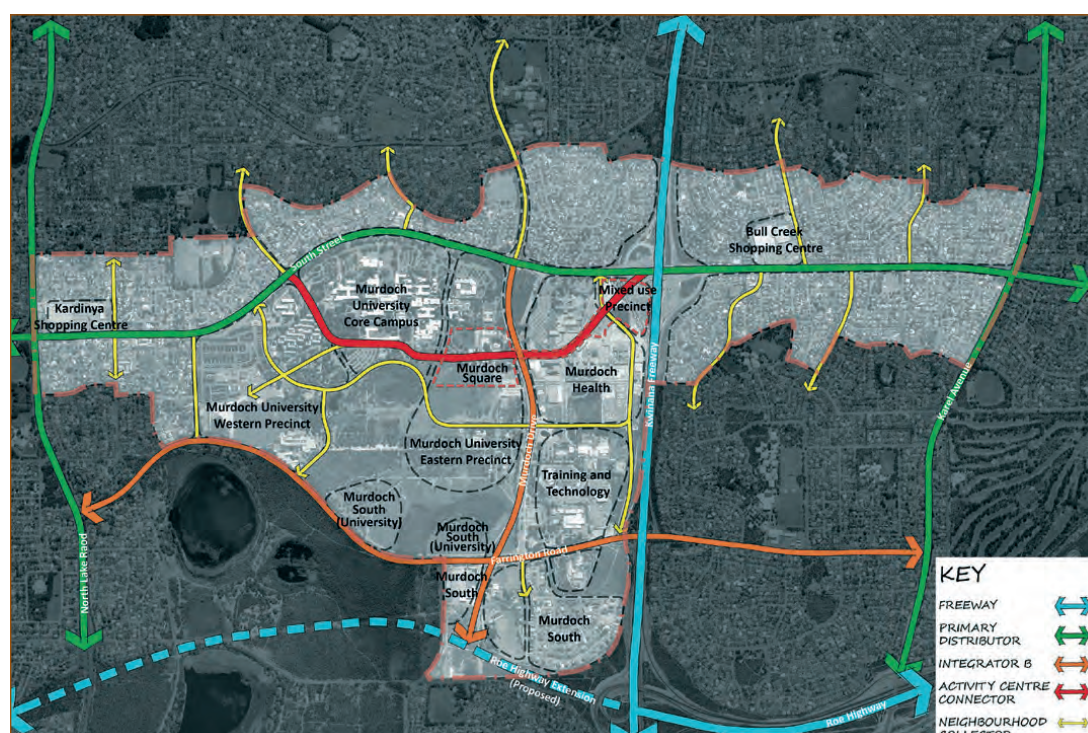
The “year of full development” assessment will provide a measure of the transport impact, once the subdivision is fully developed. The “post full development”

assessment, (structure plan year or 10-year after opening), will provide a measure of the ability of the proposed transport infrastructure to accommodate subdivision flows plus further growth in the surrounding traffic, as the rest of the structure plan area is developed, over time.

Some of this additional traffic may use the subdivision roads, as well as the roads immediately surrounding the subdivision. The post full subdivision development assessment is therefore an important component of the subdivision transport assessment.

Where there is a prior structure plan assessment, the post full development assessment should consider whether the subdivision is substantially unchanged from that assumed in the structure plan assessment. If it is unchanged, the “post” assessment can simply be extracted from the structure plan assessment. If it is significantly changed, then a revised assessment is required.

### Figure 3: Example of activity centre road network



Where there is no prior structure plan assessment, a more detailed assessment of the post full development scenario is required to determine the potential medium to longer term impacts of the subdivision on the surrounding transport networks and of the development of the surrounding area on the subdivision itself.

### 7.9.3 Time periods for assessment

The subdivision should generally be assessed for the following peaks:

- peak period(s) of the surrounding road network; and
- peak period(s) for the subdivision.

The peaks on the surrounding roads are generally the weekday morning (7am - 9am) and evening (4pm - 6pm) periods. These may be different closer to specific land uses or in specific locations, for example roads near beaches may be busiest during summer weekends. The appropriate highway peaks should therefore be agreed in advance with the approving authority if there is any doubt. Information may be extracted from SCATS data, if there are signalised intersections in the vicinity.

For subdivisions near schools it may also be appropriate to assess the afternoon end of school period, for example, 2.30pm – 3.30pm.

The peak period(s) for the subdivision depends upon the type of land uses within it. The appropriate peak(s) is likely to be identified as part of determining the trip generation in **Section 7.10.3** and if there is any doubt, should also be agreed with the approving authority.

Further advice on the appropriate time periods is provided in **Volume 5 – Technical guidance**.

## 7.10 Analysis of internal transport networks

### 7.10.1 Introduction

This section presents the steps recommended to undertake and present the analysis of the proposed internal transport networks.

### 7.10.2 Assessment parameters

- Determine the years for assessment and the time periods for the traffic flow analysis.

The assessment years and the time periods for analysis should be in accordance with the advice provided in **Section 7.9**.

### 7.10.3 Subdivision generated traffic

- Project the traffic volumes that would be generated by the subdivision land uses, for the assessment years and time periods determined in **Section 7.10.2**.

A suggested approach is to:

- divide the subdivision into a number of smaller zones;
- determine the quantum of each land use in each zone;
- determine vehicle trip generation rates for each land use type (See explanatory note 4 below);
- apply the trip rates to the land uses in each zone to obtain inbound and outbound trips for each zone;
- determine the internal/external split of vehicle trips for each zone (See explanatory note 5 below); and
- distribute trips onto the internal and external road networks.



## Explanatory Note 4 – Trip rates

Vehicle trip generation rates are to be based on surveys of comparable land uses or extracted from recognised land use traffic generation databases such as:

- Guide to Traffic Generating Developments Version 2.2, October 2002 – Roads and Traffic Authority, New South Wales and 2013/04a Updated Traffic Surveys; and
- Trip Generation Manual – Institute of Transportation Engineers, Washington, USA

In the absence of more accurate data, the typical (average) trip rates shown in **Table 2** below, (which have been extracted from the currently available data bases), should be considered as default values for the main land use types. Thus, any variation to these values should be recorded and justified.

The table shows typical (average) vehicle trip rates for the various land uses. These rates can vary significantly, especially for retail developments and professional judgement should be used when determining appropriate trip rates.

Wherever more details are known on a particular development within the subdivision, a trip rate appropriate to that specific development should be used rather than the generic rates above.

Further advice on determining appropriate trip rates is provided in **Volume 5 – Technical guidance**.

## Explanatory Note 5 – Internal vehicle trips

Some of the vehicle trips generated by the subdivision land uses are likely to be attracted to other uses within the subdivision area, for example, trips from a residential area to the local shops or school. These would only appear on the internal road network and can be described as internal trips. The remaining trips would be attracted to land uses outside the subdivision area, for example, to the district shopping centre. These can be considered as external trips.

This split of internal to external trips is likely to be different for each subdivision and is dependent upon a number of factors including size of the

**Table 2: Typical land use vehicle trip rates**

LAND USE	UNIT	AM peak hour trip rate			PM peak hour trip rate		
		In	Out	Total	In	Out	Total
Residential	Dwellings	0.2	0.6	0.8	0.5	0.3	0.8
School	Pupils	0.5	0.5	1.0	0.5	0.5	1.0
Commercial	100m <sup>2</sup> GFA	1.6	0.4	2.0	0.4	1.6	2.0
Retail (Food) <sup>ab</sup>	100m <sup>2</sup> GFA	2.0	0.5	2.5	5.0	5.0	10.0
Retail (Non-food) <sup>b</sup>	100m <sup>2</sup> GFA	1.0	0.25	1.25	2.0	2.0	4.0
Industrial	100m <sup>2</sup> GFA	0.8	0.2	1.0	0.2	0.8	1.0

GFA = gross floor area

a – These rates should be applied to retail developments/ shopping centres that have a significant food retail component.

b – The trip rates for both food and non-food retail stores can vary significantly depending upon a number of issues including type of goods sold, location and size. Caution should be used in applying these rates arbitrarily.

*subdivision, the range of land uses and facilities within it and the land uses in the surrounding areas.*

*For example, a subdivision that is predominantly residential would have a very high proportion of external trips. A large subdivision with a wide range of land uses and facilities, for example, schools, shops, employment and recreation as well as residential, would be likely to have a high proportion of internal trips.*

*A subdivision based on Liveable Neighbourhoods principles would therefore be likely to have a higher proportion of internal trips than a subdivision based on more conventional design principles.*

It is not possible within these guidelines to provide firm advice on what proportions to use for internal/external trips, as each subdivision will be different. The transport assessor should therefore use professional judgement when determining an appropriate internal/external split backed up with supporting information, data, surveys etc. where available.

In some cases where the potential adverse impacts on the surrounding land uses and transport networks may be significant, sensitivity testing of a range of possible internal/external splits may be appropriate.

## **7.10.4 Non subdivision traffic**

- Assess the potential for extraneous (, that is, through) traffic to use the roads within the subdivision.

Depending upon the subdivision layout, there may be existing traffic passing through the site on existing roads and/or the new road layout may attract traffic from surrounding roads. This potential for extraneous traffic should be assessed for the subdivision assessment years and time periods.

## **7.10.5 Design traffic flows**

- Determine the traffic flows to use to design the internal road network by adding the extraneous traffic (See 7.10.4) to the subdivision generated traffic (See 7.10.3).

## **7.10.6 Roads and intersections**

- Determine the road cross-sections required, for example, two lane or four lane, to accommodate the above design traffic flows.
- Demonstrate that adequate sight distance is provided at each intersection. Undertake a detailed intersection operational analysis.
- Determine the intersection controls required, for example, priority, roundabout or traffic signals, to accommodate the above design traffic flows.

The road cross-sections should be in accordance with *Liveable Neighbourhoods* and/or Austroads design guidelines, in particular the *Guide to Road Design* (GRD) series.

The intersection analyses should be undertaken in accordance with *GRD parts 4 – Intersections and Crossings - General, 4a – Traffic Signals and 4b – Roundabouts*. It should be sufficient to demonstrate that adequate sight distances are provided for intersections within the subdivision and for new intersections providing access to the subdivision.

It should also demonstrate that the proposed methods of control are appropriate and would satisfy operational and safety requirements as stated in Table 6.1 of Austroads *GTM Part 3: Traffic Studies & Analysis*, which provides indicative volumes above which an intersection analysis should be carried out.

The intersection analysis should demonstrate that the delays would be less than shown in **Table 3**. If they are not, the proponent should propose suitable improvements to the intersection layout and/or changes to the method of control, (for example, from priority to signals).

## 7.10.7 Access to frontage properties

- Develop/revise strategies to provide access to properties fronting all roads carrying more than 500 vehicles per hour. Strategies to be considered include:
  - individual direct access;
  - shared access (between two properties);
  - service lanes;
  - no frontage access.

The 500 vehicles per hour threshold is based on the *Liveable Neighbourhoods* Element 2 advice that vehicles reversing directly out of driveways should be avoided on roads carrying more than 5,000 vehicles per day.

If access strategies were developed at the structure plan stage, they should be reviewed and revised as necessary. If not, they should be developed at this stage.

The access strategies should determine how individual lots should be accessed, for example, one access per lot or shared access or service road. This should be based on the function of the road and its projected traffic volumes. This strategy then forms the basis for the individual lot access arrangements at the individual development application stage.

**Table 3: Guideline thresholds for intersection operation**

Criteria	Average Delay (secs/veh)
<b>Signalised intersections</b> Average delay for all vehicles passing through the intersection Average delay for any individual vehicle, pedestrian or cyclist movement	<55 secs <65 secs
<b>Priority intersections (roundabouts, give way and stop)</b> Average delay for all vehicles on the non-priority arms (, that is, have to give way or stop) Average delay for any individual vehicle, pedestrian or cyclist movement	<35 secs <45 secs
<b>Right turn lanes</b> Exclusive turning movement queue length	Less than available storage length (95th percentile queue)

Note – This table is based on the US Highways Capacity Manual's level of service approach. The delays above equate to the upper limit delay of Level of Service D for intersections as a whole and the middle of Level of Service E for individual movements.

Subdivision in industrial areas which will generate many heavy vehicle movements may call for special access arrangements for heavy vehicles.

## 7.10.8 Pedestrian/cycle networks

- Review/undertake an analysis of the operation and safety of the pedestrian/cycle networks including:
  - identifying which roads could potentially be difficult for pedestrians and cyclists to cross;
  - identifying where safe crossing facilities should be provided; and
  - indicating where safe crossing facilities are proposed.

The key component of the analysis is the ability of pedestrians/cyclists to cross major roads and at intersections. This includes the ability of public transport users to cross the road to access bus stops.

The analysis should include identifying which roads within the subdivision are likely to have traffic volumes that would adversely impact the efficiency and safety of pedestrians trying to cross. This depends upon the road cross-section as shown in **Table 4**.

Note that four lane undivided roads without pedestrian refuge islands are the most difficult to cross, the difficulties occurring at lower volumes than for a two lane road. This is due to the longer time required to cross the road, requiring a longer gap in the traffic. For this, and other safety reasons, (for example, greater potential for head on collisions), four lane undivided roads should not be considered in any new road network planning.

**Table 4: Traffic volumes affecting pedestrian crossing amenity**

Road cross-section	Traffic volume affecting ability of pedestrians to cross * (vehicles per hour – two-way)
2 lane undivided	1,100 vph
2 lane divided (or with pedestrian refuge islands)	2,800 vph
4 lane undivided (without pedestrian refuge islands)	700 vph
4 lane divided (or with pedestrian refuge islands)	1,600 vph

\* See the Pedestrian assessment section of **Volume 5** for details on how the above volume thresholds were determined.



The analysis should also identify where safe crossing facilities should be provided and indicate where they are proposed, concentrating on:

- key locations on the pedestrian network (e.g. along major pedestrian desire lines identified in **Sections 7.4 and 7.6**); and
- proposed bus stop locations, if known, or potential bus stop locations.

In addition, to ensure an efficient and safe pedestrian/cyclist network, safe crossing facilities should be considered at intervals no greater than shown in **Table 5** for the roads identified above as posing difficulties for pedestrians.

Examples of safe crossing facilities are:

- pedestrian refuge islands (up to the volumes shown in **Table 2**);
- zebra crossings;
- signalised pedestrian crossings (mid-block);
- crossing facilities at signalised intersections; and
- overpasses/underpasses (where appropriate).

Note that for undivided roads carrying greater volumes than those in **Table 5**, the provision of pedestrian refuge islands may not provide an acceptable level of service to pedestrians and one of the other facilities above may need to be considered.

## 7.10.9 Safe walk/cycle to school assessment (residential subdivisions only)

- Undertake an assessment of the walk/cycle routes to schools by:
  - identifying all schools within the subdivision and those within 800 metres of the boundaries of the subdivision;
  - identifying the potential catchment for each school;
  - identifying the most likely walk and cycle routes to each school from the catchment areas;
  - determining any potential deficiencies, or areas where improvements could be made, along these routes; and
  - proposing measures to address these deficiencies.

**Table 5: Maximum desirable spacings for safe pedestrian crossings**

Road type	Maximum spacing of safe pedestrian crossing facilities*
Arterial – minimal frontage activity	400 metres
Arterial – significant frontage activity	200 metres
Local distributor/Neighbourhood connector	100 metres

\* See the Pedestrian assessment section of **Volume 5** for the rationale behind these spacings.

This is an extension of the general walk/cycle assessment undertaken above, but concentrating on the walk/cycle routes to school. The key component is again the ability to safely cross major roads. The assessment should be based on the analysis method of **Section 7.10.8**, but with recognition that school children, and particularly primary school children, may experience difficulties at lower traffic levels.

The analysis should therefore identify locations where potential crossing difficulties are likely and recommend remedial measures. These measures could include signalised pedestrian crossings or a children's crossing with a warden. The latter should include a discussion on whether the required type A or B crossing warrants would be likely to be met.

- The assessment should also identify any missing or substandard sections of footpath/cycleway along these routes.

### 7.10.10 Pedestrian permeability and efficiency

- Undertake a walkable catchment analysis in accordance with *Liveable Neighbourhoods* Appendix 2 for;
  - all neighbourhood or town centres within the subdivision;
  - all existing or proposed bus stops within the subdivision;
  - that part of the subdivision within 400 metres of an external existing or proposed bus stop;
  - all existing or proposed train stations within the subdivision;
  - that part of the subdivision within 800 metres of an external existing or proposed train station.

Note that while this is a requirement for those subdivisions designed and submitted in accordance with *Liveable Neighbourhoods*, it is suggested that walkable catchment analysis also be undertaken for those subdivisions submitted in accordance with DC policy.

The walkable catchment analysis, as described in *Liveable Neighbourhoods* Appendix 2, is a good way of assessing the permeability and efficiency of the proposed pedestrian network.

Walkable catchment calculations are expressed as the actual area within a five-minute walking distance as a percentage of the *theoretical* area within a five-minute walking distance. The theoretical five-minute walking distance is shown as a circle, with a radius of 400m, drawn around any particular centre. This is an area of about 50ha. When calculating a ten-minute walking distance, the radius used is 800m, resulting in a circle with an area of around 200ha.

For any urban area, the higher the percentage within a five minute walk, the better its walkability. A good target for a walkable catchment is to have 60% of the area within five-minutes walking distance, or ten minutes in the case of stations.

Some bus stops and/or train stations may be outside the subdivision itself but still within reasonable walking distance. A walkable catchment analysis of those parts of the subdivision within 400 metres of the bus stops and 800 metres of the train stations should be undertaken to demonstrate that the proposed pedestrian network within the subdivision provides a high level of permeability to these external transport nodes.

## 7.10.11 Access to public transport

- Determine the level of access to public transport by calculating the percentage of proposed residential dwellings that are within 400 metres walk of an existing or proposed bus route, (or 500 metres from bus stops if known). The higher the percentage, the higher the level of access.

One of the ongoing KPIs PTA has in its Annual Report measures “the proportion of street addresses within the Perth public transport area which are within 500m of a Transperth stop providing an acceptable level of service.” It is recommended that a figure of at least 90 per cent be achieved.

At the subdivision stage, existing and proposed bus routes are likely to be known, but new bus stop locations may not. The assessment should therefore be based on a walking distance of 500 metres to bus stops, if their locations are known, or a walking distance of 400 metres to bus routes, if the bus stop locations have not been decided.

## 7.11 Analysis of external transport networks

### 7.11.1 Introduction

This section presents the steps recommended to undertake and present the analysis of the transport networks surrounding the subdivision.

### 7.11.2 Extent of analysis

The extent of analysis of the external road networks is to be in accordance with **Section 4**.

### 7.11.3 Design traffic flows on external road network

- Determine the design traffic flows on the external road network for the assessment years and time period(s) of **Section 7.10.2**.

This task will depend upon whether or not there is a prior structure plan TIA undertaken in accordance with these guidelines.

If there is, the external road network traffic flows should be extracted from the structure plan assessment and adjusted as required for any changes to the proposed subdivision compared to that assumed in the structure plan.

Where the structure plan and subdivision assessment years and/or time periods differ, the structure plan assessment should be used as a basis for determining the required subdivision period flows.

If there is no prior assessment, or if the assessment did not include projected flows on external roads, the following approach is suggested:

- Extract the existing traffic flows (from **Section 7.5**)
- Adjust these to the subdivision assessment years by:
  - obtaining future year volumes from the State's transport models, where available; or
  - applying a growth factor, agreed with the approving authority, to existing traffic volumes; or
  - using a recognised traffic engineering technique, as agreed with the approving authority.
- Adjust for any committed or proposed developments in the surrounding area (as discussed and agreed with the approving authority – **Section 5.2**).

- Adjust for any committed or proposed transport network changes, (as discussed and agreed with the approving authority – **Section 5.2**).
- Add the traffic generated by the subdivision (from **Section 7.10.3**).

Note that the State's transport models may or may not contain the proposed subdivision land uses. If flows are extracted from either of the models, they may need to be adjusted to allow for any variations in the assumed subdivision land uses.

## 7.11.4 Impact on external roads

- Assess whether the existing road cross-sections, for example, two lane or four lane, would be adequate to accommodate the above design traffic flows.

If not, indicate what improvements would be required.

The impact of changes in traffic flows on the roads surrounding the subdivision is to be assessed based on *Liveable Neighbourhoods*, where appropriate, or by using the relevant volumes of the *Austroads Guides to Road Design and Traffic Management* or a recognised alternative technique as agreed with the approving authority.

The assessment is to consider the capacity of the links to carry the projected volumes, the likely change in level of service and, where appropriate, the impact on travel times and safety.

Where increased traffic volumes will impede the efficient flow of a current or proposed bus route, consideration should be given to the provision of bus priority infrastructure and/or measures such as dedicated bus lanes and queue jumps.

## 7.11.5 Impact on external intersections

- Assess whether the existing intersection controls for example, priority, roundabout or traffic signals, would be able to accommodate the above design traffic flows.

If not, indicate what improvements would be required.

The analysis of intersections is a major component of the assessment of the external road network as the greatest impacts of a subdivision's traffic would be likely to occur at intersections.

The operation of all relevant intersections in the study area should be evaluated for each time period in the assessment years, with and without the proposed subdivision.

This should identify the changes in operation, for example, delays and queue lengths, due to the subdivision traffic, and determine whether the subdivision traffic could be accommodated under the current intersection layout or whether remedial measures (improvements) may be required.

The thresholds for consideration of remedial measures are as shown in **Table 3**. These are guideline thresholds only and remedial measures may be required, at the discretion of the approving authority, even when the thresholds have not been reached.

When any of the thresholds are exceeded in the 'with development' scenario, the developer should identify and assess remedial measures to achieve the following.

- Where the thresholds are exceeded in the base flow scenario, the proposed remedial measures should return conditions to their 'without development' levels.

- Where thresholds are not exceeded in the base scenario, the proposed remedial measures should reduce conditions to no more than the above threshold levels.

The objective of the remedial measures is therefore for the operation of the intersections to remain within the thresholds or, if the thresholds will be exceeded even without the addition of the proposed subdivision, conditions should be made no worse by the proposed subdivision than they would be without it.

## 7.11.6 Pedestrian/cycle networks

- Undertake an analysis of the operation and safety of the external pedestrian/cycle networks including:
  - identifying which roads could potentially be difficult for pedestrians and cyclists to cross;
  - identifying where safe crossing facilities should be provided;
  - indicating where safe crossing facilities are proposed.

This analysis is comparable to that undertaken in Section 7.10.8 for the internal transport networks but is to concentrate on:

- pedestrians routes to attractors within 400 metres (five-minute walk);
- pedestrian routes to bus stops within 400 metres (five-minute walk);
- pedestrian routes to train stations within 800 metres (10-minute walk); and
- cycle routes to attractors within 1,200 metres (five-minute cycle)

The key component of the analysis is again the ability of pedestrians/cyclists to cross major roads and at intersections. This includes the ability of public transport users to cross the road to access bus stops. It should consider both the pedestrians/cyclists generated by the subdivision land uses and the impact of the subdivision traffic on existing pedestrians and cyclists.





The analysis should identify which roads are likely to have traffic volumes that would adversely impact on the efficiency and safety of pedestrians trying to cross, as per **Table 4**. The traffic volumes are to be as determined in **Section 7.11.3**.

Note that, while the analysis should concentrate on the network outlined above, there may be roads further afield where flows have increased to above those in Table 4 due to the subdivision traffic. The potential need for safe crossings on these roads should also be identified.

The analysis should also identify where adequate safe crossing facilities are already provided, where they may be required and indicate where any new facilities are proposed. The analysis should concentrate on:

- key locations on the pedestrian network (, that is, along major pedestrian desire lines identified in **Section 7.8**)
- existing bus stop locations
- proposed or potential bus stop locations

In addition, to ensure an efficient and safe pedestrian/cyclist network safe crossing facilities should be provided at intervals no greater than shown in **Table 5** for the roads identified above as posing difficulties for pedestrians.

Safe crossing facilities are:

- pedestrian refuge islands (up to the volumes shown in **Table 4**)
- zebra crossings
- signalised pedestrian crossings (mid-block)
- crossing facilities at signalised intersections
- overpasses/underpasses (where appropriate)

Note that for undivided roads carrying greater volumes than those in **Table 4**, the provision of pedestrian refuge islands may not provide an acceptable level of service to pedestrians and one of the other facilities above may need to be considered.

## 7.12 Safety issues

- Identify and discuss any existing or potential safety issues raised by the proposed subdivision.
- Where appropriate, propose remedial measures to address the safety concerns.

The previous sections may have identified existing or potential safety issues that should be expanded upon. Examples of possible safety issues include:

- a new access to the subdivision crossing a busy footpath, especially one used by school children;
- the subdivision increasing traffic through a busy priority intersection; and
- the need for pedestrians/cyclists to cross a busy road to access the subdivision

The assessment should examine any particular intersections or other locations that may be of concern, that is, either identified during the transport assessment or raised by the approval authority (**Section 5**).

If the subdivision proposal would worsen conditions at existing locations with safety issues or raise new safety concerns at other locations, then appropriate measures should be investigated to minimise the adverse impacts.

Note that a road safety audit is not a standard component of a transport assessment and would not normally be required. However, in cases where the subdivision would significantly increase

traffic volumes and/or major changes to the transport infrastructure are proposed, the approving authority may require the applicant to submit a road safety audit to assess any safety implications. The road safety audit would need to be prepared by accredited road safety auditors and should be presented separately.

## 7.13 Conclusions

- Provide a summary of the findings and conclusions of the TIA.



## Appendix A I: Checklist for subdivision transport impact statement



## Checklist for a transport impact assessment of a subdivision

- Tick the provided column for items for which information is provided.
- Enter N/A in the provided column if the item is not appropriate and enter reason in comments column.
- Provide brief comments on any relevant issues.
- Provide brief description of any proposed transport improvements, for example, new bus routes or signalisation of an intersection.

ITEM	PROVIDED	COMMENTS/PROPOSALS
<b>Proposed subdivision</b>		
proposed land uses		
existing land uses		
context with surrounds		
<b>Vehicular access and parking</b>		
access arrangements		
public, private, disabled parking set down/pick up		
<b>Service vehicles (non-residential subdivisions only)</b>		
access arrangements		
on/off-site loading facilities		
<b>Traffic volumes and vehicle types (non-residential subdivisions only)</b>		
daily or peak traffic volumes		
type of vehicles (eg cars, trucks)		
<b>Traffic management on frontage streets</b>		
<b>Public transport access</b>		
nearest bus/train routes		
nearest bus stops/train stations		
pedestrian/cycle links to bus stops/ train station		

# TRANSPORT IMPACT ASSESSMENT GUIDELINES

ITEM	PROVIDED	COMMENTS/PROPOSALS
<b>Pedestrian access/facilities</b>		
existing pedestrian facilities within the subdivision (if any)		
proposed pedestrian facilities within subdivision		
existing pedestrian facilities on surrounding roads		
proposals to improve pedestrian access		
<b>Cycle access/facilities</b>		
existing cycle facilities within the subdivision (if any)		
proposed cycle facilities within subdivision		
existing cycle facilities on surrounding roads		
proposals to improve cycle access		
<b>Site specific issues</b>		
<b>Safety issues</b>		
identify issues		
remedial measures		

**Proponent's name** .....

**Company** ..... **Date** .....

**Transport assessor's name** .....

**Company** ..... **Date** .....

## Appendix A2: Checklist for structure plan transport impact assessment

## Checklist for a transport impact assessment of a structure plan

- Tick the provided column for items for which information is provided.
- Enter N/A in the provided column if the item is not appropriate and enter the reason in the comments column.
- Provide brief comments on any relevant issues
- Provide brief description of any proposed transport improvements, for example, new bus routes or signalisation of an intersection.

ITEM	PROVIDED	COMMENTS/PROPOSALS
<b>Summary</b>		
<b>Introduction/Background</b>		
name of applicant and consultant		
subdivision location and context		
brief description of subdivision		
key issues		
background information		
<b>Subdivision proposal</b>		
regional context		
proposed land uses		
table of land uses and quantities		
major attractors/generators		
any specific issues		
<b>Existing situation</b>		
existing land uses within structure plan		
existing land uses surrounding the subdivision		
existing road network within subdivision		
existing road network surrounding the subdivision		
traffic flows on roads within subdivision (AM and PM peak hours)		
traffic flows on roads surrounding the subdivision (AM and PM peak hours)		
existing pedestrian/cycle networks within the subdivision		
existing pedestrian/cycle networks surrounding the subdivision		

# TRANSPORT IMPACT ASSESSMENT GUIDELINES

ITEM	PROVIDED	COMMENTS/PROPOSALS
<b>Existing situation (cont.)</b>		
existing public transport services within the subdivision		
existing public transport services surrounding the subdivision		
<b>Proposed internal transport networks</b>		
changes/additions to existing road network		
road reservation widths		
road cross-sections & speed limits		
intersection controls		
pedestrian/cycle networks and crossing facilities		
public transport routes		
<b>Changes to external transport networks</b>		
road network		
intersection controls		
pedestrian/cycle networks and crossing facilities		
public transport services		
<b>Integration with surrounding area</b>		
surrounding attractors/generators		
proposed changes to surrounding land uses		
travel desire lines from subdivision to these attractors/generators		
adequacy of existing transport networks		
deficiencies in existing transport networks		
remedial measures to address deficiencies		
<b>Analysis of internal transport networks</b>		
assessment years and time periods		
subdivision generated traffic		
extraneous (through) traffic		
design traffic flows		
road cross-sections		



# TRANSPORT IMPACT ASSESSMENT GUIDELINES

ITEM	PROVIDED	COMMENTS/PROPOSALS
<b>Analysis of internal transport networks (cont.)</b>		
intersection sight distances		
intersection operation and method of control		
frontage access strategy		
pedestrian/cycle networks		
safe walk/cycle to school assessment (residential subdivisions only)		
pedestrian permeability & efficiency		
access to public transport		
<b>Analysis of external transport networks</b>		
base flows for assessment years		
total traffic flows		
road cross-sections		
intersection operation		
pedestrian/cycle networks		
<b>Safety issues</b>		
identify issues		
remedial measures		
<b>Conclusions</b>		

**Proponent's name** .....

**Company** ..... **Date** .....

**Transport assessor's name** .....

**Company** ..... **Date** .....

# TRANSPORT IMPACT ASSESSMENT GUIDELINES

## Transport impact assessment revision checklist

Please include this checklist when providing revisions to transport impact assessments (TIAs) to the Department of Planning, to identify changes made.

**Name of planning application:** .....

Date/revision no. of previous TIA: .....

**Date/revision no. of revised TIA:** .....

[illegible]

If information/changes not provided, please attach explanatory notes, using item no. to identify information/change request.