

**Transport impact guidelines
for site development
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Transport impact guidelines for site development

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Abbreviations and acronyms

AADT	Annual average daily traffic
DCLG	Department for Communities and Local Government (United Kingdom)
DfT	Department for Transport (United Kingdom)
GFA	Gross floor area
IHT	Institute of Highways and Transportation (United Kingdom)
IPENZ	Institution of Professional Engineers in New Zealand
ITE	Institute of Transportation Engineers
LOS	Level of service
LTMA	Land Transport Management Act 2003
MoT	Ministry of Transport, New Zealand
OZP	Outline zoning plans (for use in Hong Kong)
PPG13	Planning policy guidance note 13: Transport (United Kingdom)
RMA	Resource Management Act 1991
RTA	Road and Transport Authority (of New South Wales, Australia)
TDM	Travel demand management
TfL	Transport for London
TIA	Transport impact assessment
TLA	Territorial local authority
TRAVL	Trip Rate Assessment Valid for London (database)
TRICS	Trip Rate Information Computer System (United Kingdom)

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Executive summary

Background and introduction

This research project to develop best practice guidelines for carrying out transport assessment of development proposals in New Zealand was undertaken during 2005 and 2006 by Beca Infrastructure Limited. The need for such guidelines had been identified due to significant variation in the assessments of transport impacts of developments around New Zealand. In many cases these had not fully taken into account the passing of key national legislation, including the Resource Management Act 1991 and the Land Transport Management Act 2003.

It was determined that the guidelines should serve two main purposes:

- a guide for those carrying out transport impact assessments (TIA) that identifies the scope and content of the assessments according to development location, type and size
- a guide for those reviewing such assessments to determine that the content is appropriate to the size, location and type of development being assessed.

This guide does not replace existing Transit New Zealand and Auckland Regional Transport Authority guidelines.

Process

The developer and council should initially determine the need for a TIA. Both should be aware of the key issues of the transport network prior to discussing the site. After the developer has completed a pre-application questionnaire, the council will decide if a TIA is required and, if so, the level of detail it should contain. The scope of the assessment should be determined by the council through discussion with the developer.

There are four levels of detail for transport assessment:

- Basic assessment – the proposed development will have a negligible transport impact.
- Neighbourhood transport impact assessment – the proposed development will have a minor transport impact over the local transport network.
- Local area transport impact assessment – the proposed development will have a significant transport impact over the local transport network.
- Wide area transport impact assessment – the proposed development will have a significant transport impact over the wider transport network.

The level of detail required will depend on the level of impact expected from the proposed development.

Depending on the level of assessment some or all of the following inputs will be required:

- existing site data
- existing transport data
- committed development
- policy
- proposed development details
- trip generation
- sustainable travel initiatives
- capacity testing and mitigation.

A checklist of inputs to each level of the TIA is provided in Appendix A and a flowchart for the process is provided in Appendix B.

Abstract

This research project develops best practice guidelines for carrying out transport impact assessments (TIA) of development proposals in New Zealand. International research was undertaken during 2005 and 2006 by Beca Infrastructure Limited. There is a significant variation in the content of TIAs for developments around New Zealand, which in many cases have not fully taken into account the passing of key national legislation, including the Resource Management Act 1991 and the Land Transport Management Act 2003.

The guideline serves two main purposes:

- a guide for those carrying out TIAs that identifies the scope and content of assessments according to development location, type and size
- a guide for those reviewing such assessments to determine that the content is appropriate to the size, location and type of development being assessed.

A process has been identified from notifying council of the proposal through to completion of the TIA, if required. This does not replace existing Transit New Zealand and Auckland Regional Transport Authority guidelines.

Checklists of inputs to TIAs have been developed for four identified levels of assessment (basic, neighbourhood, local area and wide area). The level of detail required will depend on the level of impact expected from the proposed development.

1. Introduction

1.1 Background

This research project to develop best practice guidelines for carrying out transport assessments of development proposals in New Zealand was undertaken from 2005 to 2007 by Beca Infrastructure Limited. The need for such guidelines had been identified due to significant variation in the assessments of transport impacts of developments around New Zealand. In many cases these had not fully taken into account the passing of key national legislation, including the Resource Management Act 1991 and the Land Transport Management Act 2003.

This guide does not replace existing Transit New Zealand and Auckland Regional Transport Authority guidelines.

1.2 Aims and objectives

The aim of this research was to understand international best practice for carrying out assessments of the transport impacts of developments and identify the most appropriate practices for New Zealand, before compiling these into a set of guidelines that could be used by transport professionals.

It was determined that the guidelines should serve two main purposes:

- a guide for those carrying out transport impact assessments (TIA) that identifies the scope and content of assessments according to development location, type and size
- a guide for those reviewing such assessments to determine that the content is appropriate to the size, location and type of development being assessed.

The objective of the research was, therefore, to create a simple and intuitive reference guide to completing TIAs that would serve both these roles. The design of a simple flow chart, backed up with examples and additional advice, was considered to be the best means of achieving this objective.

2. Determining the need for transport impact assessments

2.1 Background

New Zealand's Resource Management Act 1991 (RMA) sets out the duties of local authorities and other statutory planning authorities to consider the impact of development proposals, including transport impacts. The Act also requires territorial local authorities to produce and update the district plans against which all resource consent applications are assessed.

In addition to the legislation relating to district plans, the RMA also defines how the resource consent process must be managed and the process to be followed for the notification of resource consent applications. The RMA includes legislation defining the process to be followed for hearings, should these be requested by the planning authority or by any party making a submission on notified resource consents.

2.2 Initial contact

The need for a TIA will be determined through initial discussions between the developer and the council. The developer or consultant acting on the developer's behalf should fill out a pre-application questionnaire to submit to the council's planning officer. This questionnaire is discussed in greater detail in Section 2.3. The planning officer will circulate this within the council for review. The questionnaire is intended to facilitate early discussions regarding the development and not replace contact between the developer and the council. The questionnaire informs the council on the general form, scale and location of the development. This will enable a considered discussion between the council and the developer early in the resource consent application process.

Thresholds for the detail required within a TIA will need to be developed to guide the council on the level of assessment required. The thresholds will also provide the developer with an indication as to whether a specialist transport consultant needs to be engaged on the project. These thresholds are discussed in greater detail in Section 2.4.

2.3 Pre-application questionnaire

The process for preparing a TIA is outlined in the flow diagram contained in Appendix B. This shows the initial contact being made between the developer and planning officer. A questionnaire should be developed that can be easily filled out by the developer without requiring technical knowledge of transport trip generation. The questions should cover general aspects of the proposed development to give the planning authority an outline of the proposals. The categories could include:

- development address/location including legal definition
- site area

- existing land use and approximate size (for example gross floor area (GFA) of retail use, the number of residential units and/or number of parking spaces)
- existing planning permissions for the site that have not been implemented (if known)
- proposed development content (for example GFA of retail use or number of residential units)
- whether the proposed development meets the district plan policies or not
- proposed opening year of development
- proposed point(s) of access onto the roading network.

Development of the questionnaire will need to be researched further, possibly linked to developing threshold limits, but should contain sufficient information for the planning authority to consider the proposals prior to the initial scoping meeting. The questionnaire is anticipated to facilitate these early discussions rather than replace them. Sites will need to be treated on a case-by-case basis and so contact with the planning authorities will be essential.

2.4 Thresholds for transport impact assessment

Threshold guidance for the level of detail required within a TIA is yet to be developed in New Zealand. These limits should be indicative and the level of detail included in the TIA will still need to be assessed on a case-by-case basis. Thresholds will vary depending on the actual land use type of the proposed development. Where a development consists of a number of different land uses, eg retail and commercial office, the threshold should be based on either individual land uses or the combined area, or both, to ensure that these developments are assessed properly.

The number of dwelling units is likely to be used for the threshold limits for residential developments. The majority of other developments will be assessed against the GFA of the development. The number of car parking spaces proposed is also a threshold regardless of land use. This will capture non-standard developments that might have a high traffic generation.

It should be noted that these thresholds will be a guideline only and will not replace discussion between individual developers and the relevant council. Nor will the thresholds set the scope of assessment. Each development will be assessed on its merits to account for the individual nature of each site location and the local transport network. The developer should employ a transport consultant if the threshold values suggest a TIA is required.

There is considerable variation in transport conditions across New Zealand, with a variety of rural, semi-rural and urban areas and this precludes determining the most appropriate thresholds for use with these guidelines. Further research should be undertaken to determine the appropriateness of land-use thresholds for different areas within New

Zealand. These thresholds should, however, generally be set by the local planning authority, rather than nationally, as each area will have individual transport requirements. The development of thresholds will help facilitate initial discussions between the developer and the planning authority. The accompanying literature review provides examples of existing thresholds that are currently used in other countries that could be adapted for use in New Zealand.

2.5 Detail of assessment

There are four levels of detail proposed for TIAs, which represent the anticipated level of impact generated by the proposed development. The council will set the required level of assessment following discussions with the developer. The requirements for each assessment are set out later in this report, but broadly the assessments are as follows:

- Basic assessment – the proposed development will have negligible transport impact.
- Neighbourhood transport impact assessment – the proposed development will have a minor transport impact over the local transport network.
- Local area transport impact assessment – the proposed development will have significant transport impact over the local transport network.
- Wide area transport impact assessment – the proposed development will have significant transport impact over the wider transport network.

3. Defining the scope of transport impact assessments

3.1 Background

The pre-application questionnaire and the development thresholds will inform the scope of the TIA. However, it is the council that will ultimately set the scope following discussions with the developer. The scope of assessment required will depend on a number of factors as discussed below.

The council should be made aware of the key issues of the transport network prior to discussing the site with the developer. Knowledge of the critical links, intersections and peak-time periods of congestion within the vicinity of the site will be required to progress the scoping. The developer should consider the following prior to meeting with the council to inform the scoping discussion.

3.2 Existing transport conditions

The existing transport conditions in the vicinity of the proposed development will need to be considered when assessing the scope of assessment. One of the key aspects to this is the location of the site. Developments that are located in, or adjacent to, existing urban areas will be able to draw benefit from the transport infrastructure already in place. A city centre site would normally have a variety of land uses accessible by non-car modes and so the transport impact may be less than for an isolated site.

The public transport provision within walking distance of a development will also be a key factor in the transport impact of a development. Developments located on public transport corridors, or adjacent to key interchanges, will benefit from a greater level of service than those located at remote points on the public transport network.

The existing traffic conditions around the proposed development site will need to be considered, since the impact of additional development traffic may be greater if the roading network is congested in the vicinity of the site. The peak periods and level of congestion should be discussed and agreed at the scoping meeting. The road hierarchy and access to the strategic road network may be factors that influence the need for a transport impact assessment depending on the proposed land use.

The existing land use of the site will affect the scope of the TIA. The requirements of the assessment could be reduced if the site of a proposed development currently has high trip generation and the proposed land use would generate fewer trips. Existing resource consents for the site could also have an effect if the permitted consent allows for higher trip generation than the proposals being considered.

3.3 Proposed development

The developer should have summarised the preliminary site proposals to inform the council of the scale and content of the development being considered. Information in the pre-application questionnaire should include the following:

- type and scale of development (eg office, residential, retail) and floor area or number of residential units
- number of staff expected for retail or food and beverage developments
- peak periods of trip generation
- proposed trip generation rates (if available)
- parking provision, both on-site and off-site where applicable
- types of vehicles generated by the site (important if a warehouse/distribution centre is proposed).

3.4 Defining the TIA content

The content of the TIA will be agreed during the scoping meeting and based on the four levels of detail set out in Section 2.5. The geographical scope will need to be set by the council, based on the information tabled at the scoping meeting. It may also require the developer's consultant to confirm the predicted absolute and percentage traffic impact of the proposed development at the extents of the modelled network, using the assumed traffic generation and distribution. The council may then require that the geographical scope of assessment should be increased if the impacts at the extents are considered to be significant.

This guideline document has not assessed the geographical scope for TIAs. It is anticipated that the council, based on its knowledge of the local roading network and type of the size of development, will set the extent of capacity assessment. The literature review has examples of thresholds that are used overseas for determining geographical scope.

4. Basic transport impact assessment

Small developments may often have negligible transport impact and, therefore, no TIA will be required to support the resource consent application. In addition, developments complying with the district plan designation may also be excluded from the need for a TIA. In this event, a minimum amount of data, such as that required for the resource consent, needs to be submitted. This information will include:

- a copy of the pre-application questionnaire
- confirmation from the council that a more detailed TIA is not required
- development details confirming that the proposals are within district plan requirements
- confirmation that the development meets all relevant access and parking design standards, including confirmation that site access arrangements meet relevant sight distance criteria
- confirmation that the development will have no significant adverse effects on existing on-site and off-site parking provision.

The basic TIA can usually be submitted in the form of a letter accompanying the pre-application questionnaire.

A checklist for the information that should be included in a basic TIA is provided in Appendix A.

5. Neighbourhood transport impact assessment

5.1 Introduction

A neighbourhood TIA should discuss the transport issues relating to the area within the immediate vicinity of the site. The existing conditions and predicted effects of the proposed development should be set out and compared. A neighbourhood TIA is likely to be required when predicted trips generated by the development exceed a threshold determined by the council or when the detail contained within a basic TIA is considered insufficient, such as when an intersection capacity analysis is needed. The geographical scope of a neighbourhood TIA is unlikely to extend further than a few hundred metres from the development site.

The information required for the neighbourhood TIA will include, but is not restricted to, the following. The subject headings represent the minimum information that should be included.

5.2 Existing site data

The developer should provide details of the existing site with regard to its land uses and transport features. These details should include the following:

- Site location plan – locate the site accurately and outline its surrounding land uses and the local transport network.
- Existing uses – provide details of the existing land uses on the site and indicate if these are in full use or partially occupied. Include details of the number of formal and informal parking spaces on site.
- Vehicle trip generation – include, if relevant, traffic counts of vehicles arriving at and departing from the site.
- Access arrangements – provide details of the access arrangements to the site (include a scale plan if appropriate). Consider access for all modes, including any maintenance or emergency access arrangements.
- Existing consents – provide details of any existing resource consents for the site. This includes both implemented and non-implemented consents.
- Adjacent land uses – describe the locality of the site and adjacent land uses. This should set out the broad nature of the neighbourhood. Draw attention to any nearby land uses, such as schools that may be significant to the site.

5.3 Existing transport data

The developer should provide details of the local transport network. The details will identify the existing travel opportunities and transport network operation and include the following:

- Walking and cycling – provide details of footways and cycleways within the immediate area surrounding the site. Outline key origins/destinations of the footways and cycleways for people travelling to/from the site along with a broad assessment of travel times. List local facilities pertinent to the proposals (such as schools and shops in the case of a residential development) with approximate walking distances and times.
- Public transport – note the location of bus stops within 400 m of the site and train stations within 800 m of the site. Provide details such as the frequency and routes of services and key origins/destinations for people travelling to/from the site.
- Rooding network – describe the local rooding network, including the road hierarchy and existing levels of service. Briefly discuss routes to main destinations.
- Traffic flows – indicate the traffic flows on the local rooding network to establish traffic flow conditions and peak hours. This includes link counts on the roads which access the site and turning counts if intersection capacity testing is required.
- Crash statistics – analyse crashes on the local rooding network for the most recent five-year period data. The analysis should review any trends in the crash data to determine if the development proposals will significantly increase the potential for crashes to occur.

5.4 Policy

Transport policies in the district plan for the area should be reviewed with regard to the proposed type of development. This review should highlight any significant policies and any major proposals within the vicinity of the site that would affect walking, cycling, public transport or traffic conditions. Outline any policies that relate to the internal roads and parking provisions.

5.5 Proposed development details

The developer should provide details of the proposed development for review. The details should include the following:

- Site layout drawings – these should be scale plans of the development proposals that show internal rooding arrangements (including footpaths and cycleways), service vehicle turning areas and parking arrangements.
- Schedule of land uses – provide a schedule of the proposed land uses to outline the quantum of development, eg the number of residential units or m² of GFA.

- Operational hours – provide the hours of operation if appropriate for the land use. Operational hours will be of particular benefit if assessing a distribution/warehousing site.
- Car parking – note the proposed number of car parking spaces including the percentage of disabled spaces, parents' parking and coach parking where appropriate. Discuss drop-off areas (eg for taxis or schools).
- Cycle parking – provide details of the proposed number of cycle parking stands and any complementary facilities, such as lockers and showers.
- Travel plan provisions for developments – include where travel plans are appropriate.
- Access – include a plan showing the proposed access arrangements (including visibility splays). Include integration of the proposed access and existing footpaths/cycleways and public transport stops where appropriate.
- Servicing – set out the servicing arrangements for the site. Include refuse collection and regular deliveries (if any). Check vehicle swept paths.
- Construction – while detailed construction methodology may not be known at the development planning stage, include a broad assessment of potential impacts of construction traffic. Outline any construction operations anticipated to impact upon the operation of the roading network and suggest mitigation or further analysis if necessary.

5.6 Trip generation, impact and mitigation

The developer should provide an assessment of the trip generation to/from the site. This should include the following as a minimum:

- Existing trip generation – assess the existing trip generation from the site. This could be based on traffic counts or trip generation rates from similar sites. Include both the existing level of occupancy and full occupancy (if not fully occupied). This exercise should also be undertaken for any existing consents on the site that have not been implemented.
- Predicted vehicle trip generation – set out the trip generation from the proposed development. Include details of assumptions and generation rates on a daily basis as well as for the network peak hours and site peak generation hours.
- Net trip generation – offset the new trip generation against the existing trip generation to give a net total of new trips.
- Trip assignment – assign trips to the road network within the scope of assessment. Details of assumptions made regarding the assignment will need to be agreed with the council.
- Site access capacity – assess the site access to prove it has sufficient traffic capacity. Undertake the assessment for the year of site opening.

- Drop-off area – analyse the turnover and capacity of drop-off areas to check that sufficient spaces have been approved and the facility will not have an adverse impact on traffic capacity and operation.
- Offsite road network analysis – analyse the offsite roading network identified during the scoping process to determine the traffic impact from the development. Assess intersections in an appropriate traffic modelling software package (eg aaSIDRA) to determine predicted queues, delay, degree of saturation and overall level of service. The intersection should compare the baseline ‘without development’ scenario to the ‘with development’ scenario.
- Mitigation – outline any offsite mitigation measures to alleviate the effects of development generated traffic.

A checklist for preparing a neighbourhood TIA is provided in Appendix A.

5.7 Model data

Detailed model outputs, where transport modelling is undertaken, should be included in an appendix to the assessment report. Where network or micro-simulation modelling is undertaken as part of an assessment, details of calibration and validation of the models should also be included in this appendix.

6. Local area transport impact assessment

6.1 Introduction

A local area TIA should discuss the transport issues relating to the local area surrounding the site. The existing conditions and predicted effects of the proposed development should be set out and compared. A local area TIA is likely to be required when predicted trips generated by the development exceed a threshold determined by the council or when the detail contained within a basic or neighbourhood TIA is considered insufficient. As a guide, the scope of a local area TIA may extend up to a kilometre from the development site.

The information required for the local area TIA includes, but is not restricted to, the following (these subject headings represent the minimum information that should be included).

6.2 Existing site data

The developer should provide details of the existing site with regard to its land uses and transport features. These details should include the following:

- Site location plan –locate the site accurately and outline its surrounding land uses and the local transport network.
- Existing uses – provide details of the existing land uses on the site and indicate if these are in full use or partially occupied. Include details of the number of parking spaces on site.
- Person trip generation – include, if relevant, traffic counts of vehicles arriving at and departing from the site. Calculate the mode share of existing journeys to and from the site. Discuss the travel patterns of existing users if the facility is relocating.
- Access arrangements – provide details of the access arrangements to the site (include a plan if appropriate). Consider access for all modes, including any maintenance or emergency access arrangements.
- Existing consents – provide details of any existing resource consents for the site. This includes both implemented and non-implemented consents.
- Adjacent land uses – describe the locality of the site to determine the adjacent land uses. This should set out the broad nature of the neighbourhood. Draw attention to any land uses, such as schools that may be significant to the site.

6.3 Existing transport data

The developer should provide details of the local transport network. The details will identify the existing travel opportunities and transport network operation and should include the following:

- Walking and cycling – provide details of footways and cycleways within the local area surrounding the site including a qualitative assessment of the routes and existing usage. Outline key origins/destinations of the cycleways for people travelling to/from the site along with an assessment of travel times. List local facilities pertinent to the proposals (such as schools and shops in the case of a residential development) with approximate walking distances and times.
- Public transport – note the location of bus stops within 400 m of the site and railway and ferry stations within 800 m of the site. Provide details such as the frequency of services and key origins/destinations reached within 30 minutes for people travelling to/from the site. Assess spare capacity in the public transport system to ensure there is sufficient capacity to accommodate any new demand.
- Rooding network – describe the local rooding network, including the road hierarchy. Briefly discuss routes to main destinations.
- Traffic flows – indicate the traffic flows on the local rooding network to establish traffic flow conditions and peak hours. This includes link counts on key roads and turning counts at critical intersections. Assess the level of service at key intersections.
- Crash statistics – analyse crashes on the local rooding network for the most recent five-year period data. The analysis should review any trends in the crash data to determine if the development proposals will significantly increase the potential for crashes to occur.

6.4 Committed development

The developer should consider the impacts of committed developments and improvements that will affect transport conditions within the study area. The baseline transport network (against which the impact of the proposed development will be assessed) should include the effects of the committed development. Comment upon timescales should be included in the following:

- Walking and cycling improvements – outline any proposed footways and/or cycleways that will benefit the development. Include details of opening years and key destinations served by these improvements.
- Public transport – consider proposed improvements to the public transport network. This should include changes to capacity, journey times and destinations. Discuss any proposals for new interchanges, bus priority or other major initiatives (eg integrated ticketing or fleet renewal).

- Roading improvements – assess any road improvements that may significantly alter the traffic conditions within the study area. This will include proposed roads and intersection improvements. Provide details of expected completion dates and predicted changes in traffic conditions and flows.
- Local developments and plan allocations – assess the traffic associated with committed local developments and plan allocation sites where possible. Include references to the TIAs for these sites regarding trip generation, distribution and proposed mitigation measures.

6.5 Policy

Transport policies in the district plan for the area should be reviewed with regard to the proposed type of development. This review should highlight any significant policies and any major proposals within the vicinity of the site that would affect walking, cycling, public transport or traffic conditions. Outline any policies that relate to the internal roads and parking provisions for the proposed development.

6.6 Proposed development details

The developer should provide details of the proposed development for review. The details should include the following:

- Site layout drawings – these are scale plans of the development proposals that show internal roading arrangements (including footpaths and cycleways), service vehicle turning areas and parking arrangements.
- Schedule of land uses – provide a schedule of the proposed land uses that outline the quantum of development, eg the number of residential units or m² of GFA and the number of bedrooms.
- Operational hours – provide the hours of operation depending on the land use. Operational hours will be of particular benefit if assessing a distribution/warehousing site.
- Car parking – note the proposed number of car parking spaces including the percentage of disabled spaces, parents parking and coach parking where appropriate. Discuss drop-off areas (eg for taxis or schools).
- Cycle parking – provide details of the proposed number of cycle parking stands and any complementary facilities, such as showers and lockers.
- Access – include a plan showing the proposed access arrangements (including visibility splays). Include, where appropriate, integration of the proposed access and existing footpath/cycleways and public transport stops.
- Servicing – set out the servicing arrangements for the site. Include refuse collection and regular deliveries (if any).

- Construction – while detailed construction methodology may not be known at the development planning stage, include a broad assessment of potential impacts of construction traffic. Outline any construction operations anticipated to impact upon the operation of the roading network and suggest mitigation or further analysis if necessary.

6.7 Trip generation

The developer should provide an assessment of the trip generation from the site. This should include the following:

- Existing vehicle and person trip generation – assess the existing trip generation of each mode for the site. This could be based on traffic counts or trip generation rates from similar sites. Include in the assessment both the existing level of occupancy of the site and full occupancy (if not fully occupied). Undertake this exercise also for any existing consents on the site that have not been implemented.
- Predicted person trip generation – set out the trip generation of all modes for the proposed development. Include details of assumptions and generation rates on a daily basis as well as for the network peak hours and site peak generation hours.
- Net trip generation – offset the new trip generation against the existing trip generation to give a net total of new trips.
- Trip types – land uses such as retail will attract a variety of new and existing trips to the site. Assess what proportion of trips fall under the following categories:
 - new trips: trips not on the network prior to opening the development
 - linked trips: trips that will use more than one facility in the new site, thus reducing the arrivals to the site as a whole but increasing the duration of trip
 - transferred trips: trips present on the network using a similar facility that will transfer to the new site. This could apply to an employer relocating to a new site or to retail trips diverting to a new store
 - pass-by trip: trips that currently pass the proposed site access point but will turn into the development. A typical example could be petrol filling stations
 - diverted trips: similar to pass-by trips. These are trips that were on the network that will divert to use the new facility and then return to their previous route.
- Event trip generation – assess 'special events' if appropriate. This will include initial store opening for a large retail development, competition days for sporting venues etc.
- Trip assignment – assign trips to the roading network within the scope of assessment. Details of assumptions made regarding the assignment will need to be agreed with the council.

6.8 Sustainable travel initiatives

The developer should outline the sustainable travel initiatives proposed for the development to reduce single occupancy car travel. The sustainable travel initiatives are effectively the first step in mitigating traffic demand arising from the development by reducing the number of vehicles generated. It is anticipated that consideration of sustainable travel at an early stage will overcome potential barriers that could arise later. The initiatives should be a mixture of physical and 'soft' measures that are complementary to encourage a modal shift. All initiatives should be available from the initial occupation of the site to ensure that sustainable travel habits are developed from the outset.

The provision of physical infrastructure should begin with the design of the site layout to ensure that the development encourages walking and cycling by providing safe and convenient footways and cycleways. The location of cycle parking should also be considered to ensure it is readily accessible and in a secure location.

The developer should prepare an outline workplace travel plan (WTP) to accompany the resource consent application. The WTP is supplementary to the information contained within the TIA and, as such, the scope of WTPs has not been set in this document. However, the WTP should be written alongside the TIA to ensure that any proposed measures are integrated with the development.

6.9 Capacity testing and mitigation

An assessment should be made of the impact of the development on the transport infrastructure. Capacity testing should be undertaken for traffic volumes that includes the effects of committed developments and the proposed development. The assessment should include the following:

- Site access capacity – assess the site access intersections to prove there is sufficient traffic capacity. Undertake the testing for the year of site opening, the year of completion and the end of the district plan.
- Drop-off area – analyse the turnover and capacity of drop-off and parking areas to check that sufficient spaces have been provided and the facility will not have an adverse impact on traffic capacity and operation.
- Offsite roading network analysis – analyse the offsite roading network identified during the scoping process to determine the traffic impact from the development. Assess intersections in the relevant traffic modelling software package (eg aaSIDRA) to determine predicted queues, degree of saturation and overall level of service. The intersection should compare the baseline 'without development' scenario to the 'with development' scenario.
- Mitigation - outline any offsite mitigation measures to alleviate the effects of development generated traffic.

- Event day mitigation – prepare a traffic management plan to mitigate/manage the 'abnormal' traffic associated with special events.
- Servicing strategy – prepare a servicing strategy for sites where a significant number of delivery vehicles are predicted (eg retail developments). Assess the frequency of deliveries and turnover time to prove that sufficient loading bays have been provided.

A checklist for preparing a local area TIA is provided in Appendix A.

It is expected that the council will normally determine the criteria for assessing whether queues, degree of saturation or level of service are appropriate, based on its knowledge of local transport conditions. These criteria will vary from location to location, however the literature review contains some examples of such criteria used overseas.

6.10 Model data

Detailed model outputs, where transport modelling is undertaken, should be included in an appendix to the assessment report. Where network or micro-simulation modelling is undertaken as part of an assessment, details of calibration and validation of the models should also be included in this appendix.

6.11 Peer review and validation

For local area transport impact assessments, an independent peer review should be undertaken. This is particularly important for assessments that include a significant element of transport modelling.

The peer review is limited to checking the assumptions made in the transport assessment and verifying calibration and validation of modelling, where this has been undertaken.

The nominated peer reviewer, who is normally an independent transport consultant, should be involved in the study from an early stage if possible, as this would avoid abortive work and minimise the time needed to carry out a peer review. Involvement of the peer reviewer at an early stage is particularly important where significant modelling work is required, since they would be able to assist in defining the scope of the modelling.

6.12 Road safety audit

For local area transport impact assessments, a road safety audit should be undertaken. An independent and suitably qualified road safety auditor should be engaged to audit both the internal and external road layout proposals that are presented as part of the application.

7. Wide area transport impact assessment

7.1 Introduction

A wide area TIA should discuss the transport issues relating to the wider area surrounding the site. The existing conditions and predicted effects of the proposed development should be set out and compared. The majority of councils will have a traffic model of the main urban areas. This model may be a useful tool to determine the operation of the existing roading network and the impact of the proposed development.

A wide area TIA may be required when the transport impact of a proposed development is expected to cover an extensive area. As the TIA with the largest scope, a wide area TIA is likely to be required for large mixed-use or retail developments.

The information required for the wide area TIA includes, but is not restricted to, the following. These subject headings represent the minimum information that should be included.

7.2 Existing site data

The developer should provide details of the existing site with regard to the land uses and transport features. These details should include the following as a minimum:

- Site location plan – locate the site accurately, outline its surrounding land uses and the local roading network.
- Existing use – provide details of the existing land uses on the site and indicate if these are in full use or partially occupied. Include details of the number of parking spaces on site.
- Person trip generation – include, if relevant, traffic counts of vehicles arriving at and departing from the site. Calculate the mode share of existing journeys to and from the site.
- Access arrangements – provide details of the access arrangements to the site (include a plan if appropriate). Consider access for all modes, including any maintenance or emergency access arrangements.
- Existing consents – provide details of any existing resource consents for the site. This includes both implemented and non-implemented consents.
- Adjacent land uses – describe the locality of the site to determine the adjacent land uses. This should set out the broad nature of the neighbourhood. Draw attention to any land uses, such as competing sites that may be significant to the one being developed.

7.3 Existing transport data

The developer should provide details of the local transport network. The details will identify the existing travel opportunities and transport network operation and should include the following:

- Walking and cycling – provide details of footways and cycleways within the local area surrounding the site including a qualitative assessment of the routes and existing usage. Outline key origins/destinations of the cycleways for people travelling to/from the site, along with an assessment of travel times. List local facilities pertinent to the proposals (such as schools and shops in the case of residential development) with approximate walking distances and times.
- Public transport – note the location of bus stops within 400 m of the site and railway and ferry stations within 800 m of the site. Provide details such as the frequency of services and key origins/destinations reached within one hour for people travelling to/from the site. Assess spare capacity in the public transport system to determine whether there is sufficient capacity to accommodate any new demand.
- Rooding network – describe the local rooding network, including the road hierarchy. Discuss routes to main destinations and the strategic road network.
- Traffic flows – indicate the traffic flows on the local rooding network to establish traffic flow conditions at peak hours, the mid-day inter-peak and daily traffic flows. This includes link counts on key roads and turning counts at critical intersections. Assess the existing level of service at critical intersections. It may be prudent to produce a traffic model of the area, against which the development impact can be assessed.
- Crash statistics – analyse crashes on the local rooding network for the most recent five-year period data. The analysis should review any trends in the crash data to determine if the development proposals will significantly increase the potential for crashes to occur.

7.4 Committed development

The developer should consider the impacts of committed developments and improvements that will affect transport conditions within the study area. The baseline transport network (against which the proposed development will be assessed) should include the effects of the committed development. These should include the following:

- Walking and cycling improvements – outline any proposed new footways or cycleways that will benefit the development. Include details of opening years and destinations.
- Public transport – consider proposed improvements to the public transport network. This will include changes to capacity, journey times and destinations. Discuss any proposals for new interchanges, bus priority or other major initiatives (eg integrated ticketing or fleet renewal).

- Roading improvements – assess any road improvements that may significantly alter the traffic conditions within the study area. This will include proposed roads and intersection improvements. Assess details of opening years and predicted changes in traffic conditions and flows.
- Local developments and plan allocations – assess the traffic associated with committed local developments and plan allocation sites where possible. Include references to the TIAs of these sites regarding trip generation, distribution and proposed mitigation measures.

7.5 Policy

Transport policies in the district plan for the area should be reviewed with regard to the proposed type of development. This review should highlight any significant policies and any major proposals within the vicinity of the site that would affect walking, cycling, public transport or traffic conditions. Outline any policies that relate to the internal roads and parking provision.

7.6 Proposed development details

The developer should provide details of the proposed development for review. The details should include the following:

- Site layout drawings – these are scale plans of the development proposals that show internal roading arrangements (including footpaths and cycleways), service vehicle turning areas and parking arrangements.
- Schedule of land uses – provide a schedule of the proposed land uses to outline the quantum of development, ie the number of residential units or m² of GFA.
- Operational hours – provide the hours of operation depending on the land use. Operational hours will be of particular benefit if assessing a distribution/warehousing site.
- Events – provide details of any special events where appropriate. These will include frequency, timings (times of year, week and day) and anticipated visitor numbers.
- Car parking – note the proposed number of car parking spaces including the percentage of disabled spaces, parents' parking and coach parking where appropriate. Discuss drop-off areas (eg for taxis or schools).
- Cycle parking – provide details of the proposed number of cycle parking stands and any complementary facilities, such as showers and lockers.
- Access – include a plan showing the proposed access arrangements (including visibility splays and sight distance requirements). Include, where appropriate, integration of the proposed access and existing footpaths/cycleways and public transport stops. Describe public transport access to/through the site including areas for bus and coach parking if appropriate.

- Servicing – set out servicing arrangements for the site. Include refuse collection and regular deliveries (if any). Highlight locations of refuse stores and loading.
- Phasing – set out the proposed phasing of the development. Indicate the timescale for the completion of key elements of the development.
- Construction – while detailed construction methodology may not be known at the development planning stage, include a broad assessment of potential impacts of construction traffic. Outline any construction operations anticipated to impact upon the operation of the roading network and suggest mitigation or further analysis if necessary.

7.7 Trip generation

The developer should provide an assessment of the trip generation from the site. This should include the following:

- Existing vehicle and person trip generation – assess the existing trip generation of each mode for the site. This could be based on traffic counts or trip generation rates from similar sites. Include in the assessment both the existing level of occupancy and full occupancy of the site (if not fully occupied). Also undertake this exercise for any existing consents on the site that have not been implemented.
- Predicted trip generation – set out the trip generation of all modes for the proposed development. Include details of assumptions and generation rates on a daily basis as well as for the network peak hours and site peak generation hours. Break down the trip generation by land use.
- Net trip generation – offset the new trip generation against the existing trip generation to give a net total of new trips.
- Trip types – land uses such as retail will attract a variety of new and existing trips to the site. Assess what proportion of trips fall under the following categories:
 - new trips: trips not on the network prior to opening the development
 - linked trips: trips that will use more than one facility in the new site, thus reducing the arrivals to the site as a whole but increasing the duration of trip
 - transferred trips: trips present on the network using a similar facility that will transfer to the new site
 - pass-by trips: trips that currently pass the proposed site access point but will turn into the development. A typical example could be petrol filling stations
 - diverted trips: similar to pass-by trips. These are trips that were on the network that will divert to use the new facility and then return to their previous route.
- Event trip generation – assess ‘special events’ if appropriate. This will include initial store opening for a large retail development, competition days for sporting venues etc.

- Trip assignment – assign trips to the roading network within the scope of assessment. Details of assumptions made regarding the assignment will need to be agreed with the council.

7.8 Sustainable travel initiatives

The developer should outline the sustainable travel initiatives proposed for the development to reduce single occupancy car travel. The sustainable travel initiatives are effectively the first step in mitigating traffic demand arising from the development by reducing the number of vehicles generated. It is anticipated that consideration of sustainable travel at an early stage will overcome potential barriers that could arise later. The initiatives should be a mixture of physical and 'soft' measures that are complementary to encourage a modal shift. All initiatives should be available from the initial occupation of the site to ensure that good travel habits are developed from the outset.

The provision of physical infrastructure should begin with the design of the site layout to ensure that the development encourages walking and cycling by providing safe and convenient footways and cycleways. The location of cycle parking should also be considered to ensure it is readily accessible and in a secure location.

The developer should prepare an outline WTP to accompany the resource consent application. The WTP is supplementary to the information contained within the TIA and, as such, the scope of WTPs has not been set in this document. However, the WTP should be written alongside the TIA to ensure that any measures proposed are integrated with the development.

7.9 Capacity testing and mitigation

An assessment should be made of the impact of the development on the transport infrastructure. Capacity testing should be undertaken for traffic volumes that includes the effects of committed developments and the proposed development. The assessment should include the following:

- Site access capacity – assess the site access intersections to prove there is sufficient traffic capacity. Undertake the capacity analysis for the opening year, completion of key phases of development and the end of district plan year, subject to council discretion.
- Assess mid-block capacity and level of service for key links within the geographical scope of the TIA.
- Drop-off area – analyse the turnover and capacity of drop-off and parking areas to check that sufficient spaces have been approved and the facility will not have an adverse impact on traffic capacity and operation.
- Offsite roading network analysis – analyse the offsite roading network identified during the scoping process to determine the traffic impact from the development. Intersections should be assessed in the relevant package (eg aaSIDRA) to determine the 95th percentile

queues, degree of saturation and overall level of service. The intersection should compare the baseline 'without development' scenario to the 'with development' scenario. The change in traffic patterns, because of the additional development on the network, should be outlined. This should be undertaken for the same periods as for the site access capacity analysis.

- Mitigation – outline any offsite mitigation measures to alleviate the effects of development generated traffic.
- Event day mitigation – prepare a traffic management plan to mitigate/manage the abnormal traffic associated with special events.
- Servicing strategy – prepare a servicing strategy for sites where a significant number of delivery vehicles are predicted (eg retail developments). Assess the frequency of deliveries and turnover time to prove that sufficient loading bays have been provided.

A checklist for preparing a wide area TIA is provided in Appendix A.

7.10 Model data

Detailed model outputs, where transport modelling is undertaken, should be included in an appendix to the assessment report. Where network or micro-simulation modelling is undertaken as part of an assessment, details of calibration and validation of the models should also be included in this appendix.

7.11 Peer review and validation

For wide area transport impact assessments, an independent peer review should be undertaken. This is particularly important for assessments that include a significant element of transport modelling.

The peer review will normally be limited to checking the assumptions made in the transport assessment and verifying calibration and validation of modelling, where this has been undertaken.

The nominated peer reviewer, who is normally an independent transport consultant, should be involved in the study from an early stage if possible, as this would avoid abortive work and minimise the time needed to carry out a peer review. Involvement of the peer reviewer at an early stage is particularly important where significant modelling work is required, since they would be able to assist in defining the scope of the modelling.

7.12 Road safety audit

For wide area transport impact assessments, a road safety audit should be undertaken. An independent and suitably qualified road safety auditor should be engaged to audit both the internal and external road layout proposals that are presented as part of the application.

Appendix A: Checklists for TIAs

Table A.1 Checklist for basic transport impact assessment.

Item no.	Description	x / ✓
1	Copy of the pre-application questionnaire	
2	Confirmation from the council that a TIA is not required	
3	Development details confirming that the proposals are within district plan requirements	
4	Confirmation that the development meets all relevant access and parking design standards	

Table A.2 Checklist for neighbourhood transport impact assessment

Item no.	Description	x / ✓
1	Existing site data	
1a	Site location plan	
1b	Existing use	
1c	Vehicle trip generation	
1d	Access arrangements	
1e	Existing consents	
1f	Adjacent land uses	
2	Existing transport data	
2a	Walking and cycling	
2b	Public transport	
2c	Roading network	
2d	Traffic flows	
2e	Crash statistics	
3	Policy	
4	Proposed development details	
4a	Site layout drawings	
4b	Schedule of land uses	
4c	Operational hours	
4d	Car parking	
4e	Cycle parking	
4f	Access	
4g	Servicing	
4h	Construction	
5	Trip generation, impact and mitigation	
5a	Existing trip generation	
5b	Predicted vehicle trip generation	
5c	Net trip generation	
5d	Trip assignment	
5e	Site access capacity assessment	

Item no.	Description	x / ✓
5f	Drop-off area	
5g	Offsite roading network analysis	
5h	Mitigation	

Table A.3 Checklist for local area transport impact assessment

Item no.	Description	x / ✓
1	Existing site data	
1a	Site location plan	
1b	Existing use	
1c	Person trip generation	
1d	Access arrangements	
1e	Existing consents	
1f	Adjacent land uses	
2	Existing transport data	
2a	Walking and cycling	
2b	Public transport	
2c	Roading network	
2d	Traffic flows	
2e	Crash statistics	
3	Committed development	
3a	Walking and cycling improvements	
3b	Public transport	
3c	Roading improvements	
3d	Local developments and plan allocations	
4	Policy	
5	Proposed development details	
5a	Site layout drawings	
5b	Schedule of land uses	
5c	Operational hours	
5d	Car parking	
5e	Cycle parking	
5f	Access	
5g	Servicing	
5h	Construction	
6	Trip generation	
6a	Existing vehicle and person trip generation	
6b	Predicted person trip generation	
6c	Net trip generation	
6d	Trip types (new, linked, transferred, pass-by, diverted)	
6e	Event trip generation	
6f	Trip assignment	
7	Sustainable travel initiatives	
7a	Physical measures	

Item no.	Description	x / ✓
7b	'Soft' measures	
7c	Outline workplace travel plan	
8	Capacity testing and mitigation	
8a	Site access capacity assessment	
8b	Drop-off area	
8c	Offsite roading network analysis	
8d	Mitigation	
8e	Event day mitigation	
8f	Servicing strategy	

Table A.4 Checklist for wide area transport impact assessment

Item no.	Description	x / ✓
1	Existing site data	
1a	Site location plan	
1b	Existing use	
1c	Person trip generation	
1d	Access arrangements	
1e	Existing consents	
1f	Adjacent land uses	
2	Existing transport data	
2a	Walking and cycling	
2b	Public transport	
2c	Roading network	
2d	Traffic flows	
2e	Crash statistics	
3	Committed development	
3a	Walking and cycling improvements	
3b	Public transport	
3c	Roading improvements	
3d	Local developments and plan allocations	
4	Policy	
5	Proposed development details	
5a	Site layout drawings	
5b	Schedule of land uses	
5c	Operational hours	
5d	Events	
5e	Car parking	
5f	Cycle parking	
5g	Access	
5h	Servicing	
5i	Phasing	
5j	Construction	
6	Trip generation	

Item no.	Description	x / ✓
6a	Existing vehicle and person trip generation	
6b	Predicted trip generation	
6c	Net trip generation	
6d	Trip types (new, linked, transferred, pass-by, diverted)	
6e	Event trip generation	
6f	Trip assignment	
7	Sustainable travel initiatives	
7a	Physical measures	
7b	'Soft' measures	
7c	Outline workplace travel plan	
8	Capacity testing and mitigation	
8a	Site access capacity assessment	
8b	Drop-off area	
8c	Offsite roading network analysis	
8d	Mitigation	
8e	Event day mitigation	
8f	Servicing strategy	

Appendix B: Flow diagram – process for preparing TIAs



