



Fiji Roads Authority

TRAFFIC IMPACT ASSESSMENT GUIDELINES FOR FIJI


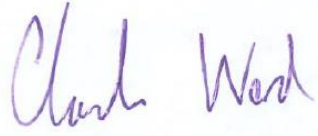

August 2020

Second Edition

August 2020

PLAN UPDATE AND DISTRIBUTION CONTROL (Responsibility: Manager Asset) PLAN UPDATE

Date	Principal Changes
April 2019 August 2020	First edition Second edition (Update sent to the FRA Board via CEO’s Report of July 2020)

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 Sign: Date: 6 August 2020	 Sign: Date: 6/8/20	 Sign: Date: 07 August 2020

Abstract

Traffic Impact Assessments (TIA) are crucial studies that aim to assist developers, affected neighbours, the wider community, and the transport network connected to a development. Often this is one of the most misunderstood reports as developers see it as a mechanism which will cause them to lose profitable floor area and possibly end up paying for infrastructure improvements. The objectors see it as a tool that they can use to block any development which they believe is not good for their community.

The research to develop a Guideline on TIA (also known as Transport Assessment (TA)) for Fiji has been ongoing since 2014 by the Fiji Roads Authority. Comparison has been made on the guidelines used by Australia, England, and Scotland, to formulate a guidance that is fit for purpose in Fiji.

Fiji still prefers to use the term TIA over TA as their transport infrastructure is limited to certain modes of transport. It also needs empowerment from key stakeholders to adapt a shift from the term TIA to TA. However, attempts have been made to align the Guidelines more to a TA while calling it Guidelines for a TIA.

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1.0 REVIEW OF THE TIA GUIDELINES

1.1 Introduction

Fiji as a developing nation has limited expertise in technical areas, including transport planning. To address issues in the transport sector Fiji has in the past adopted best practices from other countries in particular Australia and New Zealand. Therefore, it makes sense for Fiji to review the best practices around the world and adopt what is suited to its environment and not attempt to develop a whole new guidance.

Another reason why Fiji has aligned its self to its neighbors has been that after its independence from Britain, Fiji has employed expatriates from New Zealand and Australia to key technical areas for which it did not have locally. These expatriates often introduced standards that they were familiar with in their own country, or engaged consultant from their homeland to draft standards. An example is the work carried out in updating the Road standards and specification by Vic Roads through the technical assistance provided by ADB.

Given the above a review of the TIA guidelines for Australia, Scotland and England was undertaken to assist in drafting of a TIA guidelines for Fiji. TIA guidelines for New Zealand was not reviewed in detail as it is very similar to Australia.

1.2 Fiji

Fiji doesn't have extensive local guidance on how a TIA is to be undertaken, how the report needs to be formatted, or presented. FRA in 2016 issued a Term of Reference (TOR) for the TIA which is modelled from its pacific neighbor Australia. In April 2019, Fiji Roads Authority introduced its first version of the TIA guidelines. This has been well received and is now used in the preparation of the TIA reports.

The key components highlighted in the guidelines include, the summary of the proposal, comprehensive description of the existing conditions, understanding the existing traffic network, and the forecast impacts of the development on the network. The report needs to conclude with recommendations on how to mitigate any adverse impacts of the development.

1.3 Traffic Impact Assessment in Australia - Austroads

Australia is one of the leading nations when it comes to developing transport standards. Many of the South Pacific countries such as Fiji and New Zealand refer to its standards for guidance.

The main standard that is used for TIA is a document called *“Guide to Traffic Management Part 12: Traffic Impact of Developments”* Austroads of Australia. Since its initial inception the guide has been continually revised with the latest being in 2019.

The document sets out the main issues that need to be looked into and assessments to be made. This includes sub-headings for the reports, types of vehicles, access arrangement, internal traffic management plan, parking requirements, impact on the existing network, etc.

The guidance in Australia can be summarized as in the table below:

Table 1.1: Summary of TIA guidance in Australia

Section	Heading	Explanation
1	Introduction	Explains what is a TIA and why it is required.
2	Background	Attempts to show that traffic impacts of a development is not independent but interdependent on a number of other factors such as land use planning, public transport, national policy, travel demand, parking provisions/requirements, etc
3	Traffic management tools	Identifies the appropriate traffic management analysis tools, and methods that can be used to analysis the impact of a subdivision or development on the transport network
4	Traffic Impact Assessment	Sets the threshold when a TIA is required and summarises the key elements of a TIA report such as modal split, traffic generation rate, and modelling.
5	Other impacts	Highlights other key areas of assessment such as road safety, etc.

Source: Austroads: Guide to Traffic Management Part 12: Traffic Impact of Developments

1.4 Transport Assessment Guidelines (TAG) – Transport Scotland, Scotland

Scotland and the United Kingdom have slowly embraced an evolved form of TIA now called Transport Assessment (TA). It has issued Transport Assessment Guidelines (TAG) in this respect. It can be summarized in Table 1.2.

Table 1.2: Summary of TAG in Scotland

Section	Heading	Explanation
1	Introduction	Explains what is TAG, its policy, and its key strategies such as integration of transport and land use planning, emphasis on public transport, with emphasis on accessibility.
2	Assessment Principles and Process	Identifies the key assessment principles, outlines the transport assessment process, and lists the key stakeholders.
3	Identifying need for assessment	It looks at whether a TA is required or not, through scoping. It provides guidance on some thresholds when a TA should be conducted.
4	Preparing a Transport Statement (TS)	Provides the areas that should be looked at within a TS by providing the subsections/headings to be looked at.
5	Preparing a Transport Assessment (TA)	Highlights the key issues that need to be addressed by the report
6	Implementing Travel Plan	Introduces the concept of travel plan, sets the strategies, targets, and its monitoring to ensure that it's successful.

Source: Transport for Scotland: TAG

1.5 Transport Assessment Best Practice Guidelines – Transport for London (TfL), England

A guidance was prepared on TA by TfL in 2006 and was revised in 2010. Table 3.3 outlines the key headings.

Table 1.3: Summary of TA Best Practice Guidelines in England

Section	Heading	Explanation
1	Introduction	States the objectives of the guidance.
2	Overview of the Referral Process	Outlines the overall referral process stating the key purpose of each step.
3	Land use and transport policy context	Explains the key land use and transport policies that need to be referred to when undertaking a TA. Integration is the key theme under this section
4	Scoping and pre-application procedure	Explains the scoping process and provides a checklist for the pre-application process.

5	TA Structure	Provides the structure for the TA
6	TA inputs	Explains the data that needs to be input to a TA.
7	TA organisation	Details the core elements of a TA report
8	Analytical Techniques	Details how the data should be analysed.
9	Mitigations and Travel Plans	Explains how impacts can be mitigated, which includes travel plans.
10	Summary	Summarises sections 1-9

Source: Transport for London

When comparing the TIA (TA) in the three countries it is noted that there is a lot of emphasis in explaining what a TIA (TA) is about. It appears that a concerted effort has been made to make it absolute clear on what the TIA should look at and how it should be assessed. This indicates that the developers and consultants need a lot of guidance when they are writing up reports. This is also prevalent in Fiji where not only the consultants but stakeholders need to be educated in what a TIA is all about.

They also highlight the need to take an integrated approach when undertaking a TA by understanding what the land use policy is, its land use pattern and national policy, with emphasis on public transport. This is quite useful in guiding whoever is undertaking a TA in starting with a holistic approach from the initialisation of their work. While it may not be simple to comprehend all the information and their relationship on the first attempt, it at least sets the scene as to how a TA should be constituted.

The guidelines for Scotland and London provide information on the stages the TIA goes through in the approval process, while there isn't any mention of this process in the Australian guidelines or the Fiji TOR. While in Australia and Fiji it is only one level, it probably is good practice to outline the process in Scotland and London as there are a number of levels of approvals. Having different levels of approvals ensures that there are 'checks and balances' in place. However, given the size of developments and the landmass in Fiji's, its approach is 'fit for purpose'.

Setting thresholds can be tricky as even though they set a benchmark on when to conduct a TA they can create some confusion as people fail to realise that it is only a guide. The danger with having thresholds is that Consultants may not consult the approving agency (scoping) on

whether a TA should be conducted and would undertake a TA when was not required. Stakeholders and Consultants have been requesting the Fiji Roads Authority to set some thresholds on when a TIA should be conducted in Fiji.

Each country has highlighted the key criteria's that should be looked at when undertaking a TIA (TA). It is noted that the guidelines in Australia are more prescriptive. For a country such as Fiji, where the level of competency for the Traffic Engineer/Consultant may not be as high as in Australia or Britain, it would be beneficial for the TIA (TA) guidelines to be as detailed as possible. However, with the level of skill and knowledge that exists in Scotland and London this would not be a necessity. In Fiji's context this would be a key aspect of the guidance as there is only one locally based competent Traffic Engineer in the private sector.

It is to be further noted that the methodology, assessment tools and mitigation are hugely depended on the local environment. Fiji, in relation to London, Scotland, and Australia is much less developed, with issues at hand being similar to those faced by the other countries a few decades ago. An example is that Fiji's main mode of public transport is buses, while the other nations have passenger trains. Another difference is that in Fiji, buses are one hundred percent privately owned and the state doesn't decide on the routes which are responsive to demand driven by the bus companies and the public. Fiji doesn't have to entirely think outside the box for a solution as it is likely that someone around the world has already faced a similar dilemma and have found a solution which can be adopted, modified to local settings and utilised. However, this in no way should stop anyone from looking for a local solution for a problem.

The guidelines agree that the historical approach of using a "predict and provide" model is not sustainable and therefore all encourage the use of travel demand management which tries to make each subdivision and development sustainable.

It can be deduced that the key elements when drawing up a guidelines are explaining the purpose of a TA, threshold, integration, methodology, assessment criteria's, approach, and mitigation with focus on out of the box local solutions that do not rely on 'predict and provide' model.

The common area identified by all TIA guidelines which require attention are: explanation on why TIA is required, integration of land use policy with transport study, analysis tools and

methodology, clear and concise identification of the impacts and how they are mitigated, with preference on demand management rather than predict and provided.

1.6 Establishing a Threshold

A key component highlighted in the guidelines review were the different threshold that were set for when a TIA would be required for each type of development and land use. This had been developed over a period of time based on the traffic that each development and land use generated and how they impact the existing road network. Fiji, currently doesn't have any threshold for when a TIA should be conducted. An analysis of the FRA records has revealed that TIAs were conducted for the following developments between 2014 and 2018.

Table 1.4: Summary of some of the TIA submitted with FRA from 2014 to 2020

	FRA Ref	Project	Use	GFA m ²
1	DA-054-15	Damodar City Labasa	Cinema Commercial Hotel	2,111 9,002 2,742
2	DA-038-17	Legalega Commercial Development	Commercial Industrial Residential Hotel Service Station	15,272 2,524 3552 5376 398
3	SC-050-15	Supreme Fuel, Nasinu	Commercial Service Station	2192 154
4	DA-026-16	FNPF Plaza, Suva	Commercial	10,395
5	DA-059-15	FNPF Plaza, Nadi	Commercial	12,855
6	DA-070-15	Hanson's Complex (The Hub) Nausori	Commercial	20,360
7	DA-042-15	Mid-West Development Sabeto Lautoka	Commercial Service Station	1,304 300
8	DA-045-15	Flagstaff Plaza, Suva	Commercial	4620
9	SW-087-15	Mirakh Investment Ltd Nadi	Commercial	3,791
10	DA-061-17	Bookmasters Suva	Commercial Office Residential	197 756 197

11	DA-001-15	Waimanu Plaza Suva	Commercial/ Office	1,437
12	DA-038-16	Ramon Catholic Commercial Development, Suva	Commercial Office Hotel	2,557 8,383 10,443
13	DA-038-15	MacDonald's Lautoka	Retail	420 95 seating
14	DA-031-17	Sun Insurance Nadi	Office	3,970
15	DA-013-15	Motibhai & Co Nadi	Warehouse Office Manufacturing Workshop	6,475 2,829 3,160 341
16	DA-065-17	Singh's Investment Ltd, Luke Street, Suva	Warehouse	1140
17	DA-063-15	Rups Investment Ltd, Suva	Warehouse	12,650
18	SR 6351	Albert Park redevelopment, Suva	Stadium	3,074
19	SR 3928	Nausori Bus Station	Bus station	5169
20	SR 4654	Suva Bus Station	Bus station	16,150
21	SR 3928	Nausori market	Market	6,000
22	DA-007-17	Nasinu Market	Market	1,922
23	DA-032-17	Namaka Market Nadi	Market	2,017
24	DA-025-15	Gulf Investment Ltd (Mix use), Nadi	Subdivision	208,4129
25	DA-003-16	Field Forty Subdivision (Residential) Lautoka	Subdivision	48,562 36 lots
26	SC-012-17	Nepani Housing Authority Subdivision	Subdivision	188,515 200 lots
27	SW-087-18	Tavakuba Housing Authority Subdivision	Subdivision	331,164 218 lots
28	DA-008-16	Voivoi Industrial Estate, Nadi	Subdivision	176,000 110 lots
29	DA-080-15	Ping Cheng Hotel Nadi	Hotel	8,290
30	DA-028-16	Cloud Investment Ltd, Lautoka	Hotel	10,778
31	SW-022-16	Guangdong Silkroad Investment Co Fiji Ltd, Road Nadroga	Hotel	22,295

32	DA-014-15	SPJIL Legalega Hotel Development Nadi	Hotel	15,041
33	DA-044-15	Nausori Government Hospital	Hospital	10,976
34	DA-079-15	Naulu Hospital, Nausori	Hospital	4,100
35	DA-062-17	CWM Maternity Unit	Hospital	3,200
36	DA-056-15	High Court Lautoka	Court House	10,133
37	SR 4307	Anand & Prasad Investment Ltd, Lautoka	Subdivision - Service Station	8,612
38	SR 6502	Vishnu Holding Limited, Savusavu	Service Station	300
39	SR 333	National Fire Authority Suva	Fire Station	1,186
40	DA-001-16	Department of Environment, Nasinu	Waste Transfer Station	3,120
41	DA-033-16	Dayal's Street Mill, Ba	Manufacturing (Steel Mill)	5,931
42	SW-241-17	Fiji Airways Academy, Nadi	Education (Flight Simulator)	3,090
43	DA-027-18	Fiji Maritime Academy Fire Simulator, Suva	Education (Fire Simulator) Football Ground	30 8,700

Source: FRA Planning Register 2020

The interview and research with FRA has indicated that there is a real need for some guidance to be issued on what should be included within a TIA report. It further highlights keys areas that need to be emphasised such as methodology, analysis of traffic data, setting of threshold for when a TIA is required, assessment of critical factors when assessing and mitigating impacts and recommending mitigations.

2.0 GUIDANCE ON TRAFFIC IMPACT ASSESSMENT IN FIJI

2.1 Legislative Requirements

This guidance is to be cited as the “Guidance on Traffic Impact Assessment in Fiji”. This shall come into force once endorsed by the Fiji Roads Authority under its powers in section 6 and 7 of the Road Authority Act 2012.

2.2 Purpose

The objective of the TIA is to understand the impact that the proposed subdivision and development will have on the existing network around the location it is in. The report needs to carry out a complete assessment and identify the possible solutions that will be needed to mitigate the impact.

Innovative solutions are encouraged.

2.3 Interpretation and abbreviations

2.3.1 Interpretations

This section provides a definition of the common terminology that will be used within the TIA guidance.

Access Denial any part of the road network where direct access from the road is denied or limited.

Austroads means the organisation of Australia that provides guidance and standards on transport and traffic.

Authority means the Fiji Roads Authority established under the Fiji Roads Act 2012

Average Vehicle Delay (AVD)

The Average Vehicle Delay (AVD) is another measure of operational performance of an intersection relating to its LoS. The average delay should be taken as a guide only for an average intersection. Longer delays may be tolerated at some intersections where delays are expected by motorists (e.g. those in inner city areas or major roads). Table 2.1 provides a criteria that can be used to interpret AVD.

Table 2.1: Average Vehicle Delay (AVD)

LoS	Average Vehicle Delay / (secs)	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Less than 15	Good operation	Good operation
B	15 to 28	Good with acceptable delays	Acceptable delays and spare

C	28 to 42	Satisfactory	Satisfactory but accident study required
D	42 to 56	Operating near capacity	Near capacity, accident study required
E	56 to 70	At capacity, excessive delays: roundabout requires other	At capacity; requires other control mode
F	Exceeding 70	Unsatisfactory, requires additional capacity	Unsatisfactory, requires other control mode

Source: Government of New South Wales, Australia

Black spot is a place or section of road, where there is a concentration of accidents over a period of time.

Building includes any house, hut, shed, caravan or roofed enclosure whether temporary or permanent, moveable or immovable, whether used for the habitation of humans otherwise and also any wall, fence, platform, septic tank, staging, gate, post, pillar, paling, frame, hoarding (Town Planning Act 1946 General Provisions p 5), or any structure or erection connected to the foregoing.

Capacity means the level at which the transport network reaches its peak capacity. Whereby any additional volume of traffic will mean that it cannot provide an acceptable level of service to what it was designed or intended for.

Consultant means the individual or entity that is representing the developer for any development or subdivision.

Construction Traffic Management Plan means the plan that assesses traffic impacts on the local road network created during the construction period of any subdivision or development. It provides a description of the proposed construction works within the development site, and provides mitigation of the traffic impacts arising from the subject site onto the local area and how these impacts will be addressed or mitigated and how the safety of road users is ensured. It needs to include movement and management of construction vehicles in and out of a construction site, location of the temporary access, provision of loading/unloading bay, etc.

Council means any town, city or district as defined under the Local Government Act 1972

Current year the year in which the proposal is being evaluated

Degree of Saturation (D/S) The D/S of an intersection is usually taken as the highest ratio of traffic volumes on an approach to an intersection compared with the theoretical capacity and is a measure of the utilisation of available green time. For intersections controlled by traffic signals, both queues and delays increase rapidly as DS approaches 1.0. An intersection operates satisfactorily when its D/S is kept below 0.75. When D/S exceeds 0.9, queues are expected.

Department of Town & Country Planning means the department that is defined under the Town Planning Act 1946 for the assessment and approval of any development and subdivision within Fiji

Developer means the individual or entity responsible for undertaking the proposed subdivision or development.

Development in relation to any land means any building operations or rebuilding operations including the making of an alteration, addition or structural repair to any building, the formation, layout or material widening of a street or a means of vehicular access thereto and any use of the land or any building, either wholly or in part, which is materially different from the purpose for which the land or building was last used (Town Planning Act 1946 General Provisions p 8)

Egress means the exit point to any development.

Ingress means the entry point of any development.

Intersection the place or point where two or more roads cross or meet.

Level of Service (LoS) is the ranking on the performance of the road when taking into account factors such as flow of vehicle, rate of flow of vehicles, queue lengths, delay time, journey times, safety, pedestrian facilities, etc.

Table 2.2 can be used when interpreting the results on LoS.

Table 2.2: Level of Service (LoS)

LoS	Traffic Signals and Roundabouts	Give Way and Stop Signs
A	Good	Good
B	Good, with acceptable delays and spare capacity	Acceptable delays and spare
C	Satisfactory	Satisfactory, but requires accident study
D	Operating near capacity	Near capacity and requires accident study
E	At capacity, excessive delay: roundabout requires other control method	At capacity, requires other control mode
F	Unsatisfactory, requires other control mode or additional capacity	Unsatisfactory, requires other control mode

Source: Government of New South Wales, Australia

Loading/unloading bay means the zone or area provided as a pick up or drop off location either within or outside a site for delivery of goods.

Peak Hours means the hours when the traffic around the transport network is at the highest volume of traffic.

Road means all land and infrastructure that is used or intended to be used as or facilities a public right of passage for the movement of vehicles and pedestrian.

Road furniture/asset includes all the physical assets on a road reserve that may or may not be owned by the Authority. This would include but not be limited to a – streetlight, footpath, electricity post, fence, telecommunication exchange box, electricity substation, rest benches, flower garden, raised medium, fire hydrant, etc

Registered Surveyor someone who is authorised by the Surveyors Registration Board to undertake surveying in Fiji and is allowed to use the title Registered Surveyor.

Rezoning approval the change in land use of a site, lot or an area as approved by the Department of Town & Country Planning

Outline Approval means the provisional approval granted by the Department of Town & Country Planning or the Council for any Development application.

Scheme plan means the proposed outline showing how a parcel of land will be subdivided.

Service lane means any vehicular or pedestrian access provided either at the front or the rear of a lot being either 6.0 metres or 9.0 metres wide.

Service vehicles means the vehicle used to deliver goods.

Site means the area on which the development is proposed to be undertaken. The site must be legally bounded by a surveyed boundary.

Street see under Road

Subdivide means dividing a parcel of land for sale, conveyance, transfer, lease, sublease, mortgage, agreement, partition or other dealing or by procuring the issue of a certificate of title (Laws of Fiji, Subdivision of Land Act 1937 p3).

Swept Path Analysis means undertaking analysis showing how vehicles will turn around any given angle while staying within their designated path and without encroaching into the opposing lanes.

Traffic Management Plan mean a traffic management plan for all construction work to be undertaken on the road reserve only showing how the traffic will be managed while construction work is ongoing. This include works on services such as electricity, sewer, water, etc, within the road reserve.

Travel Plan the plan to reduce the number of private vehicle trips generated or attracted by the development.

Trip Generation Rate means the estimate of the number of trips expected to be generated or attracted by a development once it is fully developed. This is to be divided by mode of transport vs the types of development. Trip rates can be daily or peak hour.

2.3.2 List of Abbreviations

Table 2.3: List of abbreviations within the TIA guidance for Fiji

Abbreviation	Definition
AADT	Annual average daily traffic
AFL	Airports Fiji Limited
CBD	Central business district
CAAFI	Civil Aviation Authority of Fiji
CTMP	Construction Traffic Management Plan
DNR	Department of National Road
DOS	Degree of Saturation
DTCP	Department of Town and Country Planning
EFL	Energy Fiji Limited
EIA	Environment Impact Assessment
FRA	Fiji Roads Authority
FSC	Fiji Sugar Corporation
GFA	Gross floor area
GTIAF	Guidance on Traffic Impact Assessment in Fiji
LoS	Level of service
LTA	Land Transport Authority
m ²	Square metres
MoIT	Ministry of Infrastructure and Transport
SSD	Safe sighting distance
TFL	Telecom Fiji Limited
TIA	Traffic Impact Assessment
TIS	Traffic Impact Statement
TMP	Traffic Management Plan
WAF	Water Authority of Fiji

Source: Compilation from technical documents on TIA

2.4 When should you consider undertaking a TIA?

There is no clear threshold on when a TIS or TIA should be undertaken. Table 2.4 is a summary of scale thresholds for different types of development that should be used. However, the Authority should be consulted on any projects to determine if a TIS or TIA is required as these thresholds are only an indication of when a TIS or TIA could be required. The Authority will need

to be consulted before determining if a TIS or TIA is required. While the scale of a subdivision or development are generally used to determine if a TIS or TIA is required, this should not be the only parameter as other factors such as location and current network performance may be significant.

Table 2.4: Proposed threshold for when a TIS or TIA should be undertaken for a subdivision or development in Fiji

Threshold based on size or scale of the proposed subdivision or Development			
	Type	TIS (GFA in m ²)	TIA (GFA in m ²)
1	Commercial	> 800 < 1500	> 1500
2	Office	> 100 < 2500	> 2500
3	Industrial	> 100 < 2500	> 2500
4	Hotel	> 100 < 2500	>2500
5	Residential Apartment	> 100 < 2500	> 2500
6	Restaurant with drive through	> 200 < 400	> 400
7	Fire Station	N/A	Any Scale
8	Warehouse	< 500	> 500
9	Manufacturing	N/A	Any Scale
10	Waste Transfer Station	N/A	Any Scale
11	Service Station	N/A	Any Scale
12	Hospital	Discuss with FRA	Discuss with FRA
13	Stadium	N/A	Any Scale
14	Market	N/A	Any Scale
15	Bus Station	N/A	Any Scale
16	Cinema	N/A	Any Scale
17	Place of worship	Discuss with FRA	Discuss with FRA
18	Education	Discuss with FRA	Discuss with FRA
19	Subdivision	> 50 < 100 lots or < 80,000	> 100 lots or > 80,000

Source: Analysis of data obtain from FRA

Table 2.5: Proposed threshold based on other consideration when determining whether a TIS or TIA should be undertaken for a subdivision or development in Fiji

Threshold based on other considerations			
	Other consideration	TIS	TIA
1	Any development that is not in conformity with the approved scheme plan for the area (including spot rezoning)		✓
2	Any subdivision or development generating 30 or more two way vehicle movement in any hour		✓
3	Any subdivision or development generating 100 or more two way vehicle movement in any hour		✓
4	Any subdivision or development proposing 100 or more parking space		✓
5	Any development likely to increase accidents or conflicts among motorized users and non-motorized users, particularly vulnerable road users such as children, disabled and elderly people.		✓
6	Any development generating significant freight or HGV movement per day or significant abnormal loads per year.		✓
7	Any development proposed in a location where the local transport infrastructure is inadequate for example, substandard roads, poor pedestrian facilities and inadequate public transport provisions.		✓

Source: Transport for London: Indicative threshold for Transport assessment.

2.5 Existing site conditions

The TIA report should be able to provide a detail description of the existing site condition. This should include but not be limited to:

- a. Correct legal description of the affected lot/s and its land tenure as this is required when issuing final approval,
- b. Locality plan to show how the site can be accessed from the road network.
- c. A detail topographical survey of the site showing the position of the road reserve boundary, its carriageway, services (sewer lines, electricity cables, data cables, telecom cables, water reticulations, etc.), road furniture/assets, existing access location both for

the site and adjoining properties that may be affected, natural waterways, drains, cross culverts, contour of the site at one (1) metre interval, etc. This should be prepared by a Registered Surveyor. This is required as historically all services are located within the road corridor and their location may affect the proposed ingress and egress location, proposed acceleration and de-acceleration lane, etc.

- d. Review of the existing land use and the existing plan for the area.
- e. Review of the proposed development plans within the road network that will have an impact or be impacted by the proposed subdivision or development.
- f. Identify any major contributor of traffic around the proposed subdivision or development that should be taken into consideration such as a school or stadium.
- g. Provide a detail description of the road classification, hierarchy, its conditions, and the traffic management facilities available (intersection controls, parking restrictions, footpaths, pedestrian crossing facilities).
- h. Identify the public transport schedule, and facilities that are available to the road users.

2.6 Proposed development

When compiling the information, it is important to provide all the documents necessary to enable the Authority to understand what the proposed subdivision or development comprises.

It should include but not be limited to the following:

- a. Copy of the Outline approval and its conditions of approval as stipulated by the DTCP or the Council.
- b. Copy of any rezoning approval and its conditions of approval as stipulated by the DTCP
- c. Copy of the approved scheme plan and its conditions of approval as stipulated by the DTCP or the Council.
- d. Site plan - All drawings for the proposed development must be submitted in at least A3 paper and drawn to scale.
- e. Specify the type of development being undertaken, the GFA of each use, its hours of operations, service arrangement, car parking arrangement, total area of site, proposed access locations, etc.
- f. Declare any special conditions or requirements that need to be taken into consideration such as EIA approvals (example hydrological report), Geotechnical investigation, CAAFI requirements, FSC requirements (crossing over railway to access the site from a road network), etc.

2.7 Traffic data

To fully understand the impact of the subdivision or development on the existing network the following data is needed so that impacts can be thoroughly analysed.

2.7.1 Accident history record

Crash data can be obtained from the Fiji Police Force for the roads that will be affected by the proposed subdivision or development. This is required to undertake a safety assessment of the site and to understand the existing shortcomings of the network and what will happen if these are not addressed.

This will identify black spots if one exists.

2.7.2 Traffic Counts

Before undertaking any traffic counts, is required to liaise with FRA to confirm the traffic count locations, determine the counting hours, and determine the peak hours. Traffic counts may include relevant intersections and/ or mid-block counts on roads that may be impacted by the development.

General traffic counts, including queue lengths which are to be recorded every five (5) minutes during the peak hours should be undertaken on at least two normal working days between Tuesday and Thursday and a Saturday. Counts should not be undertaken when there is a major event that may affect the traffic count such as a march, road closure, school holiday, public holiday, sporting event, etc.

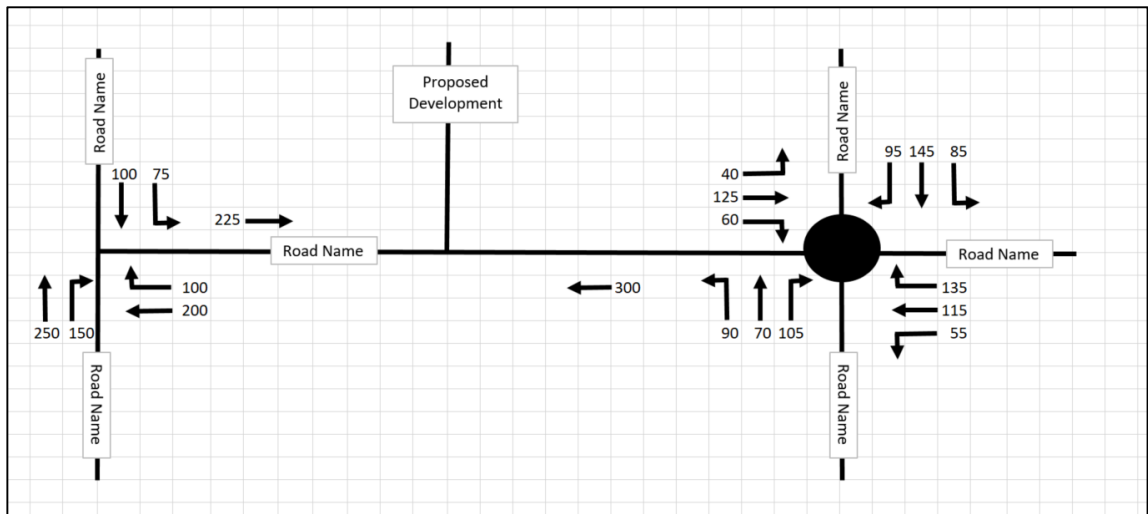
Peak hours vary from location to location, as the peak times are different in an urban area when compared a rural area and even different for a densely populated urban area to an urban centre on the periphery of a city or town. Sufficient data should be collected to indicate when local peak hours occur.

Traffic data that is more than 24 months old cannot be considered, and new counts must be undertaken.

The data should be collected by vehicle type, with clear demarcation of public transport versus private vehicles. A soft copy of the counts should be provided to FRA. All of the raw traffic count data should be submitted in Microsoft Excel format via email.

From the traffic survey data, network flow diagrams (AM and PM) need to be presented in Microsoft Excel, in the same format as the example shown in Figure 2 below.

Figure 2.1: Survey Data Network Presentation (Base Scenario), Example



The base traffic flows need to be factored by 2% per annum to create the opening year flows (AM and PM).

2.7.3 Modelling of existing conditions

FRA recommends that all traffic modelling be undertaken using the SIDRA software suite. It is imperative that the models are calibrated and validated so that the existing traffic network is replicated as closely as possible, based on traffic volumes, observed queue lengths and on-site geometry. It is noted from experience that modally presented generally rely on the pre-set parameters within the SIDRA model and at times this may not be suitable for use as the site conditions may be different and traffic characteristics may require adjustments to the standard parameters.

For very large development that are likely to generate large traffic volumes and thus affect a large area of the surrounding road network, or for developments within locations where there are numerous major intersections within close proximity that are likely to be affected by the proposed development, a network model may be required to assess over a wider area. Suitable models for assessing the effects on a wider area are LINSIG, TRANSYT, SATURN or microsimulation network models. The proposed traffic model approach should be agreed with the FRA. A soft copy of the model to be provided to FRA.

Analysis should be carried out to determine the Level of Services (LoS), Average Vehicle Delay (AVD) and Queue Length of the existing network. It should confirm if the existing network is close to or at capacity, defined as LoS D or higher.

Analysis of queue lengths must be undertaken to ensure that queues do not extend back to adjacent junctions, hence blocking the junction(s).

2.7.4 Trip Generation Rates

Trip Generation: An estimation of the number of two-way trips generated by the development. FRA acknowledges that it needs to undertake data gathering, investigation, and analysis to understand the travel demand for households and individuals in Fiji. The existing data that it has for movement of goods and services within the different zones is limited. A household survey carried out by MoIT covered only 1% of the population of Fiji. It is to be noted that there has been a 10% annual growth in car ownership in 2017. However when an analysis is carried out over a decade it equates to 2%-3% annual between 2007-2017, and 2000-2010.

Since 2014 the FRA has relied on the use of Australian trip generation rates reduced by 30% for Fiji. It is no longer acceptable to apply the 30% Fiji reduction factor on any development. A 30% reduction factor can be applicable at City and Town Centre locations to account for linked trips and a higher percentage of sustainable trips to and from the development, this is to be agreed with FRA.

It is preferred that Australian or New Zealand trip rates are used to calculate the two-way trips to and from the development. If a comparison is to be made with an existing development in Fiji, then traffic surveys for the existing development must be undertaken within the same year as the TIA is to be submitted, in a similar location with a similar catchment to that under consideration. In addition, the number of existing parking spaces at this development need to be stated.

If Australian and New Zealand trip rates are to be used then extracts from the databases must be submitted as part of the TIA, this should include:

- i. Gross Floor Area, Retail Floor Area / or number of rooms,
- ii. the location of each specific site,
- iii. the number of parking spaces at each site,

- iv. the individual trips generated by each site,
- v. the percentage split between arrivals and departures in the peak hours.

The report should also consider:

- a) Will the subdivision or development have a local or a wide area appeal?
- b) How will the people access the site? Will it affect the modal split on the network?
- c) What percentage of the trips to the site will be pass by trips or linked trips and what percentage will be diverted trips.
- d) What will be the preferred route(s) taken by commuters to access the site, backed up by evidence of explanation of the method used to distribute generated trips onto the road network.

A soft copy of the trip generation to be provided to FRA.

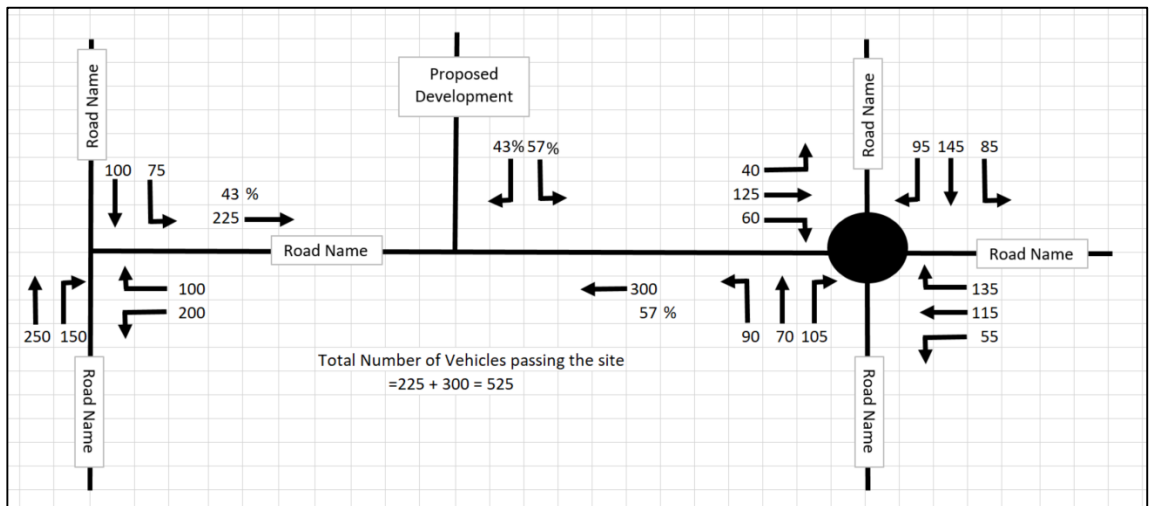
2.7.5 Trip Distribution

The trip assessment needs to clear follow the following guidelines:

1. **Trip Distribution** - The distribution of the total number of trips at the access(es) and egress(es) of the development.
2. **Primary Trips** - Trips that do not appear anywhere on the road network prior to the opening of the development.
3. **Pass-by trips** - Trips that are already present on the road network directly adjacent to the point(s) of access to the site, which will turn into the site. Pass-by trips are only to be considered for retail outlets. Pass-by trips are on the existing road network, it is generally considered that 30% will access a retail development, therefore these trips are not to be removed from the network, they are to be diverted at the development access / egress junction(s), into and out of the development instead of passing by, as they currently do.

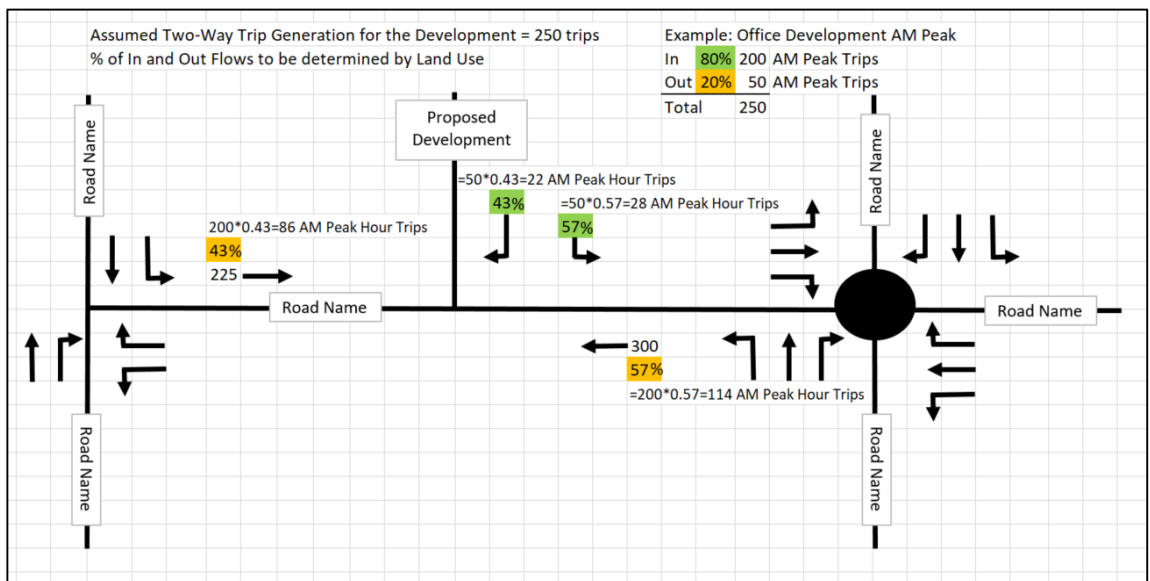
Trips are to be distributed based on the percentage of existing vehicles currently passing the site (calculated from the traffic survey data), as shown in the example below. For this example, it is assumed all trips are primary, therefore the percentage attracted to the site will be the same percentage departing the site from the same direction they have arrived, as shown in Figure 2.2.

Figure 2.2: Trip Distribution Percentage



If for some reason this is method of distribution is unsuitable for the purposes of the intended development, then the FRA needs to be consulted prior to undertaking the calculation.

Figure 2.3: Trip Distribution Calculation, Example



Should pass-by trips be relevant to the proposed development, then a maximum of 30% is deemed suitable. If for any reason this percentage is not applicable, then the FRA needs to be consulted before undertaking the calculations.

2.7.6 Trip Assignment

Trip Assignment: The assignment of the development trips across the road network which is to be assessed.

Trips are to be assigned to the relevant arms of the junctions to be assessed, based on existing turning movements (as shown in Figure 2.4).

Figure 2.4: Trip Assignment Percentages, Example

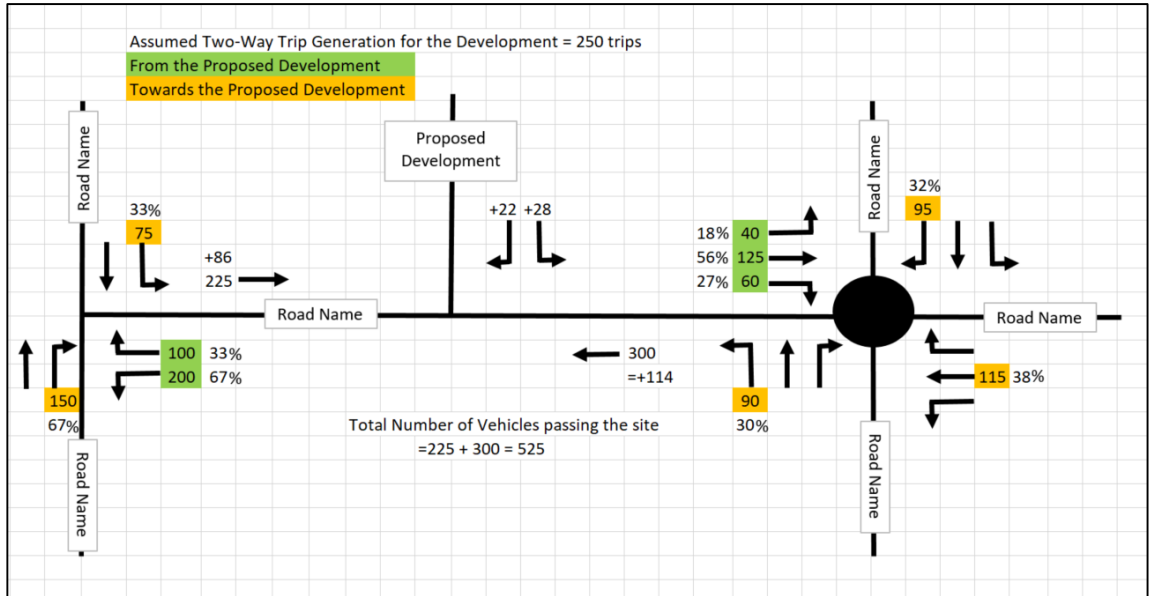
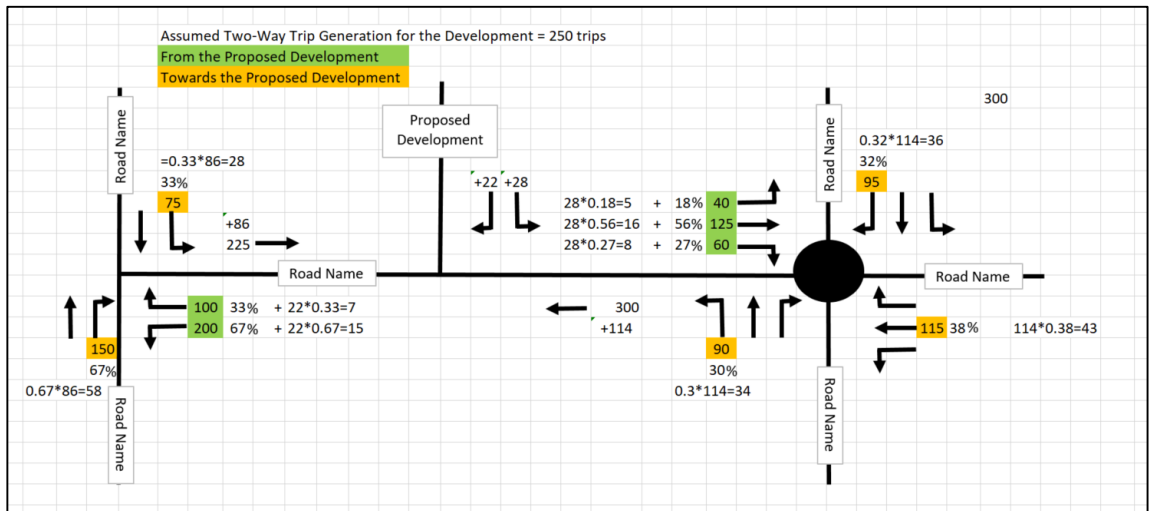
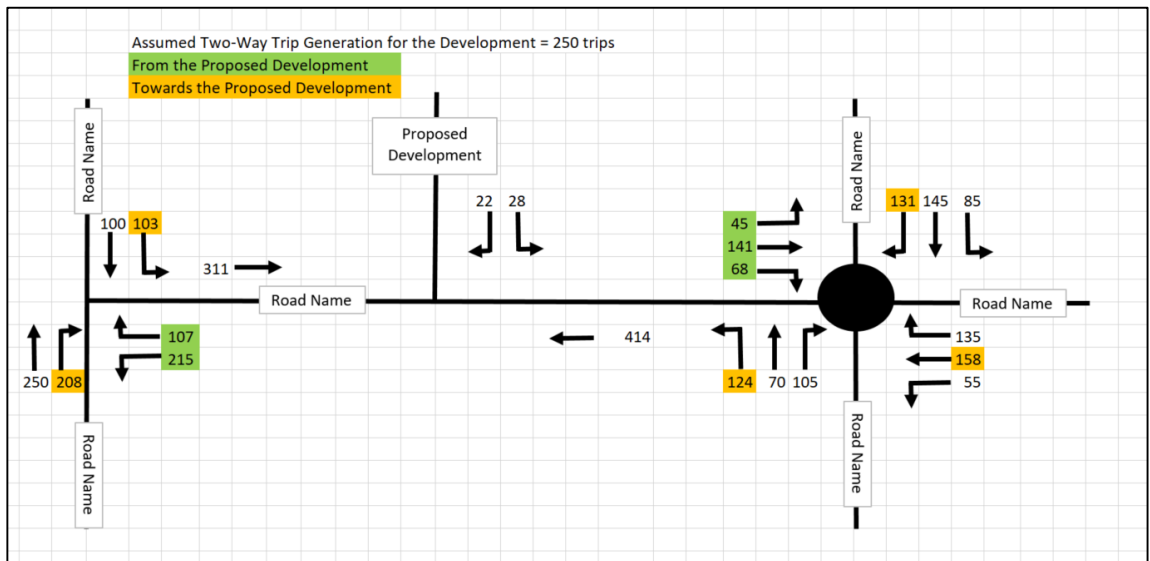


Figure 2.5: Trip Assignment Calculation, Example



Base + Development Scenario: The Base Scenario + the Development Trips.

Figure 2.6: Base + Development Scenario



2.7.7 Modelling with the additional traffic volumes (current year and 15-year model)

Traffic modelling of the impacts of the proposed subdivision or development is to be undertaken after the model for the existing network is well calibrated. The effects of the development generated traffic should be assessed on all intersections in the surrounding network at which the development is forecast to increase the peak hour traffic flow by more than 10% of the existing traffic flow. The report should take into consider all developments and subdivisions within 1 km of the study area and all development approved development but not yet completed.

Should separate development flows need to be included within the analysis, FRA will provide the development flow and distribution, these flows must then be assigned to the network for assessment purposes. These flows must be presented in the same way as shown in Figures 2.4 and 2.5.

Adding the forecast trips generated to and from the development, distributed on the road network as forecast, the with- development scenario should be modelled for both the opening year and for 15 years post opening using an annual growth rate in traffic volume of 2%-3%.

The report needs to determine the LoS and Average Vehicle Delay (AVD) at all affected intersections once the additional traffic is added to the network in both opening year and 15 years after. It should report on forecast queue lengths, intersection delays, and degree of saturation (volume/ capacity ratio).

If mitigation in the form of increased traffic capacity at intersections is proposed, traffic modelling of the proposed improvements must be included to demonstrate how the proposed intersection improvements perform in the opening year and 15 years later.

Both the Base AM and PM peak scenarios need to be assessed. From the profile of the traffic count data, should the peak hour be during midday period then prior consultation must be undertaken with FRA on the survey data prior to undertaking the assessments.

All site accesses need to be modeled in addition to adjacent junctions to be confirmed by FRA. The acceptable Levels of Service (LOS) for a new junction are LOS A to LOS D.

Should any existing junction currently operate at LOS E or LOS F, then it is expected that mitigation measures are considered to ensure that the LOS, queue lengths and delay on each arm of the junction do not deteriorate when the development flows are added.

2.7.8 Assessment to be submitted

The following are the junction assessment scenarios which must be submitted as part of the TIA:

- Base AM
- Base PM
- Base + Development AM in the year of opening
- Base + Development PM in the year of opening
- Base + Development AM (+ any necessary mitigation measures) in the year of opening
- Base + Development PM (+ any necessary mitigation measures) in the year of opening
- Future Year Base + Development AM
- Future Year Base + Development PM

In any junction assessment, if default values have been altered (especially gap acceptance) within the modelling program, then reasoning for this needs to be explained.

2.7.9 Construction traffic

It is important to assess the impacts on the network as a result of the proposed construction works. Issues that need to be addressed would include closing of any pedestrian way for hoarding, closing of any lane on the road for heavy equipment, impact of the construction on traffic flow, identifying the hours of operation and determining the peak hours to avoid construction work, providing a proposed TMP and CTMP for the proposed development. An

explanation of how the safety for all modes, in particular pedestrian, will be managed during construction will be required.

2.8 Parking supply and demand

The DTCP is the final approving authority in relation to the number of parking spaces that is permitted within a development. In June 2016, DTCP revised the car parking requirements to discourage the use of private vehicles within densely populated urban centres with an aim to encourage the use of other means (such as public transport, carpooling, etc.) to reduce congestion. However, the report should show how the approved car parking requirement imposed at the Outline approval stage has been accommodated within the subject site.

The public car parking provided within the road reserve or car parking facility provided within the vicinity is not to be included when trying to meet the requirements of the DTCP. These car parking facilities are to be considered as additional to the approval issued.

However, the report must undertake assessment to confirm if the proposed car parking requirement are adequate to meet the demand of the patrons, tenants and/or staff of the proposed development. This can be determined by calculating the number of parking spaces required as per the proposed use and verified against the existing uses within the vicinity.

Where the car parking demand is not sufficiently provided for, or where the number of parking spaces required by the DTCP is not met, then the developer needs to show how the parking demand will be managed.

The car parking layout must comply with “General Provisions” issued by the DTCP. Since this doesn’t have provision for disabled parking, reference can be made to AS/NZS 2890.6-2009: Parking Facilities – Off-street Parking for People with Disabilities (Austroads).

Depending on the scale and use of the site, a set down and pick up area should be considered for patrons that are dropped off or picked up from the site by a third party taxis and coaches where relevant.

2.9 Public Transport

The Fijian Government National Plan 2017, which sets targets for the next 5 and 20 years has emphasised the need to encourage public transport. One of its goals is to provide access to

transportation through an efficient and sustainable transport network. The policy under this goal is to ensure safe, efficient (including reducing traffic congestion), and affordable transportation.

The strategies identified are:

- (i) “explore the viability of implementing public transport network design for an efficient and equitable public transport system;
- (ii) Introducing peak period public transport zoning for high demand corridors.”
(Fijian Government National Development Plan 2017, p 70)

Therefore, the TIA report should provide a plan on how the public will be encouraged to use public transport and not be dependent on private vehicles to access the subdivisions and developments particularly during weekdays to reduce congestion.

Developers are encouraged to provide a public transport friendly environment for the public. These should include provisions for pedestrian connectivity from the nearest bus stop, ensuring that the footpaths are wide enough to cater for the demand, safe pedestrian crossing facilities at the public desire lines, provision for people with disabilities, adequate street lighting, and taxi bays/ranks

Subdivisions must be designed to be public transport friendly by ensuring that the roads are connected suitably for public transport to easily enter and exit the subdivisions. Due consideration should be given to road widths, provisions of bus bays (which can be either indented or provided in lane) with enough lane width to allow two lane of traffic when a bus is parked in lane. It is encouraged that appropriate sized civic lots are set aside for the use as taxi base so that the subdivisions are adequately services by taxis.

It is generally recommended that bus stops/bays be provided at intervals of 300m-500m in areas of public interest such as residential, education centres, or place of employment. Major development should provide enough drop off area for all modes of public transport such as coaches, taxis, and minivans.

A plan of the development including bus stops within 400m of an access, as well as the number and frequency of the bus service is to be provided. The report needs to indicate whether

- There is a bus lay-by area or if it is an on-street stopping provision.
- If bus shelter is provided

- Timetable of the buses
- Comment of bus frequency and should it be increased.

2.10 Access

2.10.1 Intersections

All intersections should be adequately designed to ensure that all vehicles can safely enter and exit them without encroaching into the opposing lanes. Modelling will assist in determining the appropriate control for affected junctions. An example would be upgrading a priority junction to a roundabout or to be signalised

The report needs to include an assessment on whether a deceleration lane and/or an acceleration lane needs to be provided. Deceleration and acceleration lanes have been instrumental in improving safety on high speed roads where it could be unsafe for vehicles to be stopping on the through lane as vehicles behind the turning vehicle may not stop in time.

It further reduces congestion and delay in journey time for as vehicles as delays occur if they have to queue behind the stationary right turning vehicle.

It is recommended that intersections be designed in accordance with the Austroads Guide to Road Design - Part 4A - Unsignalised and Signalised Intersections.

2.10.2 Driveways

Driveways play an integral part in making sure that the road network is free flowing and there are minimal delays to the through traffic as vehicles turn in and out of them. The following guidance is provided when designing driveways to properties and developments:

1. The gradient of the proposed driveway to be designed to tie into the level of the current road shoulder either side of the crossing to allow safe pedestrian thoroughfare.
2. An appropriate gradient fall to be designed onto the subject lot for the ease of vehicle movement. The underside of vehicles should not scrape where driveways change grade.
3. The design of the driveway shall be such as to prevent storm water overflow from the carriageway into the proposed lot and vice versa.
4. It recommended that for residential lot a driveway of at least 3.5m wide be maintained at all times.

5. It is generally recommended that for Commercial/Industrial development with a single entry/exit point a driveway of at least 7.0m wide be maintained at all times. The dimension may be reconsidered based on a swept path analysis provided for the size of the largest vehicles that will be accessing the site.
6. For guidance on gradient and safe sighting distance it recommended that AS/NZS 2890.1-2004: Parking Facilities – Off-street Car Parking be used.
7. Austroads design vehicles and turning path templates guide should be used as a guide for the swept path analysis required to be undertaken.

2.10.3 Service vehicle

The report needs to make a correct determination on the number and size of the service vehicles that will be accessing the site. The site must provide the appropriate size service area (loading/unloading zones). It is recommended that the Austroads Traffic Management - Part 12 - Traffic Impacts of Developments be used as a guide. Maximum vehicle sizes for common developments are listed as:

- 8.8m long – Local Commercial, Health Centres, and small offices
- 12.5m long – Shopping centres, large offices, small warehouse, and hospitals
- 19.0m and 25.0m long (includes semi-trailers) - Warehouse, Mines, and Factories

Vehicles should have a smooth and unobstructed path into and out of the development in a forward gear allowing no more than a three-point turn movement. A turning circle area within the development should be provided for all delivery vehicles.

2.10.4 Internal traffic management plan

The purpose of the internal traffic management plan is to ensure that traffic within the development is able to easily circulate without vehicles queuing out of the development or vehicles finding it difficult to exit the development due to internal congestion or queue.

Some of the factors that can assist in preparing a good internal traffic management plan are:

1. Internal traffic circulation - It is recommended to keep the internal traffic circulation in either a clockwise or anti clockwise direction to assist traffic flow and driver comprehension. The direction is dependent on the design and location of the egress and ingress points.

2. Parking bays – the angle of parking, size of the parking lots and its aisle width contribute to either an ease of flow or congestion. If patrons are able to easily manoeuvre in and out of the parking bays, it will mean more time for the shoppers to shop, and spaces becoming available sooner. It will also reduce minor crashes within the development and contribute to a better experience for all users.
3. Service zone – ensuring that the general car park is segregated from service vehicles to reduce accident risks and improve safety for all users.
4. Pedestrian facilities – provide a clear access for pedestrians from the main access from the road to the entrance of the complex. This could be by way of continuous footpath, guidance/safety railing, covered walkway, adequate lighting, and pedestrian path and crossings within the car park
5. Drop off areas – common concerns from non – private vehicle users have the provision to safely and efficiently access the site without difficulty. Therefore, the provisions for drop off areas for taxis and private vehicles (that need to drop patrons or pick them up) should be considered.
6. Queuing – the report should identify the expected queue length outside the development and provide enough storage area. Internal queuing should not block car parking spaces frustrate patrons with the delay in exiting the site.
7. Ticketing Booth - It is often noted that ticketing booths are a major contributor to queue lengths. If required, they need to have sufficient capacity (consider multiple lanes) and be adequately setback from the road boundary to avoid queuing affecting the traffic flow on the road.
8. Signage and line marking plan – a clear plan should be provided to show how the drivers and pedestrian will be guided with clear signage's and line marking. This is very important so that the traffic flow and safety is optimised.

2.10.5 Special Consideration

When developments are considered under block rezoning that results in the change in use of a corridor or area, particularly for a high density use (for example from residential precinct to a commercial precinct) the TIA should consider the following:

1. Service lane – a 6m or 9m wide front service lane should be considered to provide provision for access to the affected lots. This area could be used for loading/unloading purposes and short term parking. It significantly reduces the conflict points that an

access to each lot/property would create due to the turning movements of vehicles manoeuvring in and out of them.

2. Impacts on the adjoining areas – Often the change in use for a corridor will not only affect the subject area but the areas immediately connected to them. Consideration should be given to:
 - whether all the affected areas are connected via a pedestrian access,
 - what are the provisions for public transport (buses/taxis), at many large developments a taxi rank within the development will need to be provided;
 - if development will be staggered, how will the infrastructure required be built?
3. Road widening – Generally the following road reserve widths are recommended based on land use:
 - 9m wide for Residential development
 - 16m wide for Commercial and Industrial development
 - 20m wide for Industrial and highways

Therefore, due consideration should be given to road widening that would be required as a result of the change in use.

4. Access to and from the development must be suitable for the mobility impaired. Therefore, ramp access, doorways, elevators, surfacing, site gradient and parking provisions need to be considered and the necessary provisions are to be highlighted within the site layout plan.

2.11 Impact of development and mitigation

The TIA report will generally identify impacts at each stage of the report. However, a final summary must be provided on the impact the development will have on the transport network. There is no set sequence as to what must be highlighted first. It is expected that professional judgment be used to put issues, and impacts in a meaningful order.

Due diligence should be under taken on the indirect (non-traffic induced) impact of the proposed subdivisions or developments on the road network. This may include issues such as:

- i. Upgrading of sewer or water mains under the road carriageway or footpath.
- ii. Removing EFL overhead powerline and undergrounding them. There are instances where the streetlights are mounted on the EFL powerlines.

2.12 Proposed mitigation

Any report is incomplete without providing a summary or a list of recommendations on what should be implemented to mitigate if there are any impacts that a subdivision or development will have on the existing road network.

Recommendations need to be as concise as possible and should avoid generalising solutions. It is normally observed that any physical work needs are easily identified (such as junction improvements or upgrades) however due consideration should be given to travel demand management. This can be attained through travel plans, encouraging use of public transport, walking, cycling, carpooling, hot desking, etc.

2.12.1 Travel Plan

Travel plans have not yet been used by developers in Fiji. However, this is a useful tool that can be used to address the dependency on car based travel. Major development that employ more than thirty employees should consider ways in which they can encourage workers not to bring their vehicles to work every day. This might be achieved by providing a bus to transport workers from home to work or subsidising public transport if they live on a well connect public transport network.

Staff that are allocated company vehicles should be required to pick up and drop off at least one other staff member on the way to work or home. Flexible working hours can be encouraged so that travelling in peak hour traffic can be avoided while service is not compromised.

2.12.2 Promoting Cycling

Discussion has been generated on the use of cycling to assist the reduction of road congestion and pollution, however little has been done to promote this in Fiji. Some of the ways to encourage people to take up cycling for other than recreational activities will be by providing cycling lanes, cycling racks to park the cycles, and facilities at workplaces to allow workers to shower and change.

2.12.3 Promoting Walking

Walking can be a reasonable method that can help reduce congestion and traffic. Past hindrance to this in Fiji has been the provisions of adequate footpaths that connect the origin and destination, provision of streetlights safe pedestrian crossing facilities, and provision to shower

at a workplace, which includes lockers to store your essentials such as towels, soap, walking shoes, etc.

A plan showing all footway on major roads within 1km of the site, the width, pedestrian crossing facilities, lighting, dropped kerbs, etc. be provided. All facilities should have adequate provisions for people with disabilities.

2.13 Guidance on Developer Contribution

The FRA will study every application to determine if, in its opinion, the proposed subdivision or development is likely to impact the network in any way – either during its construction, after completion or both.

If, it is concluded that the proposal is likely to impact the network appropriate requirements will be imposed as a condition of the FRA's consent to the proposed subdivision or development proceeding. Such requirements may include, but are not limited to, a condition (or conditions) requiring the sub-divider or developer to:

- (i) construct a new road or upgrade an existing road;
- (ii) pay to the FRA a sum of money to enable the FRA to fund the cost of managing or mitigating the envisaged impacts itself (and/or);
- (iii) not to erect any building forward of a prescribed building line on the subject property – such building line condition to be registered on the property title;

The Authority may refer to the following guidance when determining the developer contribution:

- If the development is responsible for the total impact on the network, then the developer will need to pay 100% of the total cost of the mitigation required.
- If development is partially responsible of the impact they shall be liable to pay a percentage of the total cost of the development. This shall be determined by FRA based on the relative impact of the proposed development.
- If proposed work was planned by FRA but not programmed for the current year and consequently brought forward, the developer is expected to pay for the cost of bringing it forward.
- If the proposed works are programmed for the year or impact on network is not as a result of the development - no cost would be imposed on the developer.

3.0 CONCLUSION AND RECOMMENDATIONS

3.1 Conclusion

It was evident from the literature review that a lot of studies have been carried out in an attempt to understand what the impacts of a major subdivision or development are. When you summarise the findings you can conclude that there exists a strong relation between land use planning and transportation. To undertake complete TIA study, you need to understand the demand for travel and its pull and push factors. The researchers agree that public transport is one of the key tools in addressing congestion, journey time, and parking problems. However enough is not done to bring about a modal shift which can be linked to weak political will, and fragmented approach.

Integrated development should be encouraged with the need to engage transport planners early in the project stage.

Key issues identified that are critical for Fiji include, providing definition for the different terminologies used within a TIA report, tabulating a list of abbreviation to remove any ambiguity due to the different mix of international consultants in Fiji, developing a threshold that assist developers as they carry out their feasibility studies on a project, need to provide guidance TIA report writing, provide guidance on traffic data collection and analysis, identify impacts and propose mitigation with clarity on the mechanisms around developer contribution.

3.2 Positive Outcomes

The research has been able to assist in identifying elements that are currently missing in the TOR that FRA uses. The guidelines will assist all the parties involved in the TIA process, by ensuring that all the relevant/critical issues are covered in a TIA report. It should also reduce the time taken prepare and review the report. For a developer any saving in the time taken for the approval process is good news for the project.

3.3 Further Work

The guidelines prepared are still a work in progress as there needs to be more done in determining appropriate trip generation rates for the different types of development in Fiji. FRA will need to undertake a study to establish the actual trips generated by a range of existing developments. Similarly, it needs to analyse more subdivisions and developments to determine

a fine-tuned threshold for when TIA should be required. It may be that the current thresholds proposed may be adequate but this should still be independently verified with more data.

There needs to be a national traffic count conducted on key routes which is critical when trying to plan a national road network.

A bigger and large problem still exists, being the need for Fiji to prepare a land use plan and policy in consultation with the key stakeholders, major developers, investors and government. The path adopted by Melbourne City, Australia or other Australian or New Zealand Council could be an option to investigate, given that Fiji has closely aligned most of its polices and standards from its two major neighbours.

Another major drawback is the absence of basic subdivision and development regulation that should be governing the road management undertaken by the FRA. This needs to be addressed urgently to avoid any ambiguity and confusion that exists between the regulators, the developers on the roles and responsibilities of FRA.

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