ETHEKWINI TRANSPORT AUTHORITY

MANUAL FOR TRAFFIC IMPACT ASSESSMENTS AND SITE TRAFFIC ASSESSMENTS

Traffic Engineering

Version 0.1
October 2015

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Published by:

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MANUAL FOR TRAFFIC IMPACT ASSESSMENTS AND SITE TRAFFIC ASSESSMENTS

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1 BACKGROUND

1.1 Introduction

The aim of this document is to ensure uniform and consistent requirements and standards for Traffic Impact Assessments (TIA's) submitted to eThekwini Municipality (EM) – eThekwini Transport Authority (ETA).

TIA's are required by legislation in terms of the National Land Transport Act, 2009 (Act No. 5 of 2009) wherein it is stated that the development of any property or change of land use within the jurisdiction of a planning authority is subject to submission of a TIA (sections 38 (2) b), 38 (3) (b)).

The ETA acknowledges the following national TIA guidelines and has reviewed these guidelines when developing this document:

- Manual for Traffic Impact Studies, Department of Transport, RR 93/635, 1995.
- TMH 16, Volume 1 South African Traffic Impact and Site Traffic Assessment Manual, COTO, 2012
- TMH 16 Volume 2 South African Traffic Impact and Site Traffic Assessment Standards and Requirements Manual
- TMH 17 Volume 1 South African Trip Data Manual

This document contains specific refinements to the above documents that are considered appropriate to EM relating to:

- Public interest
- Safety
- Facilitation of development and economic growth
- Sustainable development

The guideline is intended for:

- ETA staff evaluating submissions.
- Developers and their agents, traffic engineers, other authorities and departments involved in preparing proposals and related planning applications for new developments or the redevelopment of existing sites within EM.

The document was prepared by the ETA's Traffic Engineering Branch and is published as the *eThekwini Transport Authority: Manual for Traffic Impact Assessments and Site Traffic Assessments, Version 0.0, July 2015*.

It must be recorded that this document must not be construed as being exhaustive and conclusive. The professional undertaking the assessment still remains responsible to undertake the assessment considering all aspects related to the potential impacts of the development.

In addition, the ETA reserves the right to reasonably require information to be supplied in the assessment that is not covered in this manual.

If any aspect is silent in this manual, the ETA will make a determination on the issue and convey same to the professional undertaking the assessment.

The document contains five sections:

1. Background
2. Submission procedure and relevant responsibilities
3. Types of traffic impact assessments and thresholds
4. Traffic impact assessment requirements and guidelines
5. Appendix A: Traffic impact standards and requirements
6. Bibliography

2 SUBMISSION PROCEDURE AND RELEVANT RESPONSIBILITIES

2.1 General

The submission of a Traffic Impact Assessment (TIA) to the municipality falls into two categories:

- Submission as part of a development application (e.g. town planning application, environmental impact assessment)
- Submission direct to ETA

In the first category listed above, a formal application is made with the Development Planning, Environment and Management Unit (DPEMU) and eThekwini Transport Authority (ETA) will provide comment on the application to DPEMU.

For direct submissions to ETA that are not part of a development application (item 1 above), this must be submitted to First Floor, Reception, eThekwini Transport Authority Building, 30 Archie Gumede Place, Durban.

For both categories, one electronic copy must be provided in addition to the specific number of hard copies agreed prior to submission.

The review process and timeframes for assessment of development application submissions shall be based on statutory regulations and requirements.

2.2 Traffic Impact Assessments for Various Planning Levels and Relevant Responsibilities

TIA's are directly related to the level of the development plan which could fall into one of the following categories (applicable in the eThekwini context):

- Spatial development framework (SDF)
- Spatial development plan (SDP)
- Local area plan (LAP)
- Functional area plan / precinct plan / special area plan
- Site Development Plan

Brief descriptions of the plans are provided hereunder:

The Spatial Development Framework (SDF) is the primary spatial response to the development context, needs and development vision and is the point of integration of strategic area wide spatial strategies in the arena of economics, transport, environment and society.

Spatial Development Plans (SDPs) cover the area identified in the SDF at a greater level of detail than the SDF. SDPs provide strategic multi-sectoral planning guidance for the area that translates the spatial intentions of the SDF, indicates the short, medium and long term growth & development opportunities and provides broad based land use, environmental, transport planning and bulk infrastructure directives to guide more detailed planning within Local Area and Functional Area Plans and informs the Land Use Schemes

A SDP comprises a number of Local Areas for which Local Area Plans (LAPs) will be prepared. The LAP carries through the intent of the SDP but responds to the specific nature of the local area. A LAP would consider issues such as the alignment of local movement systems, the identification of local economic and leisure opportunities, and the more detailed identification of areas for both development and conservation within the context of existing and new infrastructure capacity.

Functional Area Plans will be undertaken for areas within the LAP that require special attention. Functional Area Plans would exhibit a high level of detail of infrastructure requirements.

The Site Development Plan proposes the development layout on the property.

A TIA can be carried out for any of the above plans (although the level of detail and complexity will vary across each type of plan). The respective branch/s from the ETA responsible for review and approval of the TIA at various planning levels are as follows:

Review and approval from the eThekwini Transport Authority

	Level of development planning	Strategic Transport Planning Department	Traffic Engineering Branch
1	Spatial Development Framework	√	√*
2	Spatial Development Plan	√	√*
3	Local Area Plan	√	√
4	Precinct plan / Special area plan		√
5	Site Development Plan		√

*The Traffic engineering branch review and approval is limited based on the level of detail captured in the SDF and SDP.

In addition to the above, specific aspects of the TIA such as traffic signals and public transport aspects require approval from other relevant branches within the ETA.

3 TYPES OF TRAFFIC IMPACT ASSESSMENTS AND THRESHOLDS

Two types of Traffic Impact Assessments (TIA's) are necessary for submission to the eThekwini Transport Authority (ETA):

- Traffic Impact Assessment (TIA)
- Site Traffic Assessment (STA)

A TIA is submitted whenever there is a change in land use or a change that may impact on traffic operations. A change in land use or change impacting on traffic operations includes but not limited to the items listed below or combination of these items:

- Rezoning of land
- Special consent application for a change in land use
- Township establishment
- Amendment to town planning controls
- Scheme amendments
- Change to access arrangements
- Change to public transport, parking and traffic management
- Subdivision and consolidation of land
- Road closure (temporary or permanent), including pedestrianisation of roads
- Special event

The TIA focuses on the external traffic impacts and the STA focuses on the internal traffic impacts and site accesses.

A STA is submitted when:

- An application is submitted for the erection of a building or other structure (e.g. roads and other) on a site for which a Site Development Plan is required.
- Proposals are made for transportation facilities (roads and other) in a township during Township Establishment.

A STA is relevant to all transport impacts within the development site and accesses to the development site.

As part of the TIA, a STA may be included in the submission (depending on the availability of a Site Development Plan). If a Site Development Plan is not available at the time of submission of the TIA, a STA must be submitted once this is available provided that the STA is not submitted more than 5 years after approval of the TIA in which case the TIA must be revised and submitted together with the STA.

A TIA and STA is valid for a period of 5 years from date of approval.

Single dwelling units are exempted from providing of a STA and TIA.

The thresholds for submission of TIA's are as follows:

- *A TIA shall be undertaken and submitted when an application is made for a change in land use when the highest total additional hourly vehicular trip generation (including pass-by and diverted trips) exceeds* ***11 vehicle trips****.*

The thresholds for submission of STA's are as follows:

- *A STA shall be undertaken and submitted when an application is made* for the erection of a building or other structure (e.g. roads and other) on a site for which a Site Development Plan is required when *the highest total hourly vehicular trip generation (including pass-by and diverted trips) exceeds* ***11 vehicle trips****.*

Notwithstanding the thresholds, the ETA may require a TIA / STA to be undertaken having considered factors peculiar to the application and/or its impacts in terms of the environment, road network, and persons directly affected by the application.

Applications for changes in land use that result in additional vehicular trip generation that are below the threshold values are not exempt from the provision of transport infrastructure where such infrastructure is deemed necessary by the ETA.

Applications for which a site development plan is required and where the vehicle trip generation values are lower than the thresholds for STA's shall not be exempt from the provision of transport infrastructure where required such infrastructure is deemed necessary by the ETA.

4 TRAFFIC IMPACT ASSESSMENT REQUIREMENTS AND GUIDELINES

4.1 General

The submitted Traffic Impact Assessment (TIA) must contain the following sections whether applicable or not. Where an item is not applicable, this must be clearly stated together with supporting reasons.

1. Cover page
2. Letter signed by the Engineering Council of South Africa (ECSA) registered professional
3. Completed checklist
4. Development particulars
5. Study area
6. Background information
7. Site investigation
8. Other planning authorities
9. Traffic demand estimation
10. Trip distribution and traffic assignment
11. Total traffic demand
12. Demand-side mitigation
13. Proposed improvements
14. Traffic impact assessment scenarios
15. Site traffic assessment
16. Transport requirements and costs
17. Recommendations
18. Appendix of correspondence (track record regarding the approval process relating to comments and approval process of the TIA)

Where it is not possible to achieve the standards and requirements of this manual, alternative options or solutions must be developed and evaluated to determine the preferred option. All impacts of the alternative options or solutions must be assessed, even if such assessment is only made qualitatively.

The preferred solution is the one which would minimise all impacts and at the same time have greatest benefits in terms of social and economic development. This, however, is not always possible and a compromise solution is often required. The preferred compromise solution is one in which impacts are balanced and none of the impacts are excessive.

4.2 Submission Checklist

Before a full review is conducted, eThekwini Transport Authority (ETA) staff will check the completeness of the TIA Report in terms of the items detailed below. If the report is missing any of the items, it will be returned for revision without reviewing the document.

A completed checklist must be included in the report.

ETHEKWINI TRANSPORT AUTHORITY

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Tel: 031 311 7344 | Fax 031 305 5871
www.durban.gov.za

TRAFFIC IMPACT ASSESSMENT CHECKLIST

Before a full review is conducted, the report will be checked for completeness. If the report is missing any of the items listed below, it will be returned for revision without reviewing the document. If any content is not applicable this must be indicated (with reasons) as such under the section/s of the report

ETA Ref. No.:..... Date of Application:.....

Development Address:.....

Development Description.....

Traffic Professional:.....

Content	Yes	No	N/A	Comment
1. Traffic impact assessment cover				
2. Letter signed by ECSA registered professional				
3. Development Particulars				
3.1. Development description and reference name				
3.2. Location plan				
3.3. Land use rights existing and applied, including type and extent of rights, list of land uses under proposed zoning including town planning controls				
4. Study area				
4.1 Study area plan or map indicated				
5. Background information				
5.1. Listed information – transport facilities and planning				
5.2. Relevant information provided by municipality e.g. Framework plans, road classification, traffic models, etc.				
5.3. Schematic diagram/s				
6. Site investigation				
6.1. Documented and photographic record (e.g. road conditions, geometrics, operations, transport facilities, etc)				
7.Traffic Demand Estimation				
7.1. Carried out for worst case trip demand land use under the proposed change in land use or extent as stipulated in the town planning application				
7.2. Assessment years				
7.3 Assessment hours				
7.4. Traffic counts not more than 2 years old – date and time				
7.5. Traffic growth rates				
7.6. Trip generation rates				
7.7. Modal split				
8. Trip Distribution and Traffic Assignment				
8.1. Manual trip distribution and assignment				
8.2. Simulation software used for trip distribution and assignment – software files must be provided				
8.3. Supporting information documented for traffic distribution and assignment				

8.4. Trip Distribution and Traffic Assignment diagrams				
9. Total traffic demand – all aspects including diagrams				
10. Demand side mitigation				
11. Proposed improvements				
11.1. New roads or widening or intersection improvements – TRL drawing and fatal flaw implementation screening checklist				
11.2. Traffic signals must meet ETA's Urban Traffic Control warrant and requirements. In addition, a roundabout assessment comparison must be carried out				
11.3. Traffic management plans				
12. Traffic Impact Assessment Scenarios				
12.1. Assessment based on worst case land use scenario				
12.2. Design year horizon assessment				
12.2.1. "Without" proposed mitigating measures (with and without development)				
12.2.2. "With" proposed mitigating measures (with and without development				
12.3. Planning year horizon assessment				
12.3.1. "With" proposed mitigating measures				
13. Site Impact Assessment (if applicable)				
14. Transport requirements and cost				
14.1. Any changes to transport master planning				
14.2. Transport / Road services cost contribution				
14.3. Improvement costs estimates or municipal tariff as applicable				
14.4. Recommendations				
14.5. Traffic Road Layout Plans				
14.6. Eng. Drawings, Cost estimate, Financial guarantees, and Undertakings for new or existing road improvements				
15. Recommendations				
15.1. The change in land use for which approval is required.				
15.2. Proposed type and location of all erf accesses.				
15.3. The improvements, changes and mitigation measures that are required, subject thereto that these improvements or measures may be amended in subsequent investigations.				
15.4. Elements of the transport / road network master plan that should be implemented in support of the development.				
15.5 Traffic management measures aimed at protecting residential or other sensitive areas.				
16. Appendix				
16.1. Relevant Traffic Impact Assessment Correspondence. e.g. Traffic Counts, analysis details, maps, plans, etc				

Date:……..

Signature

Name : _____

Professional registration details

_____

Disclaimer : Refer to ETA Manual For Traffic Impact Assessments and Site Traffic Assessments

4.3 Contents of traffic impact assessment

4.3.1 Cover page

The following information must be shown on the cover page:

- Municipality name.
- Type of assessment e.g. Traffic Impact Assessment.
- Particulars of the town planning application, e.g. township name or amendment scheme number.
- Erf details, street address.
- Date of report, revision details, unique report number
- Name and address of the Assessor (including name of firm).

4.3.2 Letter signed by ECSA registered professional

A cover letter shall be bound into the assessment (first page following the cover) that includes the following certification:

The undersigned has been appointed as the registered professional for this Traffic Impact Assessment and has applied due diligence to the content of this report and endeavoured to ensure that the TIA is free of technical errors and takes full responsibility for its contents

I also undertake to attend any forum where the TIA is in dispute to report on matters that relate to the TIA. I understand and agree that the municipality shall not be liable to compensate me in this regard.

The letter shall be signed by a person qualified to undertake traffic assessments. The following information must be provided for this person:

- Name, address and telephone numbers.
- ECSA Registration and registration number.
- Academic qualifications.

4.3.3 TIA checklist

Completed checklist to be include in the TIA report.

4.3.4 Development particulars

The following information must be provided for the development:

- Trade name of the development (where available).
- Erf details, street address of development, including suburb.
- Reference to the town planning application including an extract from the town planning report relating to the extent of development and relevant details.
- A location plan must be provided showing the location of the development.
- Where applicable, references to any previously submitted and approved traffic assessments for the property must be provided.
- Whether the proposed land use is within existing land use rights and town planning regulations stating any deviations if any.

The following information must be provided for the existing land-use rights (exercised and not exercised) as well as the land-use rights applied for:

- Total site area in m^2.
- Floor Area Ratio (FAR) and Gross Leasable Area (GLA).
- Size of development per land use type and in the units e.g. area - m^2, dwelling units, etc.
- Town planning land use controls including the zoning certificates

The TIA shall be undertaken for the exact and actual land-use rights for which the application is made as contained in the town planning application document. No assessment shall be submitted or accepted if the assessment is made for different land-use rights varying form the town planning application document. In situations where the application is made for a range of land-use rights, the assessment shall be undertaken for the land-use with the worst impact.

Information must also be provided on the expected date and phasing of development. For each phase, the following information must be provided:

- Envisaged date of implementation.
- Extent of development per land use type per phase of development.

4.3.5 Study area

The study area is an area from which transportation elements are selected for the TIA. The elements shall be selected as follows in the case where TIA's are undertaken in the **Site Development Plan context**:

- Site Development Plan:
    - Accesses to the site. All accesses (vehicle, pedestrian and cyclist) to roads must be included in the study area
    - These elements shall be restricted to :
        - Minimum of two intersections on the road where access is proposed, on either side of the access (or one intersection where the access is taken from a cul-de-sac) plus all intersections where 75 additional peak hour passenger car trips are added to the sum of critical lanes".
    - Sensitive areas. All roads in sensitive areas on which the proposed development is likely to have an impact. Judgement may be exercised in the identification of such elements and is subject to approval by the ETA.

Where TIA's are undertaken for Framework, Spatial, Functional and Local area plans, confirmation of the study area is subject to agreement with the ETA.

The extent of the study area is determined irrespective of the responsible authority or municipal boundaries. The study area may thus extend over more than one municipal area and include roads under the jurisdiction of other authorities.

The following information must be supplied in all cases:

- Information must be provided in the report on the extent of the study area as well as the elements of the transportation system that have been selected for assessment. Where appropriate, a schematic plan of the study area must be provided showing the study area and the selected elements.

4.3.6 Background information

The report must include information on all transportation facilities and land developments that are relevant to the assessment. The location of the transportation facilities and land developments may also be shown on the schematic plan of the study area.

Transportation facilities for which information must be provided includes:

- Existing roads, streets, interchanges, intersections and accesses (including geometric assessment), together with number of lanes and type of intersection control e.g. stop, yield, roundabout or traffic signal.
- Public transport, pedestrian and cycling networks and facilities.
- Planned changes to transportation facilities that are likely to be implemented in the area during the time horizon for which the traffic assessment is undertaken.

The report must also include any relevant information that is made available by the eThekwini Municipality. Such information may include the following:

- Spatial development framework
- Traffic management plan
- Road network master plan
- Functional road hierarchy plan
- Public transport plan
- Modelled traffic demand

Where appropriate, the above information can be shown on a schematic diagram of the study area. Use can be made of appropriate colours and symbols on the diagram, for example the following:

- Functional road classification and authorities can be indicated by means of lines with different colours.
- Road lanes can be indicated by means of arrow symbols indicating turning movement directions per lane.
- Traffic control measures at intersections and accesses can be indicated by appropriate symbols.

4.3.7 Site investigations

- It is a requirement that the site be visited to undertake the investigations required for the assessment and relevant information on the site investigation must be provided in the assessment
- A photographic record of existing transportation facilities and land development in the area must be included in the assessment report.

4.3.8 Other planning authorities

Approval from other planning authorities is required and confirmed in writing and must be included in the TIA where the application is:

- Dependent on access to transport infrastructure under the jurisdiction of other authorities
- Impacts on transport infrastructure under the jurisdiction of other authorities
- Located within the area of influence of other authorities

4.3.9 Traffic demand estimation

(a) Assessment years

Traffic assessments must be undertaken for the following horizon years:

- Design horizon year.
- Planning horizon year.

The design horizon year is the year selected for determining transportation improvements that are required to accommodate the proposed development.

Transportation improvements must be designed for a horizon year of:

- 5 years where the traffic demand is less than 1000 peak hour passenger car trips
- 10 years where the traffic demand is 1000 and less than 2000 peak hour passenger car
- Planning horizon year where the traffic demand is greater than 2000 peak hour passenger cars
- In situations where the development is implemented in phases over time, the assessment must also be undertaken for the years in which each phase will be completed.

Where the demand exceeds 2000 peak hour passenger car trips, a planning horizon year assessment must be undertaken. Agreement with the ETA is necessary relating to the extent of the planning horizon year (e.g. 10, 15, 20 year assessment) and relevant details. It is mandatory that such assessments are carried out using traffic simulation modelling.

The planning horizon year must be selected as one in which all developments in the study area are expected to be fully completed and developments in the area have stabilised.

(b) Assessment hours

- The assessment must be undertaken for the hours during which the combined effect of background and development traffic will result in the highest traffic demand. More than one analysis hour may be required depending on the combination of traffic flows.
- The assessment hours must be selected from normal or abnormal days of the year or both, as follows:
  - In urban areas, the assessment hours must be selected from normal days, except when land uses are specifically focussed on abnormal days (e.g. holiday resorts).
  - In rural areas, the assessment hours must be selected from both the normal and abnormal days. The identification of rural areas will be guided by eThekwini Municipality
- Normal days are days of the year during which the traffic pattern tends to be stable and where these patterns are not affected or influenced by
  - abnormal but predictable events such as school and public holidays (including influenced days), or
  - exceptional and unpredictable events, such as road closures, construction, accidents and adverse weather conditions. Assessments may be undertaken on abnormal days but not on exceptional days.
- For normal days, the analysis is undertaken for a specific hour of the week, such as Weekday AM peak, Friday PM peak, Saturday peak, etc. Any normal day of the year can be selected for such analysis, except in areas near to large retail centres where the analysis should be undertaken for the end of the month (or a day following and as near as possible to the end of the month).
- For abnormal days, the assessment hours will be selected from the abnormal days specified and provided by ETA.
- Abnormal days are defined as the following days of the year:
  - Public holidays.
  - Days influenced by public holidays.

- School holidays in any province of the country, measured for the full duration of the holiday.
- December recess, measured from the last seven days in November up to end of the school holiday in January of the following year.
- Special event

(c) Peak hour factors

The peak hour factor is defined as the hourly volume divided by the peak 15-min flow rate (four times the 15-min traffic count) within the peak hour, both measured in units of vehicles per hour.

The peak hour factor used in the analysis must be estimated as follows:

- For traffic streams that consist mostly of development traffic, the peak hour factor applicable to the development traffic.
- For other traffic streams, the typical peak hour factor for roads or streets near or adjacent to developments of the same type.

(d) Background Traffic Demand Estimation

(i) Introduction

Background traffic is the existing and future traffic on the road network, excluding traffic generated by the development.

The background traffic is estimated by means of a combination of “traffic growth” and “build-up” methods.

The method is based on traffic counts and applies either a growth rate to such counts, or accumulates trip generation from other expected developments. A combination of the two methods can be used.

(ii) Traffic counts

The following information must be provided on traffic counts undertaken or obtained during the study:

- Name of intersection
- Date counted
- Day of the week
- Day class (Normal, Abnormal)
- Congestion levels noted during the count.
- Name of person that undertook the traffic count.

The required traffic counts must be undertaken for the selected assessment hours. Traffic must be counted in 15-minute intervals during the peak period.

Traffic is mostly counted at intersections, but traffic counts may also be required on links. At intersections, traffic is counted per turning movement.

On roads that carry a significant volume of heavy or public transport vehicles (more than 10% of the total traffic), a vehicle classification count must be undertaken, differentiating between the different vehicle types.

Traffic counts shall be undertaken under supervision of a competent person who is responsible for the quality of the counts.

When traffic is congested, preference must be given to obtaining the required traffic demand from a model. Where such model is not available, an estimate must be made of the traffic that is diverted or which is travelling outside the peak-hour (due to peak-hour spreading). The adjustment depends on the degree to which traffic is congested in the area.

Traffic counts up to two (2) years old may be used in the assessment, provided that no changes have occurred during this period that may have significantly affected the traffic demand.

(iii) Traffic growth

- Appropriate growth rates must be used for the estimation of future background traffic. Growth rates are only applied to traffic counts and not to the trip generation rates of developments since such rates are determined for fully occupied developments.
- The appropriate growth rate depends on the expected growth in the area in which the development is located as well as the degree to which approved but not yet exercised developments as well as future development in the area are taken into account in the assessment. Lower growth rates are used when such developments and rights are taken into account.
- Growth rates must be agreed with the ETA
- Typical growth rates:

Development Area	**Growth rate**
Low growth areas	0 - 3%
Average growth areas	3 - 4%
Above average growth areas	4 - 6%
Fast growing areas	6 - 8%
Exceptionally high growth areas	> 8%

- The growth rate must be applied from the date of the traffic count to the year of analysis.

(e) Existing exercised land-use rights

- Where a development has existing land-use rights that have been exercised and were a growth rate is applied, the trip generation of the exercised rights must be estimated and subtracted from the traffic counts before any growth is applied.
- The trip generation of existing exercised land-use rights must be determined using the same methodology for estimating the trip generation of the new rights, taking pass-by, diverted and transferred trips into account. Since the trip generation of the existing rights is subtracted from existing traffic, the trip generation study for the application must be undertaken for the full development, including existing and new rights.
- The ETA may consider the use of a direct onsite measurement of trip generation for the exercised rights.

(f) Trip generation by other developments

Other developments as well as future potential development in the area must be taken into account in the estimation of future background traffic. The following developments must be taken into account:

- Approved developments and latent land uses rights

The traffic demand due to the above developments are accumulated and added to the traffic counts. No growth rate is applied to the traffic demand estimated for these developments. The growth rate used in the analysis also depends to the extent to which such other developments are taken into account.

(g) Redistribution of background traffic

In situations where a development proposal may result in a diversion of background traffic, such diversion must be taken into account as part of the "with" development scenario.

The report must include a determination of the likely diversion of background traffic as a result of the proposal.

(h) Trip generation rates

Trip generation rates are measured in units of trip ends, with either an origin or a destination at the development. It is the sum of traffic to or from a development.

Trip generation rates (in vehicle trips) are provided Appendix A.

The trip generation rate shall be applied to the primary land use generating the highest / worst case traffic demand (primary land use contained in the zoning certificate) and for the extent of development indicated in the town planning application.

Where traffic demand is estimated on the basis of person trips, the appropriate trip generation model must be agreed with the ETA. In such circumstances complete details on the models must be documented in the TIA.

Existing trip generation rates models from the EMME strategic modelling for the municipal area for person trips are available – use of the trip generation models must be approved by the ETA.

The trip generation rate shall NOT be adjusted to account for spreading of the peak hour due to congestion. The trip generation rate must reflect the actual traffic demand which would have existed if there was no congestion on the road network.

No growth rate is applied to the trip generation of a development since trip generation rates have been established for fully matured developments.

The trip generation must be determined for the following scenarios:

- Development with existing exercised rights when such rights exist.
- Development with total rights, including new rights.

The additional trip generation is the difference between the trip generation for the above two scenarios.

The ETA may from time to time publish updated trip generation rates.

(i) Modal split

Agreement with the ETA must be obtained regarding a reduction in trip generation in areas with a low level of vehicle ownership or near public transport facilities.

The reduction in the trip generation rate will reduce the need to implement road improvements, but additional facilities to accommodate the other modes of transport (public transport or walking) may be required.

Appendix A contains typical reduction factors for a range of land uses. Use of these factors must first be agreed with the ETA.

(j) Trip types

For purposes of TIA's, trip generation fundamentally consists of the following types of trips:

- Primary trips
- Pass-by trips
- Diverted trips
- Transferred trips

All the above trip types are new at the accesses to the development but not necessarily on the road network. Only primary trips are considered to be new trips, but pass-by, diverted and transferred trips are already on the road network and are only new on certain segments of the network.

Since all trips are new at the accesses to the development, pass-by, diverted and transferred trips are not deducted from the trip generation rate. It is only the trip distribution and assignment that are affected by the trips.

A maximum of 20% of background traffic may be included in pass-by or diverted trips

(k) Trip distribution and assignment

(i) Introduction

- Traffic generated by the development must be distributed and assigned to the road network to allow determination of the traffic demand per traffic stream (turning movements).
- Where a development consists of different land uses with trip generation characteristics that differ significantly, the trip distribution and assignment must be undertaken separately for each land use. Land uses with similar trip generation characteristics, however, may be grouped and the analysis performed for each group. A separate study may also be required for the distribution and assignment of existing exercised rights.
- The following section describe the acceptable methods in which the trip distribution and assignment is carried out my manually. However traffic simulation software can be used. In such cases the complete description of modelling techniques and parameters together with calibration and validation must be provided.

(ii) Trip distribution

- Trip distribution involves determining the number of trips that will travel to and from other destinations or origins on the road network. The following methods may be used for estimating the trip distribution:
- Gravity model. According to the gravity model, trip distribution is proportional to the relative magnitude of origin and destination zones, and inversely proportional to the travel time between the zones.
- Analogy method. Uses the directional distribution observed at another similar development in the vicinity of the site.
- Surrogate method. Uses available socio-economic data to determine trip origins and destinations.
- Trip distribution may not be based on traffic counts in the vicinity of the development, unless it can be shown that such counts are indicative of the likely trip distribution for the development.
- The gravity model requires information on the relative magnitude of origin and destination zones as well as travel times between zones. The basic formula for the gravity model is as follows:

$$P_{ij} = \frac{A_j / F_{ij}}{\sum_k A_k / F_{ik}}$$

With:

P_{ij} = Proportion of trips between zones i and j

A_j = Attractions in zone j (or k)

F_{ij} = Friction factor between zones i and j

The friction factor is related to the travel time between zones. Where this relationship is unknown, it may be approximated by the following formula:

$$F_{ij} = t_{ij}^2$$

In which t_{ij} is the travel time between zones

- It is recommended that trip distribution should be estimated manually, based on the principles of the gravity model but with knowledge of local conditions.

(l) Traffic assignment

- Traffic assignment involves determining the percentage of traffic that will use specific routes in the network. The traffic assignment is made with consideration to logical routings, available roadway capacity, right-turn movements, travel times and other factors. Pass-by and diverted traffic must also be taken into account.
- The trip distribution and assignment must be shown on a schematic diagram of the study area. Separate diagrams are required for each of the following trip types:
  - Primary trip distribution
  - Pass-by trip distribution
  - Diverted trip distribution
  - Transferred trip distribution
- In all cases, the percentages must be shown for the inbound and outbound traffic movements.
- The traffic assignment percentages are determined as percentages of trips (of a particular type) entering or exiting from the development. The traffic assignment is determined by multiplying the trip generation rate of the development with the assignment percentages.

(m) Pass-by, diverted and transferred trips

- For purposes of traffic assessments, trip generation fundamentally consists of primary, pass-by, diverted and transferred trips. Only primary trips are new on the total road network, while pass-by, diverted and transferred trips are already on the road network, although they could be new on segments of the road network.
- Since all trips are new on the accesses to the development, pass-by, diverted and transferred trips are not deducted from the trip generation rate. It is only the trip distribution and assignment that are affected by the trips, as described below.
- For small study areas, diverted and transferred trips are often considered to be primary because the trips would be new to the study areas. For larger areas, however, both types of trips should be taken into account in the analysis. The number of new trips on the road network can be significantly overestimated if such diversion or transfer is not taken into account.
- Pass-by trips are trips already on the road network directly adjacent to the point(s) of access to the site and where the traffic can turn directly into or out of the site. The trips are not new outside the development and will only affect traffic patterns on the accesses to the development.
- Diverted trips are trips already on the road network but not directly adjacent to the accesses to the site. The trips are similar to pass-by trips, except that they have to

deviate to other roads to obtain access to the site. Diverted trips will tend to return to their original route and continue to their original destinations after visiting the development. The diverted trips will thus only be new on certain segments of the road network, but not on the streets from which they are diverted.

- Transferred trips are trips that are already present on the road network and which are visiting similar developments near to the proposed development and which have the potential of transferring or switching their destination to the proposed development. These trips are different from pass-by and diverted trips in that trips are wholly transferred from one development to another. Estimates for transferred trips may be considered and requires approval from ETA.

The TIA is required to provide the extent of trips per trip category when the distinction in trip categories is used in the assessment.

4.3.10 Total Traffic Demand

(a) Introduction

- Total horizon year traffic demand must be estimated for the design as well as planning horizon years. It is only necessary to estimate the total traffic demand for the "with" development scenario and no estimate is required for the "without" development scenario.
- The total traffic demand is determined by first estimating the background traffic and then adding the trip generation of the development to this background traffic.
- The background ("without" development) traffic demand is estimated as follows:
  - Traffic counts are used to estimate current demand.
  - From the traffic counts, subtract the trip generation of the existing exercised rights of the development.
  - The resultant traffic is then grown using an appropriate growth rate (where required).
  - Traffic from other developments and future development is added to the grown traffic to determine future background traffic (where appropriate).
- The total "with" development traffic demand is then estimated as follows:
  - Where necessary, the future background traffic is first redistributed to accommodate proposed changes to the transportation system.
  - The total trip generation of development, including existing and new rights, is then added to determine the "with" development traffic.

(b) Required information

The following information on traffic demand must be provided for each horizon year and peak hour that is assessed. This information must be provided per turning movement or stream of traffic.

- Background traffic ("without" development traffic)
  - Existing peak hour traffic (counts).
  - Trip generation of development with existing exercised rights.
  - Peak hour traffic less trip generation with exercised rights.
  - Future traffic growth.
  - Traffic from other developments.
  - Total future background traffic.
- "With" development traffic:
  - Redistribution of future background traffic due to development.
  - Total trip generation of development, including new rights.
  - Total "with" development traffic.
  - The following data must be shown on schematic diagrams:
  - Existing peak hour traffic (traffic counts).
  - Total traffic demand estimates for the "with development" scenario and for each horizon year.

(c) Multimodal demand

Traffic demand for public transport, walking and bicycle modes of transport must be estimated where transportation elements involving these modes have been identified that may be affected by such traffic demand.

The multimodal traffic demand estimation will mostly be required in areas with low vehicle ownership or where a development is located near to public transport facilities. In other areas, this demand estimation may be required for land uses that attract large volumes of pedestrians or public transport (such as educational developments, sports stadiums or central business districts).

In situations where the multi-modal demand is relatively low, the assessment of the impacts may be made qualitatively without estimating the actual traffic demand. A quantitative assessment, however, will be required when the demand for the other modes already approaches or exceeds system capacity or where the development itself is expected to generate high levels of travel.

(d) Demand estimation

The quantitative multimodal traffic demand must be estimated using information on the expected trip generation rates (including pass-by trips) of such modes.

The estimation of pedestrian or cycling traffic demand may be undertaken when applicable to the application. This implies that pedestrian and bicycle traffic must be counted, future background traffic estimated, trips generated and assigned and the total future "with" development traffic determined.

For public transport, however, the demand estimation will be restricted to the estimation of the additional traffic that will be generated by the development. Existing services and service capacity and utilisation must also be provided.

Future background public transport demand will not be estimated.

Information on multimodal traffic demand similar to that required in the previous sections must be provided. The information may also be shown in schematic diagrams.

4.3.11 Demand-side mitigation

Consideration should be given to mitigate the impact of a proposed development by means of demand-side measures.

Only demand-side measures that can be implemented at the time of the application may be considered. These measures include, but are not limited to:

- Mixed-use developments.
- Reduction of the size, or changing the type of land use.
- Public transport.

When demand side mitigation measures are used in the assessment, a comprehensive methodology and analysis is required to be undertaken.

4.3.12 Proposed improvements

In situations where it is not possible to fully mitigate the impact of a proposed development by means of demand-side mitigation measures, improvements to the transportation system may be required. In such cases, at least one set of feasible mitigation measures must be proposed. However, approval of the TIA does not imply that these measures will necessarily

be implemented and other measures or improvements may be identified during subsequent investigations.

The proposed improvements shall be listed in the assessment report and information provided on each proposed improvement.
Information on the proposed mitigating measures must be shown on schematic diagram of the study area. Use can be made of appropriate colours and symbols to show the information.

Where new roads, intersections and other transportation facilities, or improvements to existing facilities are proposed, Traffic Road Layout (TRL) plans must be prepared. The TRL is intended to evaluate the feasibility of the proposals.

Requirements for TRL's:

- Horizontal alignment design to be produced to scale on aerial photography backdrop (or Topographical survey if available)
- Existing cadastral and servitudes to be shown – available from eThekwini Municipality – Corporate GIS department
- Dimensions for all new elements to be provided
- Vehicle swept path to be shown for required design vehicle
- Vertical alignment of centre line for new roads / sections of roads – existing contour information available from Corporate GIS department can be used (or Topographical survey if available)
- Future transport proposals
- Relevant design standards to be used e.g. *Urban Transport Guideline (UTG), Technical Recommendations for Highways, etc*. – design guidelines

The TRL must be accompanied with a screening checklist to indicate the feasibility of such improvements;

- Land availability – show extent of land acquisition required
- Environmental sensitivity – based on existing available information
- Impact on engineering and telecommunications services - based on existing available information
- Impact on public transport
- Impact on non-motorised transport (NMT)
- Impact on future transport proposals

Where land acquisition is required, the TIA must include an undertaking from the land owner confirming consent for the land acquisition.

Where improvements are related to upgrade of priority control intersections to traffic signals such assessment must be carried out using the ETA's traffic signal warrants. The TIA must consider the appropriateness of implementing a roundabout in lieu of traffic signals.

Exceptional circumstances may necessitate the need for traffic signals despite priority intersections not meeting the traffic signal warrant. In such circumstances this must be agreed with the ETA.

Where new or changes to existing roundabouts (including traffic and mini-circles) are proposed, information must be provided on the number of lanes, diameter and circulating road width. Any additional road reserve that may be required must be indicated on a schematic diagram.

Where traffic management measures are required to protect residential and other sensitive areas, information must be provided on the measures that must be implemented. This information can be provided in tabular form or in a schematic diagram. These measures will

be implemented in consultation with the affected community. The requirements and development of traffic management plans must be agreed with the ETA.

4.3.13 Traffic Impact Assessment Scenarios

The TIA's must be undertaken for the following scenarios:

- Design horizon year assessments, undertaken with the purpose of establishing the mitigating measures that are required to accommodate the development.
    - The assessments must be undertaken for the design horizon years and assessment hours for the "with" development scenario and the following two situations:
        - "Without" proposed mitigating measures, undertaken to show the need for mitigating measures.
        - "With" proposed mitigating measures, undertaken to show whether the proposed measures will be effective in addressing the impacts of the development.
- Planning horizon year assessments (where applicable – refer to 4.3.7.a - Assessment Years), undertaken with the purpose of establishing whether it will be physically possible to accommodate the proposed development.
    - The assessments must be undertaken for the planning horizon years and hours, for the "with" development scenario, but only for the situation "with" mitigating measures.

The impacts of the proposed land use shall be assessed in terms of the standards and requirements provided in Appendix A.

Particular attention shall be given to impact standards that cannot be complied with. In such circumstances, the deviation from the standards shall be adequately motivated and the consequences of not meeting the standards discussed. Consideration and attention shall be given to the need for an efficient and safe transportation system.

4.3.14 Site Traffic Assessment

The purpose of a STA is to assess whether transportation facilities proposed in a Site Development Plan or for a township during Township Establishment meet the standards and requirements of this manual. Site Development Plans are plans that the Municipality require of a landowner intending to erect or alter any buildings or other structures on a development site.

The STA will include all the similar requirements of the TIA but will be limited to the site.

If a Site Development Plan is not in place at the time of submission of the TIA, a STA must be submitted once this in place provided that the STA is not submitted after 5 years from approval of the TIA in which case the TIA must be revised and submitted together with the STA for approval.

Where the SDP is not in place, this must be clearly indicated under the STA section in the TIA.

When the STA is submitted after the TIA and within five years of approval of the TIA, the format of the STA will be as follows:

- Site Traffic Assessment cover (refer TIA requirements in preceding sections)
- Letter (refer Traffic Impact Assessment requirements in preceding sections)
- Completed checklist (refer Traffic Impact Assessment requirements in preceding sections)
- Development particulars (refer Traffic Impact Assessment requirements in preceding sections)

- Study area:
  - The study area of a Site Traffic Assessment shall include all roads and transportation facilities on the site as well as site accesses. Within the study area, the following transportation elements must be selected for assessment:
    - All accesses to the site, even when such accesses have been assessed during a TIA.
    - All proposed new roads or transportation facilities, or improvements to existing roads or facilities on the site (including public transport and other facilities).
    - All elements of the site transportation system.
  - Information must be provided on the elements of the transportation system that have been selected for assessment. Where appropriate, a schematic plan of the study area may be provided showing the study area as well as the location of the elements selected for assessment.
- Background information:
  - Information on transportation facilities and land developments in the area that is relevant to the assessment must be provided in the report.
  - The transportation facilities for which information must be provided includes the following:
  - Existing roads, streets, interchanges, intersections and accesses, number of lanes and type of intersection control e.g. stop, yield, roundabout or traffic signal.
  - Public transport, pedestrian and cycling networks and facilities.
  - Where applicable, sufficient detail of architectural proposals including plans and elevations must be provided to illustrate the proposed development
- Site investigations (refer to TIA requirements in preceding sections)
- Traffic demand estimation (refer to TIA requirements in preceding sections)
- Traffic impact assessment scenarios (refer to TIA requirements in preceding sections)
- Recommendations:
  - The STA must provide recommendations on whether the proposed Site Development Plan or transportation facilities proposed in a township can be approved by the Municipality.
  - Where such recommendations cannot be made, the Site Development Plan or proposed transportation facilities must be amended and a revised STA submitted.

4.3.15 Road network master planning

ETA is responsible for the planning of the major road network and the development of road network master plans showing improvements that are required to accommodate the spatial development framework.

The TIA may make recommendations for the implementation of elements of the road network master plan that should be implemented in support of the development. The required improvements may be identified by means of the traffic demand model of the ETA.

In cases where an application is dependent on the implementation of elements of the road network master plan ahead of the ETA's implementation programme and/or available budget, the applicant will be required to fund and implement the elements of the road network master plan required for the development application. Alternatively, the application can be resubmitted for consideration once the elements of the road network master plan have been implemented by the ETA.

4.3.16 Transport requirements and costs

Cost of transport improvements must be provided for all external requirements including the site accesses.

Where improvements are proposed to transport infrastructure or require new transport infrastructure, an estimate of the cost of such improvements must be provided.

Existing constraints related to traffic operations or provision of transport infrastructure (road, sidewalks, etc.), will be addressed by ETA based on the availability of funds. Consequently should an application for a change in land use proceed prior to the ETA addressing the existing traffic operations or transport infrastructure constraints, the applicant will be required to fund and implement all existing traffic operations or transport infrastructure constraints in addition to the applicant's traffic impacts. Alternatively the application can be resubmitted for consideration once ETA has implemented measures to address existing constraints.

Prior to Site Development Plan approval and where the TIA has indicated transport improvements or required to address existing traffic and transport constraints, the applicant is required to provide the following:

- Provide ETA and Roads Provision Department with Engineering Drawings
- Cost estimate for improvements which must be confirmed in writing by Road Provision Department
- Financial guarantees, and
- Undertakings

4.3.17 Recommendations

Recommendations shall be provided in the assessment report on all land development or changes to the transportation system for which approval is required. Items not included in the recommendations, will NOT be approved by the Municipality, even if such items are discussed in the report.

Recommendations are required for the following:

- The land use for which approval is required.
- Proposed type and location of all erf accesses.
- The improvements, changes and mitigation measures that are required, subject thereto that these improvements or measures may be amended in subsequent investigations.
- Elements of the road network master plan that should be implemented in support of the development.
- Traffic management measures aimed at protecting residential or other sensitive areas.
- Site traffic measures.
- Improvement costs

4.3.18 Appendix of Relevant Traffic Impacts Assessment Correspondence

An appendix must be provided in the TIA (where applicable) and clearly marked as: Relevant Traffic Impact Assessment Correspondence. The intention of this appendix is to document and record information relating to:

- Approval and review process
- Communication with the ETA regarding discussion and agreement relating to any aspect of the TIA e.g. agreed trip generation rates, design standard deviations / agreements, public transport, etc.
- Comments from ETA regarding the submission in the case where revisions are required and the document is resubmitted.
- Changes where any aspect of the land use has changed and the TIA is resubmitted
- Other relevant communication and information.

5 APPENDIX A : TRAFFIC IMPACT STANDARDS AND REQUIREMENTS

5.1 Assessment Standards and Requirements

5.1.1 Introduction

Standards and requirements are provided in this appendix for both Traffic Impact Assessment (TIA's) and Site Traffic Assessments (STA's).

5.1.2 Variance from standards and requirements

Where it is not possible to achieve the standards and requirements of this manual, alternative options or solutions must be developed and evaluated to determine the most preferred option. All impacts of the alternative options or solutions must be assessed, even if such assessment is only made qualitatively.

The preferred solution is the one which would minimise all impacts and at the same time have greatest benefits in terms of social and economic development. This, however, is not always possible and a compromise solution is often required. The preferred compromise solution is one in which impacts are balanced and none of the impacts are excessive.

5.1.3 References to other standards and requirements

Reference is made in this manual to standards and requirements provided in other publications. These standards and requirements are not repeated in this manual and these publications must therefore be consulted for the requirements. References to the publications are provided in the bibliography.

Although reference is made to specific editions of the publications, the latest editions of the publications shall be used for determining the required standards and requirements.

5.2 Functional Road Network

5.2.1 Classification system

Road design and assessment standards and requirements depend on the functional classification of roads. The eThekwini Transport Authority (ETA) currently has a road classification system in place.

Roads are currently classified into Classes 1 to 5 as defined by the RISFSA classification. The road classification is available on ("RISFSA" GIS layer):
http://citymaps.durban.gov.za/website/master/viewer.htm

The road classification is subject to regular updating and as such all classifications on the above website must be verified with ETA.

5.2.2 Site traffic assessments

In the assessment of roads and streets proposed for Township Establishment, a proposed functional classification of the roads shall be indicated in the assessment report, except where such classification is already included in the ETA's road master plan.

For site developments, it is not a requirement to classify on-site roads, but the principles of a functional road network must also be applied to such roads. Major roads on large sites may be provided as Class 4 (or higher) roads but most roadways would likely be provided as Class 5 roads. Roadways or aisles serving parking and offloading areas are not covered by the classification scheme and must be provided in accordance with the requirements for parking and offloading facilities as contained in the eThekwini Municipality Town Planning Regulations.

5.2.3 Design Standards

The following design standards (Table 5.1) shall be applied.

Table 5.1: Applicable road design standards

Road classes	Manual or guideline
Class 1 to 3	CUTA UTG 1 (1986), AASHTO (2004), Geometric Design Guidelines (SANRAL)
Class 4	CUTA UTG 5 (1988)
Class 5	CUTA UTG 7 (1989)
Commercial and Industrial roads	CUTA UTG 10 (1990)

5.3 Capacity Analysis

5.3.1 Introduction

A capacity analysis must be undertaken for those elements of the transportation system and all modes of transport in the study area. The capacity analysis must be undertaken for both TIA's and STA's.

For STA's, the capacity analysis is not required when an analysis was undertaken for that specific element during the TIA, provided that:

- No change which requires a new capacity analysis for the element has occurred, and;
- The previous analysis was done less than 5 years prior to the date on which the STA is submitted.
- It is clearly referenced and specified in the STA.

The capacity analysis must be undertaken for all transportation elements including but not limited to the following:

- Signalised and unsignalised or priority controlled intersections and accesses, as well as roundabouts (including traffic and mini-circles).
- Roadway link capacity analysis between intersections
- Basic two-lane and multilane highway segments (where capacity is not restricted by intersections).
- Basic freeway segments, freeway weaving sections, ramps and ramp junctions, interchange ramp terminals.
- Pedestrian facilities:
  - Sidewalks, walkways and stairs (including cross flows).
  - Pedestrian queuing (e.g. transit platforms and street corners).
  - Pedestrian crossings.
- Bicycle facilities:
  - Bicycle paths
  - Bicycle crossings
- Public transport facilities and services.

5.3.2 General requirements

The capacity analysis must be undertaken using the methodologies and parameters of the Highway Capacity Manual (TRB, 2010)

The capacity analysis may also be undertaken using microscopic or macroscopic simulation software, provided that such software has been calibrated and validated for South African conditions. Where such software is used, the level-of-service criteria of the Highway Capacity Manual shall apply.

Traffic Simulation Modelling Software

Use of traffic simulation modelling software is permitted provided that:

- Model development criteria and methodology is agreed with ETA
- All modelling techniques, parameters, calibration, validation are provided including the traffic modelling software files.
- ETA currently uses the following software programmes (other software programmes will not be considered)

- SIDRA
- TRANSYT
- AIMSUN
- AUTOJ
- SATURN
- EMME

Where provision is made in the Highway Capacity Manual for a multiple time period method for a capacity analysis, such method must be used starting in a time period when traffic volumes are low and queues are short. Alternatively, an approach must be followed in which the analysis must be undertaken for a single time period of 1 hour assuming that the peak 15-minute traffic volumes occur for the duration of the full hour. This approach must also be followed when a multiple time period method is not available.

The level of service provided by a transportation facility is deemed acceptable when the requirements provided in this chapter are met for each individual traffic stream or movement at all critical locations in the transportation system during the worst 15-minute time period. The assessment shall NOT be based on the *average* level of service of the facility.

In general, the traffic operations are acceptable when, during the peak 15-minute period:

- The volume/capacity ratio does not exceed a maximum of 1.0 (volume does not exceed the capacity of the facility) and;
- The Level of Service (LOS), as defined by the Highway Capacity Manual, is not worse than the levels given in Table 5.2 :

Table 5.2: Acceptable Level of Service

Area/Road Class	Normal Days	Abnormal Days
Urban	LOS D	LOS E
Rural Classes 3 - 5	LOS C	LOS D
Rural Classes 1 - 2	LOS B	LOS C

5.3.3 Residential road capacity

An assessment must be made on whether the trip generation of the development will result in traffic volumes that will exceed the capacity of residential roads (two-lane two-way roads) as shown below:

Residential	Minimum Width (m)	Capacity (veh/h) (two-way two lane road)
Class 5	4.5	200
Class 4	5.5	500

Residential	Maximum Width (m)	Capacity (veh/h) (two-way two lane road)
Class 5	7	500
Class 4	9	1000

Where the road width lies between the minimum and maximum ranges above, the capacity can be calculated using the following formulae:

- Class 5 : Capacity = 120xwidth - 340
- Class 4: Capacity = 142.86xwidth - 285.71

Where:
- Capacity is vehicle per hours
- Width is the hardened road width in meters excluding storm water drainage elements

5.3.4 Road width and capacity requirements

An assessment must be made of roads leading to the development which are used for approaching and accessing the development to ensure that minimum road width requirements are met and that there is adequate link capacity. Applications for changes in land use on roads leading to the development not meeting the minimum road width and capacity requirements will not be supported unless implemented and funded by the applicant.

5.3.5 Public transport facilities or services

Where required, the TIA must determine the available spare capacity of public transport facilities or services.

Operations of public transport facilities and services will be deemed acceptable when the estimated increased demand does not exceed the spare capacity of the public transport facilities or services.

A public transport (PT) study must be undertaken to determine service capacity, utilisation, available spare capacity and infrastructure requirements.

Service capacity to be estimated based on the following:

- Determine public transport demand based on person trips
- Apply modal splits and determine number of PT vehicles required
- Determine existing service based on latest (Current Public Transport Record) CPTR data
- Determine number of OLS (operating licences) required based on service capacity

Infrastructure (facilities):

- From the demand and service capacity, public transport routes need to be determined in terms of taxi and bus routes
- Other public transport facilities must also be determined based on the information in Table 5.3.

Table 5.3: Public transport facility warrants Based on Passenger Demand (Persons)

Proposed Facility	Demand (Peak Hour)	Demand (Per Day)	Modes Involved
Level 1 Multi Modal Facilities	> 4 000	> 20 000	All modes (rail, bus, taxi)
LEVEL 2 Major Public Transport Rank / Terminal Facility	600 to 4 000	3 000 to 20 000	Combinations of taxis, buses, trains
LEVEL 3 Minor Public Transport Rank	300 to 600	1 500 to 3 000	Taxis and/or buses
LEVEL 4 a Embayment's on Major routes	200 to 300	1 000 to 1 500	Taxis and/or buses
LEVEL 4 b Stops on Minor routes	100 to 200	500 to 1 000	Taxis and/or buses

5.4 Road Access and Intersection Provision

5.4.1 Provision of road access

Each portion of land is entitled to one access to the public road network. However, this is subject to the public's right to a safe and efficient road system and accesses should only be provided at suitable locations and on appropriate classes of road.

The most appropriate classes of roads for the provision of accesses are Class 4 and 5 roads.

The primary function of Class 1 to 3 roads is to provide mobility and long-distance accessibility and these roads are therefore not suitable for the provision of direct access to developments. Access from these roads should therefore be restricted to intersections with the public road network and not to developments.

Access on Class 1 to 3 roads may, however, be given to developments when all of the following conditions are met:

- There is no other reasonable access available to the development.
- The access does not jeopardise the possible future provision of intersections to the public road network or accesses to other developments in the area. Where provided, accesses should as far as possible serve different properties that may benefit from such access.
- It is a partial or marginal intersections and it can be shown that such an access will be of benefit to general road users on the road network and not only to the development.
- The applicant accepts that the access will be closed should traffic conditions along the road justify such a closure subject to ETA identifying and constructing an alternative access location.

Access to commercial and industrial developments from residential Class 4 and 5 roads is not supported.

Site access to developments shall conform to the following ETA requirements (Table 5.4):

Table 5.4: Access spacing

Road Class of primary road	Min. access spacing on side street from intersection with primary road (m)
4/5	20
3	60
1/2	120

5.4.2 Multiple accesses

Developments such as shopping centres should preferably have separate accesses for private vehicles and for large delivery vehicles. A separate access may also be desirable for use by public transport.

The site of such developments should preferably be located where separate accesses can be provided.

5.5 Intersection Spacing and Separation

5.5.1 Intersection spacing

All intersection spacing (Class 1, 2, 3, 4, and 5 roads) and separation shall be in accordance with:

- TRH 26 : South African Road Classification and Access Management Manual (2012)

5.6 Intersection Control Warrants

5.6.1 Introduction

A warrant analysis must be undertaken to determine whether proposed intersection controls are warranted. The assessment must be undertaken during TIA's as well as STA's.

For STA's, the warrant analysis is not required when an analysis was undertaken during the TIA, provided that:

- No change has occurred which requires a re-assessment of the warrant requirements, and;
- The previous assessment was done less than 5 years prior to the date on which the STA is submitted.
- It is clearly referenced and specified in the STA.

The warrants are provided to prevent the unnecessary installation of intersection controls that may unnecessarily impede the flow of traffic along a major road or street. The following control types will result in flow being impeded and may therefore only be installed when warranted:

- Traffic signals.
- Roundabouts (including traffic and mini-circles).

5.6.2 Traffic signal warrants

A traffic signal may be installed at intersections that comply with the road access requirements of this manual AND when the signals are warranted in terms of ETA's traffic signals warrant.

Where improvements are related to upgrade of priority control intersections to traffic signals such assessment must be carried out using the ETA's traffic signal warrant. Prior to considering traffic signals, other forms of control (e.g. roundabout, restricted access) must be considered.

When traffic signals are considered – all information relating to layout, signal settings and design must be provided in the TIA or as agreed with the ETA's Urban Traffic Control branch.

Exceptional circumstances may necessitate the need for traffic signals despite the priority intersections not meeting the traffic signal warrant. In such circumstances this must be agreed with the ETA.

The ETA's traffic signal warrant forms for carrying of traffic signal warrants for pedestrian crossings and vehicular traffic are shown below. The warrant assessments must be included in the TIA.

INTERSECTION: DATE:
INTERSECT.TYPE: DAY:
MAJOR ROAD: DIRECTION:
MINOR ROAD: DIRECTION:

TIME	CROSSING MAJOR ROAD								CROSSING MINOR ROAD							
	Adults	Scholars	Scholars x (1,5)	Elderly	Elderly x (2)	Total	Traffic Volume	Warrant	Adults	Scholars	Scholars x (1,5)	Elderly	Elderly x (2)	Total	Traffic Volume	Warrant
			0		0	0					0		0			
06-07			0		0	0					0		0			
07-08			0		0	0					0		0			
08-09			0		0	0					0		0			
09-10			0		0	0					0		0			
10-11			0		0	0					0		0			
11-12			0		0	0					0		0			
12-13			0		0	0					0		0			
13-14			0		0	0					0		0			
14-15			0		0	0					0		0			
15-16			0		0	0					0		0			
16-17			0		0	0					0		0			
17-18			0		0	0					0		0			
TOTAL																

WARRANT REQUIREMENTS

Vehicle Volume per hr (2 way)	Ped. Volume per hour	12 Hr 2 way vehicle volume	No. of Hrs required
>400	>300	<6000	8
>500	151 - 300	6000 - 7200	7
>600	121 - 300	7201 - 8400	6
>700	91 - 120	8401 - 9600	5
>900	61 - 90	>9600	4

Figure 5.1: Signalised Pedestrian Crossing Warrant Assessment

INTERSECTION: DATE:
INTERSECT.TYPE: DAY:
MAJOR ROAD: NO. OF LANES:
MINOR ROAD: NO. OF LANES:

✔

	MAJOR ROAD			MINOR ROAD				WARRANT		
TIME	E-W	W-E	TOTAL	N-S	S-N	TOTAL			R/T ONLY	
							1A	1B	1A	1B
06-07			0			0				
07-08			0			0				
08-09			0			0				
09-10			0			0				
10-11			0			0				
11-12			0			0				
12-13			0			0				
13-14			0			0				
14-15			0			0				
15-16			0			0				
16-17			0			0				
17-18			0			0				
TOTAL	0	0	0	0	0	0	0	0	0	0

WARRANT 1A (8 HOURS) (MIN. VEHICULAR VOLUME)				WARRANT 1B (8 HOURS) (INTERRUPTION OF CONTINOUS TRAFFIC)			
MAJOR ROAD (2 WAY)		MINOR ROAD (1 WAY)		MAJOR ROAD (2 WAY)		MINOR ROAD (1 WAY)	
LANES	VOLUME	LANES	VOLUMES	LANES	VOLUME	LANES	VOLUME
1	500	1	150	1	750	1	75
2+	600	1	150	2+	900	1	75
2+	600	2+	200	2+	900	2+	100
1	500	2+	200	1	750	2+	100

WARRANT 2 (PEDESTRIAN)	SEE SPERATE FORM		
WARRANT 3 (ACCIDENT)	80% OF 1A OR 1B	INJURY PREVENTABLE BY SIGNAL	

Figure 5.2: Vehicle Traffic Signal Warrant Assessment

5.6.3 Roundabout warrants

In urban areas, roundabouts (including traffic and mini-circles) may be installed at intersections that comply with the road access requirements of this manual AND where the following requirements are met:

- It must be possible to install the roundabout in accordance with ETA design requirements for roundabouts.
- The roundabout must have sufficient capacity to accommodate traffic growth over a period of 10 years.
- The roundabout should not be installed in a network of traffic signals where it would interrupt traffic signal progression.
- Roundabouts shall not be installed where approach gradients and gradients across the roundabout is greater or equal to 6 percent
- Roundabouts shall not be installed on Class 1, 2 and 3 roads.

5.6.4 All-way stop control

All-way stop control intersections are not supported.

Exceptional circumstances may be considered for implementation of all-way stops control due to geometric constraints (e.g. sight distances) and provided that volumes are low and approximately equal on all approaches. Approval is required from ETA for the consideration of all-way stop control intersections.

5.7 Access Throat Lengths

5.7.1 Introduction

An assessment of access throat lengths must be carried out. The provision of adequate throat length is important for safe and efficient traffic operation of the road system.

Throat length is measured from the road reserve boundary to the nearest edge of a cross road or driveway within the site. Where access control is provided, the throat length is measured to the stop line or any form of control.

5.7.2 Egress throat lengths

Egress (outbound) throats from a development must be of sufficient length to allow the access intersection to operate efficiently. Minimum egress throat lengths aimed at such operation are provided Table 5.5.

Table 5.5: Minimum egress throat lengths

Control type:	Priority control	Traffic signal control[1]		
Number of egress lanes:	All	1-2 Lanes[2]	3 Lanes[2]	4 Lanes[2]
Minimum throat length:	15 - 25 m [3]	25 m	60 m	95 m

[1] excluding requirements for traffic signal road reserve / servitude lengths

[2] Including auxiliary turning lanes. Taper lengths must be added to the requirements.

[3] 6- 25 m for driveways

An assessment must be undertaken to determine whether the site circulation system has sufficient capacity to ensure that the access can be adequately utilised during the peak 15-minute period.

5.7.3 Ingress throat lengths

Ingress (inbound) throats to a development must be of sufficient length to allow the access intersection to operate efficiently and safely. Where some form of control is provided on the access, the ingress throat should also be of sufficient length to prevent spillback onto the road or street system. The required throat length is determined by means of the following formula:

$$L_{Throat} = N_{Que} \cdot S_{Veh} \qquad (L_{Throat} \geq L_{Min})$$

In which:

L_{Throat} = Required throat length to prevent spillback (m)
N_{Que} = 95th Percentile queue length (No of vehicles per channel)
S_{Veh} = Stopped spacing of vehicles
L_{Min} = Minimum throat length

The throat length determined by means of the above formula is subject to certain minimum values aimed at safe operations. Where no form of control is provided on the access, the minimum values can be used for determining the required throat length. The minimum throat lengths are provided in Table 5.6:

Table 5.6: Minimum throat lengths

Development	Class 1	Class 2	Class 3	Class 4a	Class 4b	Class 5a	Class 5b	Driveway
Service Station	75 m	50 m	25 m	15 m	15 m	10 m	10 m	N/A
Other developments	150 m	100 m	75 m	25 m	15 m	15	6.5 m	6.5 m

Throat lengths must be determined for the 95th percentile queue length.

A stopped spacing of 6.5 m may be used for light vehicles. The spacing must be increased when there is a significant the proportion of heavy vehicles.

Provision should be made for the following deceleration distances and shall be design in accordance with the relevant design standards.

5.7.4 Priority control

Where a priority controlled intersection (including a roundabout) is provided on the access to a development, the 90th percentile storage length may be determined by means of the method described below.

The method requires the determination of the volume/capacity (v/c) ratio during the peak 15-minute period using the capacity analysis methodology for roundabouts:

$$v/c = \frac{\text{Volume} / \text{PHF}}{\text{Capacity}} \cdot 100$$

In which PHF is the peak hour factor required to convert the hourly volume to a peak 15-minute volume.

The 90th percentile storage length NQue (vehicles per lane) that must be accommodated is then determined from Table 5.7:

Table 5.7: 90th Percentile storage lengths (vehicles per lane)

v/c ratio (%):	19	33	43	50	56	61	65	68	71	73
Storage Length N_{Que}:	1	2	3	4	5	6	7	8	9	10
v/c ratio (%):	75	77	78	79	80	81	82	83	84	85
Storage Length N_{Que}:	11	12	13	14	15	16	17	18	19	20

The storage lengths provided in the above table were determined by means of simulation of a wide range of traffic conditions. The storage lengths provide for relatively high levels of platooning in arrival flows and are therefore conservative.

The queue lengths may also be determined using the methodologies of the Highway Capacity Manual (2010), provided that the impact of platooning in arrival flows is taken into account.

5.7.5 Access control

Access control involves the use of some form of gate or boom to control access to a development. The 90th percentile storage length at such access control may be determined by means of the method described below.

For the determination of the storage length, a traffic ratio over all channels must be determined by means of the following formula:

$$\text{Traffic ratio} = \frac{Total\ Volume / PHF}{Service\ flow\ rate} \cdot 100$$

In which PHF is the peak hour factor required to convert the hourly volume to a peak 15-minute volume.

Service flow rates required for the above formula are provided Table 5.8 for different access control mechanisms.

Table 5.8: Service flow rates

Control type	Service flow rate
Swipe magnetic card	480 vph
Remote controlled gates	450 vph
Ticket dispenser: Automatic	390-450 vph
Ticket dispenser: Push button	220-360 vph
Pin number operated gates	150 vph
Pay fee on entry	120 vph
Cell-phone operated gates (gate opens when a call is received)	100 vph
Manual recording, Visitor completes form	80 vph
Intercom operated gates (visitor contacts resident by intercom)	50 vph

The 95th percentile storage length NQue (vehicles per channel) is determined from Table 5.9 for the calculated traffic ratio. The storage lengths include the vehicles being served.

Table 5.9: 95th Percentile storage length (vehicles per channel) at controlled accesses

Storage (Vehs)	Traffic ratio for Number of Channels (Percentage)					
N_{Que}	1 Channel	2 Channel	3 Channel	4 Channel	5 Channel	6 Channel
1	22	55	92	131	176	220
2	38	91	150	213	282	351
3	48	113	183	256	336	414
4	55	127	202	281	364	446
5	60	136	214	295	380	463
6	64	142	222	305	390	475
7	67	147	228	311	397	482
8	69	150	233	316	403	488
9	71	153	236	320	407	492
10	73	155	239	323	410	495

The storage lengths provided in the above table were determined by means of simulation of a range of queuing systems. A range of traffic arrivals distributions were used in the simulation, while move-up and service times were assumed to follow a lognormal distribution. The storage lengths provide for relatively high levels of platooning in arrival flows and are therefore conservative.

5.8 Traffic Calming

Traffic calming shall be in terms of eThekwini Municipality's Traffic Calming Policy.

5.9 Non-Motorised Transport (NMT) and Universal Access

5.9.1 Pedestrian and bicycle facility assessment and universal access

It is an important requirement that adequate facilities must be provided for pedestrians and cyclists (non-motorised transport) and meet universal access requirements where necessary. An assessment must be made of whether provision has been made for pedestrian, bicycle facilities and universal access facilities in accordance with the requirements of this manual.

During TIA's, an assessment must be made of the provision of the following on-street facilities:

- Sidewalks and bicycle lanes.
- Pedestrian and cyclist crossings (midblock and at intersections)
- Universal access facilities

During STA's, an assessment must be made of the provision as well as the design of the following facilities:

- Pedestrian/cyclist accessibility to the development from the adjacent street network (particularly from on-street public transport facilities).
- Accommodation of on-site pedestrian movements from public transport facilities, drop-off facilities and parking areas. An assessment must be made of proposed sidewalks, walkways and pedestrian crossings.
- Accommodation of pedestrians with physical disabilities – universal access compliance.

5.9.2 General standards and requirements

In general, pedestrian and bicycle facilities must be designed and provided in accordance with the requirements provided in the following manuals and guidelines, unless specified differently in this manual:

- Applicable South African or ETA NMT and Universal Access polices and guidelines
- Engineering Service Guidelines (1994).
- Pedestrian and Bicycle Facility Guidelines (Department of Transport, 2002).

5.9.3 Sidewalks and bicycle lanes

Sidewalks and bicycle lanes are required on suburban and urban roads. On rural roads, pedestrians and cyclists would normally use the shoulder of the road. However, sidewalks and bicycle lanes may also be provided on rural roads where pedestrian and cyclist volumes are high.

No pedestrian or cyclist facilities may be provided on Class 1 roads (urban and rural) and measures must be introduced to prevent or limit pedestrian or cyclist access to such roads.

The provision of pedestrian facilities by means of sidewalks shall be determined using ETA's warrants for sidewalks. However ETA may require pedestrian facilities under specific circumstances where the sidewalk warrants are not met (e.g. school development).

Sidewalks shall be a minimum width of 2m wide unless site conditions dictate otherwise.

(a) Warrants for paved pedestrian footpaths / sidewalks

The warrant for pedestrian footways / sidewalks consists of five categories or parameters that are evaluated in the assessment. A list of the parameters together with the maximum point score and descriptions are provided below.

Parameter	Parameter Description	Point Score
1	Road verge	20
2	Vehicle traffic volume and speed	20
3	Number of pedestrians using the route	20
5	Pedestrian-related collisions on route	40

Road verge

The road verge must be assessed for the following:

- Availability of road verge (width)
- Terrain of the verge

The point scoring the criteria is as follows:

Criteria	Point score
Road verge width ≥1.5m grassed or gravel / sand and cross fall 0% to 4 %	0
All other cases	20

Vehicular Traffic volume

For class 2, 3 roads and class 4 commercial/industrial roads or public transport routes, average daily traffic (ADT) must be measured using a 24-hour traffic count or estimated from 12 hour traffic counts using an appropriate expansion factor to yield the estimated 24-hour traffic counts.

For class 4 and 5 residential roads the use of peak hour traffic or 12 hour traffic counts expanded to ADT (using an appropriate expansion factor) is acceptable.

The point scoring the criteria is as follows:

ADT in pcu per hour	Point score
501 – 1800+	20
100 - 500	10
<100	0

Number of pedestrians using the route

Daily pedestrian volumes can be estimated using peak hour or 12 hour pedestrian counts

The point scoring the criteria is as follows:

Number of pedestrians per day	Point score
< 250	0
250-1000	12
1000-5000+	20

Pedestrian related collisions on route

Pedestrian related collisions should be weighted according to severity and costs. Multiply the annual number of collisions at the particular site with factors for each type of collisions and add the totals to get the EAN (equivalent accident number). Multiply EAN by 40/111 to obtain the scoring.

If the value is 40 or more allocate maximum points of 40 else, use the actual figure.

EAN factors for various types of accidents are given below:

EAN factors Severity of collision	Factor
Fatal	43
Serious injury	10
Minor injury	3
Damage only	1

The fraction 40/111 has been made up as follows:

- The EAN of the site has to be multiplied by the maximum points that can be entered for this parameter.
- The figure then has to be divided by a figure representing the EAN of a typical site where pedestrian related collisions occurred due to the absence of a proper sidewalk. An EAN of 111 was researched for this purpose (NDOT, 1992).

Conditions for implementation

- A total score above 60 - implement of pedestrian footpath / sidewalks
- A total score below 60 is not warranted for implementation of pedestrian footpath / sidewalks

The warrant assessment form is shown in Table 5.10.

Table 5.10: Warrant for implementation of pedestrian footpath / sidewalk

Parameter	Max. Point Score	Assessment Point Score
Road verge		
Road verge width ≥1.5m grassed or gravel / sand and cross fall ≤ 4 %	0	
All other cases	20	
Vehicular Traffic volume (ADT)		
501 – 1800+	20	
100 - 500	10	
<100	0	
Number of pedestrians per day		
< 250	0	
250-1000	12	
1000-5000+	20	
Pedestrian related collision		
To be calculated	40	
Total		

5.9.4 Pedestrian and cyclist crossings

Signalised pedestrian or bicycle crossings may be provided when traffic signals at such crossings become warranted in terms of the traffic signal warrants.

Un-signalised pedestrian and cyclist crossings are not supported.

5.9.5 Pedestrian and cyclist access

No pedestrian or cyclist access to a development (formal or informal) may be provided on Class 1 roads (urban and rural) and measures must be introduced to prevent or limit pedestrian or cyclist access to such roads.

On Class 2 to 3 roads, pedestrian and cyclist access may only be provided opposite formal pedestrian and cyclist crossings. Measures must be introduced elsewhere to prevent or limit pedestrian or cyclist access.

On Class 4 and 5 roads, pedestrian and cyclist access may be provided at any location, but preference should be given to locations opposite formal pedestrian and cyclist crossings.

5.10 Public Transport Facilities

5.10.1 Public transport assessment

An assessment must be made on whether provision has been made for public transport facilities.

During TIA's, an assessment must be made of the provision of on-street public transport stops and bays.

During STA's, an assessment must be made of the provision as well as design of on-site public transport stops.

Refer to Section 5.3.4.

5.10.2 Public transport stops and bays

An assessment must be made of the number of public transport stops required to serve the development.

5.10.3 Location and design of public transport stops and bays

Public transport stops must be located within an acceptable walking distance from generators and attractors, as well as public transport stops on other routes when interchange takes place. Walking distances to the stops should be a maximum of preferably 400 to 600 m but not more than 800 m. Public transport stops must be served by an adequate network of sidewalks and walkways.

On-street public transport stops should be located as near as possible to intersections and accesses. The stops can be located either on the approach or on the far side of the intersection, but preference should be given to the far side. On approaches, the stops should be located sufficiently far back to prevent the intersection or access being obstructed by the stop.

Where public transport stops are provided on-site, fast and convenient vehicular access must be provided to the stops from roads or streets adjacent to the development (preferably by means of direct access from the street).

5.11 Parking and Loading Provision and Design

Parking and loading provision and design shall be in accordance with the eThekwini Municipality Town Planning Regulations.

5.12 Site Development Plan Assessment

The Site Development Plan shall be assessed in terms of the Site Development Plan checklist

ETHEKWINI TRANSPORT AUTHORITY
30 Archie Gumede Place | Durban | 4001
P O Box 680 | Durban | 4000
Tel: 031 311 7344 | Fax 031 305 5871
www.durban.gov.za

SITE DEVELOPMENT / BUILDING PLAN ASSESSMENT CHECKLIST

ETA Ref. No.:..... Date of Application:.....

Development Address:.....

Development Description.....

	YES	NO	N/A
Site traffic assessment required (refer to STA checklist)			
Engineering Drawings, Cost estimate, Financial guarantees, and Undertakings for new or existing road improvements			
Light vehicle access/driveway			
Access location dimension from property beacon to center line of access Access location from intersection: Min. 150m from class 1 / 2 roads Min. 60m from class 3 roads Min. 20m class 4 / 5 roads			
Access width at road edge			
Access scoop shown/access hardening shown (refer to Access Detail)			
Access / driveway long section to be shown (refer to Access Detail)			
Access width at boundary to be max. 9m			
Min. access width / driveway widths (refer to Table 1)			
Two-way driveway/ramp width min. 3m may be allowed if serving ≤ 6 parking bays (no pedestrians)			
Max. gradient 1:8 if access/driveway used by pedestrians			
Max. gradient 1:7 if access/driveway used by light vehicles only			
Heavy vehicle access/driveway			
Access location dimension from property beacon to center line of access Access location from intersection: Min. 150m from class 1 / 2 roads Min. 60m from class 3 roads Min. 20m class 4 / 5 roads			
Access width at road edge based on heavy vehicle tracking and tracking shown Access width at boundary max. 9m			
Access scoop / access hardening shown (refer to Access Detail)			
Access / driveway long section to be shown (refer to Access Detail)			
Min. access width / driveway widths (refer to Table 1)			
Max. gradient for access/driveway 1:10			
Ramps			
Light vehicle ramps grade max.1:7			
Heavy vehicle ramp grade max. 1:10			
Max. gradient for parking ramps 1:15			
Min. ramp widths (refer to Table 1)			
Parking and loading			
Max. gradient across parking area 1:15			
Light vehicle parking area min. height clearance 2.5m			
Loading vehicle parking area min. height clearance 4.5m			
Parking / loading bay dimensions – refer to Town Planning : *Minimum Standards for Parking and Loading Facilities to be Provided Within Any Site*			

ETHEKWINI TRANSPORT AUTHORITY

30 Archie Gumede Place | Durban | 4001
P O Box 680 | Durban | 4000
Tel: 031 311 7344 | Fax 031 305 5871
www.durban.gov.za

	YES	NO	N/A
Aisle width adequate for two-way/one-way – refer to Town Planning : *Minimum Standards for Parking and Loading Facilities to be Provided Within Any Site*			
Vehicle tracking for loading areas			
No. of loading bays – refer to Town Planning : *Minimum Standards for Parking and Loading Facilities to be Provided Within Any Site*			
No. of light vehicle parking bays relaxed from 4.9m depth to 4.6m only if less than 10% of the total parking			
Parking bay width for light vehicles relaxed to max. 0.1m if isolated parking areas			
Min. one access (ingress and egress) for max. 400 parking bays			
Full frontal access to parking from road not permitted			
Tandem parking bays permitted only if surplus to parking requirements			
Additional/General			
Boundary wall / fence to be shown for all developments (excluding single dwelling house – single unit per site)			
Petrol service station (PSS) frontage min. 36m			
Pump island for PSS min. 5m from site boundary			
PSS clear visibility of min. 120m in both directions at height of 1.37m from point of egress			
PSS not to be sited on a road having gradient at any point within 120m of any point of access to the PSS > 1:7			
Heavy vehicle access control (gate/boom/security control) to be setback based on requirements of ETA Manual for Site Traffic and Traffic Impact Assessments– or waivered if building plan endorsed that 'access to remain open during business operating hours'			
Light vehicle access control (gate/boom/security control) to be setback based on requirements of ETA Manual for Site Traffic and Traffic Impact Assessments - or waivered if building plan endorsed that 'access to remain open during business operating hours'			
Left-in-left out access designed and endorsed on plan			
Accesses to be clearly annotated for type of vehicle use (light/heavy veh. or both)			

Assessed by:……..……..

Date:……

Approved / Not Acceptable :

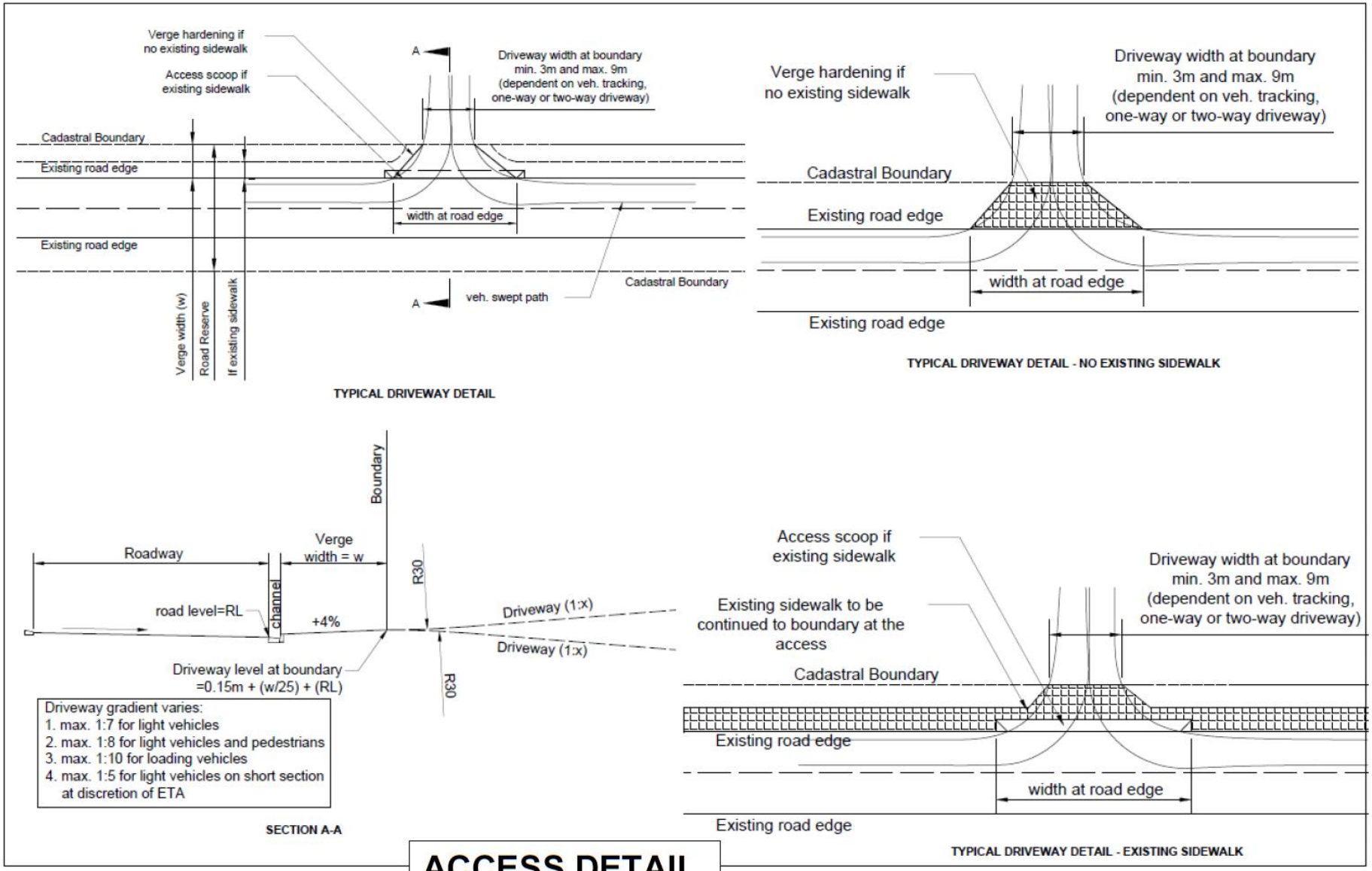
Disclaimer : The above must not be construed to be an exhaustive list of requirements. The Head ETA reserves the right to request additional requirements or to amend the requirements as deemed necessary.

Table 1 : Minimum access /driveway/ ramp widths

Description	Minimum width (m)[1,2]	
	One-way	Two-way
Access / driveway / ramp	3.0	5.5

[1] minimum width to be widened to accommodate turning paths of design vehicles

[2] minimum width to be increased by min. 1.2m to accommodate pedestrians and must include physical separation from vehicles e.g. kerb



ACCESS DETAIL

5.13 Peak Hour Vehicle Trip Generation Rates

Peak-hour trip generation rates and other associated traffic parameters and characteristics are provided below. These parameters are intended for use with TIA's. Where available, rates are provided for the following peak periods:

- Weekday AM peak (06:00 to 08:30)
- Weekday PM peak (16:00 to 18:30)
- Weekday Midday peak (11:30 to 14:00)
- Weekday Evening peak (18:30 to 24:00)
- Saturday Morning/Midday peak (08:30 to 14:00)
- Sunday Morning/Midday peak (08:30 to 14:00)

A size adjustment factor which is used to adjust various parameters provided in the table. The parameter is multiplied with the adjustment factor to provide the parameter for a development of a particular size. The size adjustment factor is determined by using the following formula:

$$\text{Size adjustment factor} = 1 + \frac{A}{1 + \frac{\text{sqm Size}}{B}}$$

Where:
A and B are parameters provided in the Table below and sqm Size is the size (GLA) of the development measured in units of m^2.

Size Adjustment Factor
1+A/(1+sqm Size/B)

110 Industrial Area **100sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.80	0.80				0.40			
% Heavy									
In/Out	70:30	25:75				30:70			
PHF Dev									
PHF Street									
Veh Occupancy	1.80								
% Pass-by									
% Diverted									

150 Warehousing and Distribution **100sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.50	0.50				0.15			
% Heavy									
In/Out	60:40	45:55				65:35			
PHF Dev									
PHF Street									
Veh Occupancy	1.50	1.50							
% Pass-by									
% Diverted									

210 Residential Dwelling Units **1 D/Unit**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.30	1.30				0.65	0.65		
% Heavy									
In/Out	25:75	70:30				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

225 Student Apartments and Flats **1 D/Unit**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.30	0.40				0.20	0.20		
% Heavy									
In/Out	25:75	65:35				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

251 Retirement Village **1 D/Unit**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.35	0.35		0.40		0.20	0.20		
% Heavy									
In/Out	40:60	50:50				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

254 Old-Aged Home **1 D/Unit**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.15	0.20		0.35		0.30	0.35		
% Heavy									
In/Out	65:35	40:60		50:50		50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

310 Hotel **1 Room**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.50	0.50		0.25		0.70	0.55		
% Heavy									
In/Out	60:40	55:45		50:50		50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

350 Guest House **1 Room**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.45	0.45				0.25	0.25		
% Heavy									
In/Out	50:50	50:50				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

430 Golf Course **1 Course**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	40.00	50.00				80.00	80.00		
% Heavy									
In/Out	80:20	45:55				50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

473 Casino **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.85	5.00		3.25	6.25	3.00			
% Heavy									
In/Out	75:25	50:50		55:45	50:50	70:30			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

480 Amusement Park **1 ha**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.50	10.00				47.00	44.00		
% Heavy									
In/Out	85:15	60:40				60:40	45:55		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

488 Sport Stadium **1000 seats**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate		150.00			270.00	170.00			
% Heavy									
In/Out		90:10			10:90	90:10			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

492 Health and Fitness Centre **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	5.00	9.50				7.00			
% Heavy									
In/Out	50:50	60:40				50:50			
PHF Dev	0.85	0.85							
PHF Street									
Veh Occupancy	1.10	1.30				1.0			
% Pass-by									
% Diverted									

520 Public School **1 Student**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.80	0.30		0.35					
% Heavy									
In/Out	50:50	50:50		45:55					
PHF Dev	0.55			0.55					
PHF Street									
Veh Occupancy	1.55			1.70					
% Pass-by									
% Diverted									

536 Private School **1 Student**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.90	0.30		0.5					
% Heavy									
In/Out	50:50	50:50		45:55					
PHF Dev	0.55			0.55					
PHF Street									
Veh Occupancy	1.50			1.70					
% Pass-by									
% Diverted									

550 University **1 Student**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.50	0.50		0.50					
% Heavy									
In/Out	80:20	30:70		30:70					
PHF Dev	0.65			0.65					
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

560 Places of Public Worship (Weekend) **1 Seat**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.05	0.05					0.65		
% Heavy									
In/Out	55:45	50:50					55:45		
PHF Dev							0.65		
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

561 Places of Public Worship (Weekday) **1 Seat**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.05	0.05							
% Heavy									
In/Out	50:50	50:50							
PHF Dev		0.65							
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

565 Pre-School (Day Care Centre) — **1 Student**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.00	0.80		0.30					
% Heavy									
In/Out	50:50	50:50		50:50					
PHF Dev		0.65		0.65					
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

566 Cemetery — **1 Ha**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.20	0.20		4.00		8.00			
% Heavy									
In/Out	70:30	35:65		75:25		50:50			
PHF Dev		0.65		0.65		0.65			
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

611 Public Hospital — **1 Bed**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.50	1.45		1.50		1.00	1.00		
% Heavy									
In/Out	80:20	40:60		40:60		50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

612 Private Hospital — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.65	1.50		1.60	1.70				
% Heavy									
In/Out	60:40	40:60		45:55	60:40				
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

620 Nursing Home — **1 Bed**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.20	0.20		0.30		0.40	0.35		
% Heavy									
In/Out	70:30	40:60		40:60		50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

630 Medical Clinic — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	6.00	6.00		4.20		7.80			
% Heavy									
In/Out	60:40	40:60		50:50		45:55			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

710 Offices — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	2.10	2.10				0.45	0.15		
% Heavy									
In/Out	85:15	20:80				55:45	55:45		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

713 Home offices and undertakings — **1 House**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	6.50	6.50		7.00					
% Heavy									
In/Out	85:15	15:85		50:50					
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

720 Medical consulting rooms — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	8.00	8.00		8.00		3.90	0.45		
% Heavy									
In/Out	55:45	45:55		45:55		60:40	50:50		
PHF Dev									
PHF Street									
Veh Occupancy	1.60			1.50					
% Pass-by									
% Diverted									

780 Conference Centre — **1 Seat**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.50	0.50							
% Heavy									
In/Out	90:10	10:90							
PHF Dev	0.75	0.75							
PHF Street									
Veh Occupancy	1.50	1.50							
% Pass-by									
% Diverted									

812 Building Hardware — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	2.80		5.50			11.00	5.00		
% Heavy									
In/Out	65:35		45:55			50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

817 Nursery (Garden Centre) — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	1.40	3.00	4.10			4.00			
% Heavy									
In/Out	65:35	30:70	50:50			45:55			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

820 Shopping and Retail Centre — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.60	3.00	3.40			4.50		6.000	3500
% Heavy									
In/Out	65:35	50:50				50:50			
PHF Dev						0.90			
PHF Street									
Veh Occupancy									
% Pass-by			13			12		1.950	48000
% Diverted			29			38			

841 Motor Dealership — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	2.20		2.30	5.10		2.20			
% Heavy									
In/Out	65:35		50:50			45:55			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

931 Restaurant (Sit-down) — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	0.75	11.80		9.80	9.00	11.00	9.00		
% Heavy									
In/Out	70:30	40:60		60:40	60:40	60:40	60:40		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by		39							
% Diverted		30							

933 Fast Food — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	45.00	50.00		30.00	55.00				
% Heavy									
In/Out	55:45	55:45		50:50	50:50				
PHF Dev									
PHF Street									
Veh Occupancy					1.65				
% Pass-by		52							
% Diverted		25							

946 Filling Station — **1 Station**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	4% of adjacent streets	4% of adjacent streets	4% of adjacent streets	4% of adjacent streets	4% of adjacent streets	4% of adjacent streets	4% of adjacent streets		
% Heavy									
In/Out	50:50	50:50	50:50	50:50	50:50	50:50	50:50		
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

950 Vehicle Fitment Centre — **100 sqm GLA**

Description	AM Peak	PM Peak	Friday PM	Midday	Evening	Saturday	Sunday	Factor A	Factor B
Trip Rate	3.00	4.30				5.20			
% Heavy									
In/Out	65:35	45:55				50:50			
PHF Dev									
PHF Street									
Veh Occupancy									
% Pass-by									
% Diverted									

5.14 Trip Reduction Factors

The trip reduction factors are provided below for mixed-use development, vehicle ownership and transit (public transport) nodes or corridors may be used in combination, in which case the following formula must be used to determine the combined reduction factor:

PC = (1 - PM) x (1 - PV) x (1 - PT)

where:

PC = Combined reduction factor
PM = Reduction factor for mixed-use development
PV = Reduction factor for vehicle ownership
PT = Reduction factor for transit nodes or corridors

Use of the trip reduction factors must be agreed with ETA.

The trip generation rates provided are applicable to areas with high vehicle ownership and where a low level of transit service is provided. For other areas, a lower trip generation rate is applicable based on reduction factors.

Category	Vehicles per household	Cars per 1000 population
High vehicle ownership	>1.0	>280
Medium vehicle ownership	0.5 – 1.0	150 - 280
Low vehicle ownership	0.25 - 0.49	75 - 149
Very low vehicle ownership	< 0.25	< 75

Transit (public transport) reduction factor:

The transit reduction factors are applicable to developments that are located within a reasonable walking distance from a major transit node or stops on a major transit corridor. ETA will decide on whether a particular development qualifies for this reduction.

Mixed use reduction factor:

Mixed-use developments are defined as developments in an area that consist of two or more single-use developments between which trips can be made by means of non-motorised modes of transport (such as walking) which has the effect of reducing the vehicle trip generation in the area. Some of the land-uses for which trip generation rates are provided already constitute mixed-use developments and therefore already provides for a reduced trip rate. An example of such a land use is shopping centres that could consist of other component land uses such as restaurants, cinemas, etc.

For land-uses which are not already included as a component of another land-use, an estimate may be made of the multi-use trips using the mixed-use reduction factors. These reduction factors may be applied subject to the following conditions:

- The mixed-use developments must be located within a reasonable walking distance from each other.
- The mixed-use reduction for a development may not exceed the available multiuse trips generated at the other adjacent or nearby developments.

	Land Use	Size Units	Percentage reduction for development in areas with Mixed-use Development	Low vehicle Ownership	Very low vehicle ownership	PT nodes or Corridors
100	**Industrial**					
110	Industry Area	100 sqm GLA	5%	20%	30%	15%
150	Warehousing and Distribution	100 sqm GLA	5%	20%	30%	15%
200	**Residential**					
210	Residential Dwelling Units	1 D/Unit	10%	40%	70%	15%
225	Student Apartments and Flats	1 D/Unit	25%	50%	80%	15%
251	Retirement Village	1 D/Unit	5%	50%	80%	15%
254	Old-Age Home	1 D/Unit	5%	50%	80%	15%
300	**Lodging**					
310	Hotel	1 Room	20%	20%	30%	15%
350	Guest House	1 Room	20%	30%	50%	15%
400	**Recreational and Sport**					
430	Golf Course	1 Course	5%	0%	0%	0%
473	Casino	100 sqm GLA	5%	20%	30%	15%
480	Amusement Park	1 ha	5%	30%	50%	15%
488	Sport Stadium	1000 Seat	5%	30%	50%	15%
492	Health and Fitness Centre	100 sqm GLA	5%	20%	30%	15%
500	**Institutional**					
520	Public Primary School	1 Student	30%	50%	80%	15%
530	Public Secondary School	1 Student	30%	50%	80%	15%
536	Private School	1 Student	30%	50%	80%	15%
550	University / College	1 Student	20%	40%	60%	15%
560	Places of Public Worship (Weekend)	1 Seat	10%	50%	80%	15%
561	Places of Public Worship (Weekday)	1 Seat	10%	50%	80%	15%
565	Pre-School (Day Care Centre)	1 Student	5%	50%	80%	15%
566	Cemetery	1 Ha	0%	30%	50%	15%
600	**Medical**					
611	Public Hospital	1 Bed	0%	50%	80%	15%
612	Private Hospital	100 sqm GLA	0%	20%	30%	15%
620	Nursing Home	1 Bed	0%	50%	80%	15%
630	Medical Clinic	100 sqm GLA	0%	50%	80%	15%
700	**Office**					
710	Offices	100 sqm GLA	20%	20%	30%	15%
713	Home offices and undertakings	1 House	10%	20%	30%	15%
720	Medical consulting rooms	100 sqm GLA	10%	30%	50%	15%
780	Conference Centre	1 Seat	10%	20%	30%	10%
800	**Retail**					
812	Building Hardware	100 sqm GLA	10%	30%	50%	15%
817	Nursery (Garden Centre)	100 sqm GLA	10%	30%	50%	15%
820	Shopping and Retail Centre	100 sqm GLA	10%	30%	60%	15%
841	Motor Dealership	100 sqm GLA	5%	20%	30%	15%
900	**Services**					
931	Restaurant (Sit-down)	100 sqm GLA	10%	10%	15%	15%
933	Fast Food	100 sqm GLA	10%	40%	60%	15%
946	Filling Station	1 Station	0%	0%	0%	0%
950	Vehicle Fitment Centre	100 sqm GLA	0%	0%	0%	0%

5.15 Vehicle Ownership Rates

Vehicle ownership per area is shown in Table 5.11:

Table 5.11: Vehicle ownership rates

Survey Area No.	Area	Avg. Car Ownership cars/1000
R 1	CBD West	200
R 2	CBD East	211
R 3	Berea North	249
R 4	Berea South	228
R 5	Durban North	275
R 6	Duikerfontein	173
R 7	Umgeni South	180
R 8	Cato Manor	145
R 9	Bluff	249
R 10	Merewent Environs	211
R 11	Greater Lamontville	87
R 12	Montlands	303
R 13	Old Lines Suburbs	344
R 14	Queensburgh	315
R 15	Shallcross Environs	157
R 16	Chatsworth West	193
R 17	Chatsworth East	231
R 18	Isipingo Environs	222
R 19	Westville	261
R 20	Pinetown	308
R 21	Caversham Glen	263
R 22	Newlands	201
R 23	Avoca Hills Environs	195
R 24	Kwa Mashu South	110
R 25	Kwa Mashu North	150
R 26	Ntuzuma West	115
R 27	Ntuzuma East	107
R 28	Inanda	73
R 29	Phoenix North	190
R 30	Phoenix South	236
R 31	Umhlanga	294
R 32	Ottawa Environs	137
R 33	Clermont	100
R 34	Kwa Dabeka	104
R 35	New Germany Environs	234
R 36	Lotus Park	204
R 37	Amanzimtoti	259
R 38	KwaMakutha Complex	109
R 39	Folweni Complex	114
R 40	Umlazi South	137
R 41	Umlazi West	140
R 42	Umlazi North	104
R 43	Demat	142
R 44	St. Wendolins Environs	124
R 45	Nagina	162
R 46	Kwa Ndengezi	142
R 47	Marianhill	72
R 48	Verulam Environs	214
R 49	Greater Tongaat	120
R 50	Greater Umkomaas	111
R 51	Greater Hillcrest	209
R 52	Summerveld Environs	84
R 53	Shongweni Environs	71
R 54	Mpumalanga Environs	86
R 55	Cato Ridge Environs	88
R 56	Greater Inanda Farmlands	76
R 57	Greater Western Environs	80
R 58	Adams Complex	124
R 59	Inwabi Environs	121
R 60	Greater Umbumbulu	111

Vehicle ownership is based on the report *"Study to Determine the Present and Future Spatial Distribution of Population, Employed Residents, Workplace Employment and Vehicle Ownership for the eThekwin Metropolitan Area, ETA, 2011".* Vehicle ownership is representative of current trends, however future trends for each area may varying and must be obtained from the ETA's Strategic Transport Planning Department where necessary.

A map of the various areas is shown in Figure 5.3

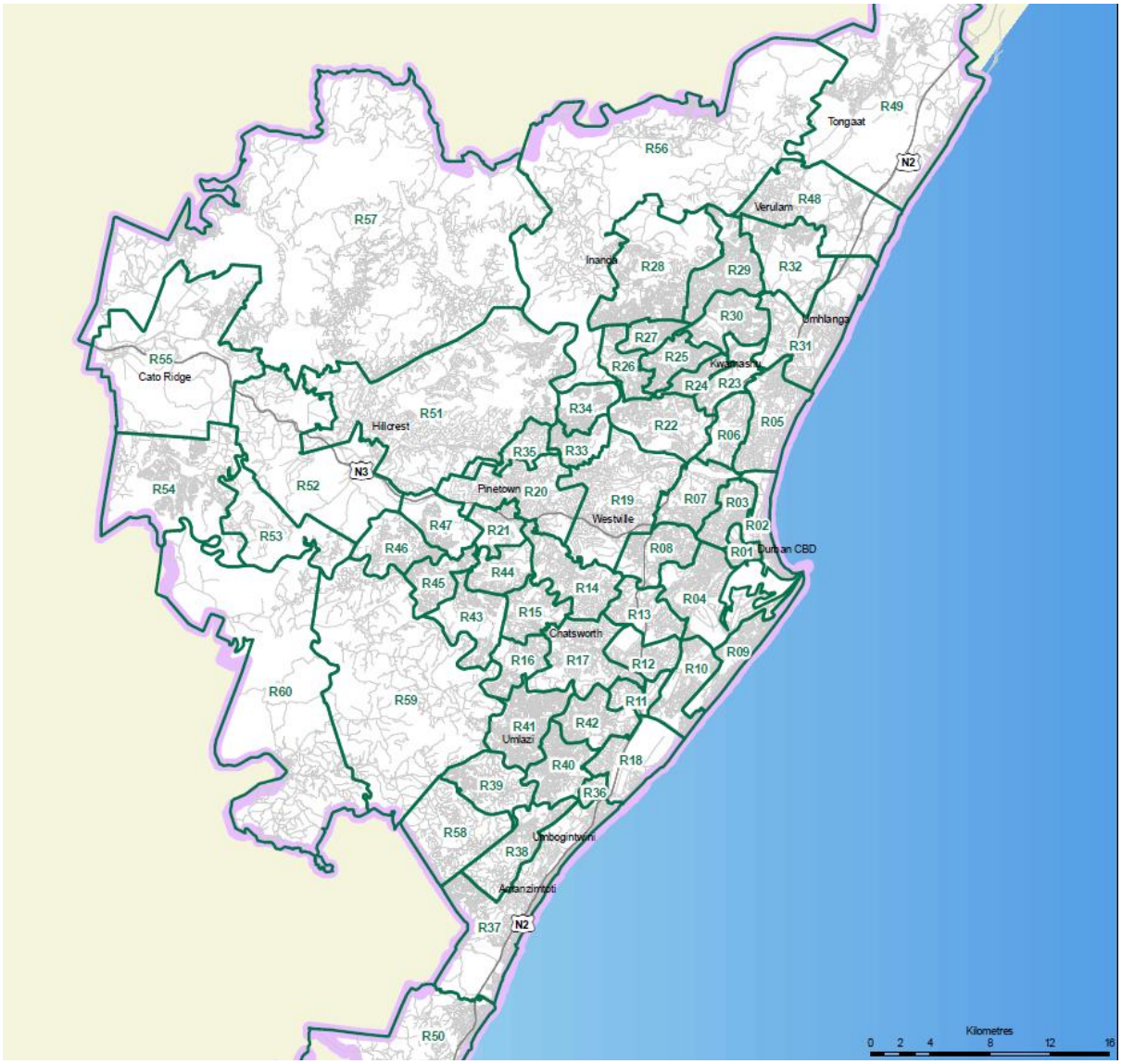


Figure 5.3.: Surveyed areas for vehicle ownership rates

5.16 Trip Generation Land Use Descriptions

Land-Uses and Size Units

100 Industrial

110 Industrial Area	**100 sqm GLA**

Industrial area include, typical service industries include vehicle repairs, appliance and television repairs. The industrial area may also contain related facilities such as services and warehousing, the conversion of raw materials or parts into products and where the materials or products have a heavy nature. A small amount of retail may be included.

150 Warehousing and Distribution	**100 sqm GLA**

Warehouses are primarily used for the storage and distribution of materials, but may include office and other functions associated with such storage. Goods are often sorted and distributed from these warehouses.

200 Residential

210 Residential Dwelling Unit	**Dwelling units**

All types of residential dwelling, single units, flats, multi-storey, simplexes, duplexes, townhouses, etc

225 Students Apartments and Flats	**Dwelling units**

Apartments and flats specifically targeted at students. This land-use may only be used when guarantees are given that the development will not be used by persons other than students.

251 Retirement Village	**Dwelling units**

Dwelling units intended for senior adults. Dwelling units could be either detached or provided in one building structure. This land-use may only be used when guarantees are given that the development will not be used for any other purpose.

254 Old-Age Home	**Dwelling units**

Provide living facilities and care for senior adults. They commonly have single rooms for residents and services including dining, housekeeping, care, medication administration and transportation. This land-use may only be used when guarantees are given that the development will not be used for any other purpose.

Land-Uses and Size Units

300 Lodging

310 Hotel — **Rooms**

Hotels provide sleeping accommodation and supporting facilities such as the reception area and dining rooms. Facilities that are mostly provided for hotel users are included in the trip generation rates.

350 Guest House — **Rooms**

Smaller lodging facilities with characteristics similar to a hotel, but which are provided in a building which has a residential character.

400 Recreational and Sport

430 Golf Course Courses

Trip generation rates for golf courses include facilities normally associated with such courses, such as a restaurant, lounge, etc.

473 Casino — **100 sqm GLA**

Casino establishments provide gambling facilities.

480 Amusement Park — **ha**

An amusement park contains rides, entertainment, refreshment facilities and picnic areas.

488 Sport Stadium — **Seats**

Sport stadiums may consist of one or more sport fields surrounded by seats for spectators.

492 Health and Fitness Centre — **100 sqm GLA**

Health and Fitness Centres focus on individual fitness or training. Typically they provide exercise facilities, gymnastic equipment, locker rooms and small refreshment facilities.

500 Institutional

520 Public School — **Students**

Public primary and secondary schools

536 Private School — **Students**

This land-use includes schools for all ages of students.

550 University / College — **Students**

This land-use includes universities, technicons and colleges.

560 Places of Public Worship (Weekend) — **Seats**

Places of public worship which normally operate on weekends (e.g. Saturdays or Sundays).

561 Places of Public Worship (Weekday) — **Seats**

Places of public worship which normally operate during the week (e.g. Friday).

565 Pre-School (Day Care Centre) — **Students**

A facility where care is provided for pre-school age children. The facilities include classrooms, offices, eating areas and playgrounds.

566 Cemetery — **Ha**

Place of burial. Size measured in units of hectares.

600 Medical

611 Public Hospital — **Beds**

An institution where public medical care is provided. The land-use includes related facilities normally associated with hospitals, including doctor consulting rooms, pharmacies and other medical services.

612 Private Hospital — **100 sqm GLA**

An institution where private medical care is provided. The land-use includes related facilities normally associated with hospitals, including doctor consulting rooms, pharmacies and other medical services. The consulting rooms are those used by doctors whose primary duty is to provide health care at the hospital. Other rooms must be treated as medical consulting rooms..

620 Nursing home — **Beds**

A facility whose primary function is to care for persons who are unable to care for themselves. Care is mostly provided by nursing staff and by visiting doctors. Traffic is primary generated by employees, deliveries and visitors and not by residents. This land-use may only be used when guarantees are given that the development will not be used for any other purpose.

630 Medical Clinic — **100 sqm GLA**

A facility at which limited diagnostic outpatient care is provided. No prolonged in-house medical or surgical care typical of hospitals is provided.

700 Offices

710 Offices — **100 sqm GLA**

This land-use includes developments at which affairs of businesses, commercial or industrial organisations are conducted.

713 Home offices and undertakings Houses — **1 dwelling house**

This land-use includes all home office undertakings, such as small businesses, professional firms, hair-dressers, etc. A residential component must be maintained on the site.

720 Medical consulting rooms — **100 sqm GLA**

Medical consulting rooms are facilities at which medical practitioners may be consulted on an appointment basis, with no or limited provision for hospitalization. Pharmacies are not included.

780 Conference Centre — **Seats**

A conference centre provides conference facilities. The land-use may include associated land uses, such a dining facilities, dining rooms, etc.

800 Retail

812 Building Hardware — **100 sqm GLA**

A building material centre is a free-standing facility that sells building hardware and materials. May include a component of hardware and paint sales. This land-use may only be used when guarantees are given that the development will not be used for any other purpose.

817 Nursery (Garden Centre) — **100 sqm GLA**

A nursery or garden centre is a free-standing facility at which items are sold to the public.

820 Shopping and Retail Centre — **100 sqm GLA**

A shopping centre is an integrated (mixed-use) group of commercial establishments that operate as a unit. May include small components of other land uses, such as restaurants, hardware and paint shops, etc.

841 Motor Dealership **100 sqm GLA**

A motor dealership is a location at which either new or used vehicles are sold. May contain a limited component of vehicle parts sales. This land-use may only be used when guarantees are given that the development will not be used for any other purpose.

900 Services

931 Restaurant (Sit-down) **100 sqm GLA**

This land-use consists of sit-down restaurants

933 Fast Food **100 sqm GLA**

Facilities that sell take-away food. Table services are not normally provided, but limited facilities are sometimes available. Include drive-through facilities.

946 Filling Station Stations

Filling Stations at which the primary business is the fuelling of motor vehicles. Related facilities such as a convenience shop, service facilities and a car wash are not included.

950 Vehicle Fitment Centre **100 sqm GLA**

Vehicle Fitment Centres specialise in the fitment of vehicle parts such as exhausts, tyres, radios and vehicle repairs.

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