Feedback Tutorial letter/ assignment 1
Transport Economics & Planning (TEP5215)

Dear Distance students

Congratulations on completing assignment 1. Your first assignment explicitly required you to go beyond the Study Guide as you research further from the different sources about your subject, for sure most of you managed to do exactly that. Your work was quite impressive and it was clear from the varied responses that some of you are now at university level. Therefore I am happy to report to you that about 15 of you managed to get marks above 70%, with the highest scoring a resounding 86%. That is really pleasing and such work is encouraged. Furthermore about 30 of you had marks which were above 60%. That is equally encouraging and we need to be highly encouraged by such work. This must be a motivation so that in the next assignment we can aim even higher.

Whilst on the other hand a few did not do so well and some of you had marks ranging in the 40s. Please be highly encouraged to score higher in the next assignment. Some of you who did not score well, it was because you failed to make use of practical examples in your
explanation. Be diligent, always do your assignment well in time and revise it thoroughly to see if you have made any mistakes.

In addition, I would like to thank all those who typed their assignments. These were neatly presented and the act made it easier for me to read and mark. Furthermore, this act shows your seriousness you are showing towards your studies. As managers or future managers you are expected to always go the extra mile out of your own accord.

Moreover, you are required to provide references at the end of your assignment. Whilst I was not awarding marks with regards to this aspect, it is proper that you do this. In addition, for those of you who provided references, please may you be encouraged to make proper use of in-text references. Only about 30% of you managed to do so, but 80% had problems with in-text references. Please make use of the APA referencing style as recommended by NUST and master it.

Reading the Questions, Understanding and Answering:

I believe that some of you did not really read the questions and as such missed the point of discussion. As a result, you lost marks because you just started answering, but did not really address the question at hand. There were those who tried to take points in the study guide and put it in their own words but unfortunately just missed the point or went out of topic. And on the hand, some copied directly and did not even use proper in-text referencing. This indicates that you might not have read the study guide and your instructions, or, that you read, but did not understand what you were reading.

Spelling and Grammar:

As Bachelor Students, by now, you should have learned that reading is important. You are not only to read when you are given assignments, but all the time. By reading, I’m referring to educational material which will enhance your grammar, spelling and intellect. Those who typed your assignments, you had an opportunity to use your computers grammar and spelling buttons. Some of you just “ignored” this tool which is so freely provided. Those who handwrote your assignments, you had the opportunity of making use of a dictionary. No matter how little time you have, it is just proper and courteous to read through your work and correct mistakes before submitting. It is also important to note at the same time that spelling and
grammar check does not correct all your mistakes, because if a word is correct but written in the wrong tense, the computer cannot pick this up. Reading your work before submitting will assist you to avoid these pitfalls.

**Overall Comments:**

There are some students who displayed a wealth of knowledge, while others just copied what was written in the book. The idea is not to re-write the study guide, but to use it as a “guide”. You are expected to read other sources e.g. books in order to get a better understanding of the topic and to broaden your knowledge as well. Yet you are not required to ignore the study guide and just write what you think is correct, But the main point is to read and understand, take notes of the key words and combine sources and put it in your own words.

Secondly, it is vital that you pay attention to the marks allocated to each question. Now, it doesn’t mean you just write, no, you must learn to answer the questions and provide concrete facts which can win you marks.

Learn to back up your statement with evidence. Why do you say that? Don’t just make statements because at times what you say is not really fact.

Learn the meaning of the terms used in your question papers. Discuss, Explain, etc. If you are asked to discuss, the reader expects you to challenge them with your discussions. Learn to group your thoughts together and write in chronological order. Avoid repetitions and assumptions. Most importantly, don’t lose focus of what you want to say.

I hope that you will take time to go through these pointers and that they will be of help not only for this assignments, but for all your other work too.

**Here are some tips for your future studies:**

1) Make sure you have all the required prescribed material before the official start of the academic year. Order the books from a book store (Book Den in Windhoek has all the prescribed books and your study guide contains the other relevant material)

2) Make sure you have the prescribed study guide from COLL and make use of it.
3) Follow the course outline and start reading the prescribed material. If you do not have an outline or guide start reading anyway. The sooner you have “digested” the texts the better.

4) If possible read wider than the required texts. If you can, read up as much as possible on the required texts. Feel free to browse the web, but remember not all sites are reliable and many are not suitable as academic references (Wikipedia).

5) NEVER copy or paraphrase directly from any source or your workbook. This is plagiarism and you can be severely penalised.

6) Always quote your sources at the end of your assignment.

7) NUST uses the APA method of referencing. Find out about it or contact the NUST library. They have copies available. You can also look on the internet.

8) In answering questions always remember the lecturers want to see what you know not what others know, so give answers which show your own authentic response. Your response should be shaped by your reading of the text and about the text but present your answers in such a way that they reflect your own ideas and your wording of other people’s ideas.

Questions specific comments

QUESTION 1

RDP ARGUES FOR PRIVATIZATION OF AIR NAMIBIA – NEW ERA PUBLICATIONS.

“Windhoek Rally for Democracy and Progress (RDP) Member of Parliament Mike Kavekotora says the government must privatize Air Namibia to lessen the burden of its continued dependence on State funding for survival, which has been the case for more than a decade. Kavekotora, in his contribution to the 2016/17 national budget debate in the National Assembly on Tuesday last week, said the national airline is a nonessential commercial State-owned enterprise (SOE) that is milking government to the bone. The national airline is set to receive N$695 million in State funding for this financial year, compared to the N$579.8 million it received in the last financial year. “With regard to Air Namibia, although its subsidies have not been reflected in the national budgets before 2007, the cumulative bailouts since
Independence up to the projected funding in the 2018/19 financial year exceed N$10 billion,” he noted. Kavekotora added that Namibians should ask themselves how to privatize Air Namibia successfully, instead of whether or not to privatize the airline. He noted that many oppose the privatisation of Air Namibia, with some citing political justification, as opposed to economic and financial considerations. He advised that government could retain Air Namibia in a cost-effective way by having a minority shareholding in the airline. “It simply does not make economic sense to continue allocating more government resources to Air Namibia in comparison to other SOE’s like TransNamib,” he said. Further, he said the argument of retaining the airline to bring tourists does not in itself hold water, saying many developing nations’ with renowned tourist destinations, such as Costa Rica, Peru and the Dominican Republic, do not have national airlines. Getting out of the airline business, he said, would free up limited government resources to focus on social needs and developing local products and services for the tourist market. However, Minister of Land Reform Utoni Nujoma accused Kavekotora of being politically motivated in his proposal. “Your speech is politically motivated. Your speech is hollow. What government is doing is to try to address challenges inherited from apartheid,” he reacted. Kavekotora also took issue with the state of Namibia’s railway network, saying it faces avoidable problems, notably the maintenance backlog and lack of investment in rail system since Independence. According to him, the little investment in rolling stock did not make any significant impact on Namibia’s capacity to move freight by rail, resulting in the burgeoning of trucks on national roads. This, he says, led to a rapid decline in the life cycle of the national road network. “It is against this [background] that a higher allocation to Air Namibia compared to TransNamib is highly questionable,” Kavekotora said. Meanwhile, United People’s Movement (UPM) leader Jan van Wyk took issue with the Anti-Corruption Commission (ACC), saying corruption is high and widespread. He said the allocation of funds to the ACC is a complete waste of public resources, as the body only concentrates on low profile cases, while cases involving the misuse of State funds are only made known when newspapers report on it. An amount of N$49.9 million has been allocated to the ACC for the 2016/17 financial year, compared to N$39.8 million last year.”
Discuss using practical examples how the concept of privatization would help increase economic efficiency within the context of the stated scenario [20 Marks]

This was a very straightforward question which should have been answered with greater accuracy than was. Students answered this question fairly; however, there were few who failed to give enough points to the aspect in question. Always be guided by the allocated marks to each question to know how much is required from you.

Full marks were also allocated to students who extensively researched on the matter in question, backed up by findings of other researchers in the transport and logistics field as well as report from relevant transport agencies.

QUESTION 2

Traffic congestion on road networks is a fact of life in the modern world: Time is wasted daily on a colossal scale. Windhoek is no exception, has we have witnessed the increase of vehicle population on its roads. A study conducted by GIZ, in collaboration with the City of Windhoek and The Ministry of Works and Transport concluded that even though the population of Windhoek is expected to grow from 333 100 inhabitants to 737 000 inhabitants by 2032, No clear solutions are in place to help cater for such increase in the number of commuters. The study identified a commuter’s train as the best option to help decrease congestion on the Windhoek roads, however this option is not yet economically and financially viable, and might only be relevant from 2032.

Using examples, Advice the City of Windhoek of the techniques that they can use to minimize congestion? [15 Marks]

- Please read the SUSTAINABLE URBAN TRANSPORT MASTER PLAN (SUTMP) for City of Windhoek attached. The plan clearly highlighted on how City of Windhoek plan to reduce congestion.

The Sustainable Urban Transport Master Plan (SUTMP) is a 20-year plan that identifies the types of investment in infrastructure and services that are required to improve the public transport (PT) system and non-motorised transport (NMT) provisions in the City of Windhoek, including Rehoboth, Okahandja and Hosea Kutako Airport (i.e., the Project Area). The SUTMP advances organisational, legislative, regulative, financial and operational measures needed to establish a network of high quality that is
accessible, affordable, convenient, efficient, equitable, and safe. The PT and NMT facilities and services will meet both current and future mobility needs of the diverse and growing population in the Project Area through 2032.

QUESTION 3

Giving practical examples, discuss any 5 regulatory instruments that the Namibian Government can use to intervene in the transport market? [15 Marks]

The question was answered fairly despite the fact that some students failed to give practical examples. Unit 2 in your study Guide will help you understand the different instruments for government intervention.

Please feel free to contact me should you have further questions or concerns

I wish you all the best for your second assignment.

Best regards

Ms Hilma Kotti-Nuuyandja

Marker-Tutor (Transport Economics and Planning)
Sustainable Urban Transport Master Plan
for Windhoek including Rehoboth, Okahandja and Hosea Kutako International Airport

Project Summary
Submit your Comments on the Project Summary now:
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Implemented by

german cooperation
deutsche zusammenarbeit

GIZ
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

REPUBLIC OF NAMIBIA

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<td>Central Business District</td>
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<td>CBS</td>
<td>Central Bus Station</td>
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<td>CCC</td>
<td>Central Control System</td>
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<td>CO</td>
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<td>Diesel Multiple Units</td>
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<td>Fourth National Development Plan</td>
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<td>NOx</td>
<td>Nitrogen oxides</td>
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<td>Non-motorised Transport</td>
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<td>Namibia Public Passenger Transport Association</td>
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<td>Net Present Value</td>
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<td>Private Sector Road Safety Forum</td>
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<td>Right of Way</td>
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<td>Transport Demand Management</td>
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I. Foreword by the Minister of Works and Transport

The Namibian Government is determined to deliver the change in urban transport the people of Windhoek and Namibia have called for. Windhoek’s land use planning is based on historical policies. Such planning results in high population densities in the small area of poorest townships and a low density in richer larger areas of Windhoek. Residents of the informal settlement, located rather far away from the Central Business District, are forced to travel long distances to access basic facilities due to the scarcity of commercial development in townships. In the process, Windhoek is facing increasing transportation challenges such as, traffic congestion, cyclist and pedestrian accidents, air pollution, high costs of transportation and other social and economic challenges.

Transportation problems are not new to mankind and urban areas have always been problematic because of the large concentration of people – Windhoek is no exception. Being not only the political but also economic capital, Windhoek will maintain to grow rapidly. The question to policy makers as well as transport and city planners is, how can our current transport system cope with the increased transport demand? Will Windhoek have traffic jams, as many other African Cities are experiencing every day? Will we be able to provide safe, affordable and efficient mobility in a liveable urban environment?

Even though only 13% of Windhoek’s resident can afford and own cars, private cars are currently the dominating mode of transport in the capital and Namibia in general. How do 87% of residents without cars reach schools, hospitals, markets and other social services Windhoek offers? How much of their disposable income is spent on transportation? On the basis of the above, there is a need for a robust public transport service. Taxis and municipal buses carry many people to work, but is the service accessible, affordable and safe enough? In most cases there is complain of abuse of powers in these operations. Taxis complain about the ill treatment at the hands of law enforcement whereas the public view taxis as reckless and with no regards for traffic law or their passengers. Buses are often too full and exposed to the congestion leading to passengers arriving late at work places. This does not match with a modern transport system we should have in Namibia’s capital.

Many residents would like to use the most affordable Non-motorised transport options - walking and cycling. However, lack of non-motorised facilities forced them to use unpaved ways along roads or compete for space with motorist. Their travel becomes a dangerous adventure as they are forced to walk unsafe riverbeds and crossing high speed highways. The same accounts for cyclists, resulting in many avoidable road safety fatalities. More than half of the traffic accidents in Windhoek involve a non-motorised transport due to their vulnerability.

We are fully aware of the challenges that we are currently facing and that we will encounter if we do not adjust our planning. Hence, my Ministry took the initiative to develop a strategic plan, the Sustainable Urban Transport Master Plan, as a pilot plan. The plan highlights the problems but, most importantly, suggests improvements. An improved bus system, an integrated non-motorised transport network, many transport demand management measures as well as policy recommendations are made to enhance public transport in Namibia and Windhoek.

I am grateful that the Federal Ministry for Economic Cooperation and Development through its implementing agency the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH supported the development of this plan from an early stage on. We do not develop cities for politicians and technocrats. Hence we involved stakeholders and citizens during the planning process. We highly appreciate the support of the stakeholders. The ideas and visions we collected are the basis for the Master Plan that stands on sound technical and economic modelling.

I would also like to highlight the good intergovernmental cooperation between the Ministry of Regional Local Government, Housing and Rural Development, the City of Windhoek all other contributing governmental bodies and my very own Ministry. I am confident that implementation of this visionary plan can now begin.

Like all good plans, continued consultation will be undertaken to make sure it remains relevant to the people’s needs and continues to strengthen the community.
II. Foreword by the German Ambassador

Over the next 20 years Namibia’s capital Windhoek will grow to almost 1 Mio residents. More people means more traffic on roads and more goods to move. I would like to congratulate the Namibian government to have made a timely decision to change course in urban transport planning and to begin a new era in the way Namibia’s capital is shaped for the current and future generations. This Sustainable Urban Transport Master Plan for Windhoek includes Rehoboth, Okahandja and Hosea Kutako International Airport. The plan is publicly known as “Move Windhoek” and proves how central and local government work together to improve the life of Namibia’s citizens.

Urban space has to satisfy several demands Namibia’s citizen’s have: housing, work, social integration, leisure and of course mobility of persons and goods. To create and maintain an attractive urban environment, the requirements of all of these functions have to be carefully balanced against each other. Urban transport and land-use planners around the world conclude that car-based urban transport is not a sustainable development path – neither in terms of urban functionality nor socially or environmentally. In the Namibian context this cannot be highlighted enough. Only public and non-motorised transport can assure access to mobility in large cities by all citizens regardless of income and social status.

When it comes to public and non-motorised transportation, Germany is proud to be at the forefront of integrating all modes of public transportation. We offer our partner countries world-wide to share the experience we gained in the last decades. Germany’s urban transportation solutions are in demand world-wide with successful projects in mega-cities like Johannesburg and Beijing.

An applied and local approach is crucial: It is important to combine international best practice with local know-how to adequately address the situation in Windhoek. I am confident Namibian and German experts were able to team up and bring together their individual knowledge to develop this Sustainable Urban Transport Master Plan. The 2013 Integrated Mobility Award by International Association of Public Transport in Geneva shows that the team has done a tremendous job over the last year. Congratulations!

I am glad that the City of Windhoek and the Ministry of Works and Transport thoroughly planned the process and involved stakeholders and the public on many levels. Stakeholder workshops, public hearings in Katutura and public events like the “Cycle to Work Day” show the commitment to involve the general public. The initiatives proposed are based on extensive input and citizen-focused and they aim at supporting Windhoek’s image as a sustainable city.

An approach of good governance, transparency and participation that I can only congratulate you to.

This Master Plan is the combination of extensive analysis and consultation. It brings together modelling evidence we need for the technical and economic feasibility. The implementation of the plan is an economic necessity for many people in Windhoek living without an adequate access to transportation. It is a necessity for local economic development and for equality and therefore directly contributes to NDP4.

The German Government will further cooperate with the Namibian Government in the Transport sector to improve accessibility and safety on Namibia’s roads.

Being a Windhoek citizen myself, I am particularly looking forward to the implementation of the Urban Transport Master Plan in the near future.

Onno Hückmann, Ambassador of the Federal Republic of Germany
1. Move Windhoek: A Vision in Urban Transport for the City of Windhoek

1.1 What the Master Plan is About

The Sustainable Urban Transport Master Plan (SUTMP) is a 20-year plan that identifies the types of investment in infrastructure and services that are required to improve the public transport (PT) system and non-motorised transport (NMT) provisions in the City of Windhoek, including Rehoboth, Okahandja and Hosea Kutako Airport (i.e., the Project Area). The SUTMP advances organisational, legislative, regulative, financial and operational measures needed to establish a network of high quality that is accessible, affordable, convenient, efficient, equitable, and safe. The PT and NMT facilities and services will meet both current and future mobility needs of the diverse and growing population in the Project Area through 2032.

This document summarises the Master Plan and its Technical Annex and is to be shared with the public and stakeholders for comments.

1.2 Existing Conditions

Every city has different features that require a highly unique transport system. The City of Windhoek for example is characterised by high density in poor areas, a CBD area, growth during apartheid and high peak demand for traffic between 1700 and 1800hrs when shops and businesses close. Public transport systems exist only in very limited extent. Provisions for non-motorised transport, the second most important means of transportation in the northern and central parts of Windhoek, are inadequate, disconnected and almost non-existent for bicycles. Private taxis, cars and mini buses are used by the majority of the population in preference to the City of Windhoek bus service. Vehicle ownership is increasing rapidly in line with per capita economic growth.

Although a relatively small city population-wise, the road safety situation in Windhoek is alarmingly and extremely high by international comparison. In just one month (October 2012) there were a total of 486 accident cases in the Windhoek Central Business District (CBD) recorded by the Namibian Police, i.e. more than 16 accidents per day happening in a relatively small area of...
the city. Despite its size, however, the largest concentration of job opportunities is found within and around the CBD. Major job opportunities outside the CBD are found in the northern and southern industrial areas. In addition:

- Roughly 87% of the population are low-income earners, who cannot afford cars.
- On average, low income earners spend 24% of their disposable income for their mobility needs.
- 52% of the low income earners can also hardly afford public transportation, as it will require more than half of their monthly income.
- Non-motorised transportation modes are the most affordable modes to 87% of the population.

![Figure 2 Improved affordability of public transport is an economic necessity for many](image)

1.3 Links with National, Regional and International Policies and Strategies

The SUTMP is aligned with relevant policy instruments at national, regional and global scales.

- **International Policy**
  - Including aspects of the green economy transition that can address the challenges in the transport sector, e.g., upgrading road design standards to safety levels.
  - This is consistent with the National Report to the UN Commission on Sustainable Development (MET, 2012).

- **National Policy**
  - Public Transport included in the Annual Sectoral Execution Plan developed by the Ministry of Works and Transport in priority areas based on NDP4 identified strategies.
  - NAD 3.5m is budgeted for 2013/14 Financial Year.

- **Regional Policy**
  - The SUTMP builds on the Transport Safety Strategic Plan for the Khomas Region (2011), the City of Windhoek Arterial Master Plan, as well as the Transportation Land Use for the City of Windhoek (2006), among others.
  - The Council has set aside NAD 2m in 2013 to support implementation of public transport measures.

- On average, low income earners spend 24% of their disposable income for their mobility needs.
- 52% of the low income earners can also hardly afford public transportation, as it will require more than half of their monthly income.

- Non-motorised transportation modes are the most affordable modes to 87% of the population.

**a)** In an international policy context, the public transport system has an important role to play in greening the economy in the context of sustainable development and poverty alleviation in Namibia. Development of a long-term Master Plan for public and non-motorised transport is recognised as an aspect for both.
b) In line with national policies, implementing measures intended to increase the supply of PT and NMT infrastructure and services such as is proposed under the polycentric land use supports faster and sustainable economic growth, creation of employment opportunities, and enhanced income equality – the three key priorities identified under the Fourth National Development Plan (NDP4).

c) At a regional level, the existing transport demand for the City of Windhoek was evaluated and its future development estimated supported by a validated transport demand model. The model was based on existing transport demand model of Windhoek (2006), but was up-dated and expanded to include Okahandja, Rehoboth and Hosea Kutako International Airport.

1.4 Scope of Work

In the boundaries of the City of Windhoek a comprehensive analysis was conducted and additional traffic counts as well as Origin and Destination Surveys to and from Rehoboth, Okahandja and Hosea Kutako International Airport were done and analysed.

1.5 Key Assumptions

The SUTMP makes the following key assumptions:

**Sustainable Transport (ST 2032) Scenario:** This scenario assumes major improvements of the transport system consisting of: (i) A Public transport network that will consist of a commuter railway, Bus Rapid Transit lines, High Quality Bus lines and Minibuses/taxis, (ii) NMT Network including pedestrian zones, and (iii) Road Reclassification for safety and liveability reasons.

**The Business As Usual (BAU2032) scenario:** assumes a continuation of the present policies and trends with no major improvement of roads, public or non-motorised transport. It includes all measures already planned today. The BAU 2032 is used to assess the impacts of ST 2032.

**Future settlement pattern and urban structure will follow a polycentric development,** with a moderate densification of the CoW where possible, moderate mixed-land use, and generally the implementation of the concept of decentral concentration. The major urban development area will be the strong transit corridor oriented development (TOD) towards Okahandja accommodating the bulk of the population growth. Brakwater and Elisenheim will be tightly connected to the TOD corridor by high-quality PT.

**The population in the Study Area will grow largely due to immigration mainly of lower income households.** By 2032, the forecasted population will be: City of Windhoek (737,000), Rehoboth (28,800) and Okahandja (31,000) people.

**Figure 3 Key Assumption**

Throughout this document the impact of the Sustainable Transport Scenario is compared with the consequences of not improving the current system. This “Business as Usual Scenario” forms a possible contrast to improvements under the Sustainable Transport Scenario.
2. Principle Outcomes and Impacts – How the City Benefits

The key objective of the Master Plan is to support decision makers in developing an affordable, accessible, attractive and efficient public transport and non-motorised transport system for the next 20 years. The SUTMP recommends a range of suitable measures to improve public transport and non-motorised transport in the City of Windhoek. Overall, the Master Plan suggests seven measures and four variants.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Variants</th>
</tr>
</thead>
</table>
| 1 Public Transport in Windhoek | a. Bus Rapid Transit (BRT)/Bus  
   b. Light Rail Train/BRT/Bus |
| 2 Public Transport in the Northern Corridor (direction Okahandja) | a. Commuter Rail + Feeder Buses  
   b. BRT + Feeder Buses |
| 3 Public Transport in the Southern Corridor (direction Rehoboth) | Express Bus Service |
| 4 Public Transport in the Eastern Corridor (direction Hosea Kutako International Airport) | Express Bus Service |
| 5 NMT Network including pedestrian zones | No variants |
| 6 Road Reclassification | No variants |
| 7 Accompanying measures | Institutional, Legal and Financing Transport Management  
   Public Awareness |

If implemented, these measures will ensure that the transport sector contributes efficiently to economic growth and direct and indirect employment generation, that traffic safety improves, that there is improvement in the quality of service for NMT and public transport, and that the City of Windhoek is liveable enhancing the quality of life of all its people.

2.1 Changes in Traffic Volumes

Due to in-migration and per capita economic growth in the project area, the total passenger kilometers will increase by more than 130% in the planning horizon. This increase would be higher without implementing transport avoiding measures through polycentric and dense settlement structures e.g., in Brakwater where places of employment and residential areas will be located close to each other therefore reducing trip length in such a manner that many home-to-work place trips can be done using NMT.

2.2 Travel Time

Given that present trends are on-going and no major investments in road infrastructure takes place under BAU2032, overall travel time increases significantly as roads in Windhoek will be more and more congested. While in 2012 people spend less than 10 minutes in their car on average, in BAU2032 they will need six times more time (60 minutes) per trip. Since buses are caught up in traffic as well, travel time for bus passengers increases by more than one hour in 2032. The trip duration in cycling can be explained by the fact that nowadays only enthusiasts cycle, while in ST2032 cycling will be made safe and attractive. Consequently, people use their bikes for normal distances.
2.3 Impact on Accessibility

ST2032 has very positive effects on travel time and thus accessibility. Most measures reduce travel time considerably, not only for the improved Public Transport but as well for cars. The strongest impacts may be expected in the northern corridor where major congestion occurs in Business as Usual Scenario (BAU2032). Without improvements, people would have to walk long distances, while in the Sustainable Transport Scenario (ST2032) they take the bus to work. Old Windhoek (the existing city boundaries before expansion to the northern corridor) and the Southern Corridor benefit as well from major travel time improvements. Only the road reclassification has minor negative impacts on travel times, since the maximum allowable speed is reduced in some areas e.g. around schools and residential areas. However, the slight travel time increase is more than compensated by the other measures in a manner that the overall accessibility is improving immensely. This shows clearly, that measures to improve Public Transport accelerate overall speeds in Windhoek’s entire transport system.

<table>
<thead>
<tr>
<th>Improvement of travel time per trip (min/trip)</th>
<th>Impacts of ST2032 on Accessibility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cars</td>
</tr>
<tr>
<td>PT Windhoek</td>
<td>-15</td>
</tr>
<tr>
<td>PT Northern Corridor</td>
<td>-296</td>
</tr>
<tr>
<td>PT Southern Corridor</td>
<td>-23</td>
</tr>
<tr>
<td>PT Eastern Corridor</td>
<td>-10</td>
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<tr>
<td>NMT Network</td>
<td>0</td>
</tr>
<tr>
<td>Road Reclassification</td>
<td>8</td>
</tr>
<tr>
<td>Whole Scenario</td>
<td>-32</td>
</tr>
</tbody>
</table>

Figure 6 Impacts of ST2032 on Accessibility
2.4 Impact on Economic Growth
Vision 2030 is anchored on the promise of economic growth and transport is an important enabling factor. The systems dynamics model, used in the project design and calculations, shows that mainly due to major congestion in the BAU2032 Scenario, economic development will be hampered considerably. As a result, loss of production potential in the Khomas Region is estimated to be in the order of NAD 3 bn or of 5-6% of the region’s economic growth. The reduction of employment is estimated about 12,000 work places in the Khomas region, i.e. predominantly for the urban area of Windhoek or in a range of 6-8%. However, the measures developed in ST2032 will overcome these constraints and thus be a precondition of strong economic growth.

2.5 Effects on Recurrent Costs and Revenue
When recurrent costs and revenues are compared over the 20 year period, the highest cost coverage is achieved on the commuter rail in the northern corridor, followed by Bus Rapid Transit (BRT) in the current developed areas of Windhoek (referred to as Old Windhoek). For both variants revenues exceed costs. However, cost coverage for the alternative variants is not achieved. This leads to the conclusion the variants BRT and Buses providing High Level of Service (BHLS) in Windhoek and the Commuter Rail + BHLS in the Northern Corridor are the most favourable options regarding investment costs and coverage of operational expenditure.

The overall picture is positive: the planned measures have a positive impact on economic growth, public infrastructure, poverty, health and environment.
The overall assessment for public infrastructure reveals that costs may be easily recovered through alleviation of traffic jams, reduction of vehicle operating and external costs. These effects dominate in the whole project area, but the Northern and Southern Corridors have higher cost efficiencies. The construction of the NMT network has positive impacts on modal split, while the reclassification of the road network has major impacts through improved quality of urban life.

2.6 Impact on Transport Cost for Low Income Households

Investments in transport infrastructures are expected to induce modal shift towards more efficient and environmentally friendly transport means. These shifts are the result of transport avoiding urban planning measures that generate shorter trips that are undertaken mainly by walking, as well as through the investments in Public Transport that reduces the relative growth of car trips compared to growth in other modes of transport. The improved public transport services entail that people are no longer forced to walk long distances. Since they use the bus instead, the number of walking trips decreases. The infrastructure investments and accompanying measures for bicycle improvement increase modal share to 10%.

Perhaps the most important impact for the low income households will be determined by the modal share for the motorised traffic. While in BAU 2032 expensive car and taxi trips make up more than 90% of all motorised trips, in ST2032 this share decreases to 45%. Transport expenditure of low-income households will be reduced by 17%. This poses an enormous relief to low income household budgets of annually by more than 2000 $N; money which is available for education, food, medicine and other important items.
One of the main goals of the SUTMP is to give low income households good access to public transport services. In BAU2032 only 65% of lower income households reach the next bus stop within less than 15 min walking. In ST2032, minibuses will be introduced that serve as well low density areas and thus 95% of the population will have access to the next bus stop within 15 minutes.

Implementing measures under the ST2032 Scenario will improve speeds of low income households massively: by using Public Transport they will save more than one hour per trip and travel with the same speed as an average household. Impacts are expected to be highest in the Northern Corridor.

In ST2032, minibuses will be introduced that serve as well low density areas and thus 95% of the population will have access to the next bus stop within 15 min walk.
2.8 Health and Environment Impacts

Traffic related health and environmental impacts are mainly stemming from road accidents, fuel consumption and thus air pollution and climate change impacts. Calculations revealed an extremely beneficial outcome for the ST2032 recommendations.

The ST2032 Scenario will implement a number of measures that decreases traffic accidents by nearly a quarter as depicted. This means in 2032 there will be 122 lives saved, 520 less severe and 930 slight injuries. The strongest impacts may be expected in Old Windhoek and the northern development corridor, where the largest share of traffic occurs.

Road accident rates in Windhoek are the cause of major pain and grief amongst Windhoek’s population. With the increasing transport volumes the number of road fatalities will increase as well and reach in the order of 500 in BAU2032.
Air pollution and climate change are other environmental effects that are considerably reduced by the decreased car traffic in ST2032 compared to the BAU Scenario. Total external costs amount to NAD 3.1 billion in BAU2032. The largest share is caused by accidents, followed by climate change effects and air pollution. The measures assumed in ST2032 will reduce external costs by NAD 780 million annually. Most effects are generated in the highly populated areas of Khomas, i.e. Windhoek and the new residential area in Brakwater. Road reclassification has very positive impacts through reduced traffic accidents. Not measurable are the positive impacts on attractiveness and liveability in the residential streets.

![Figure 10 External Costs by Scenario](image)

### 3. The New Public Transport System

The Public Transport system should be organised and adopted to a polycentric development in the Windhoek agglomeration. The core of this strategy is the implementation of the real modern state of the art and highly integrated Public Transport System. This means:

- Building a high-level bus service as part of the new public transport system with a central bus station (CBS), complemented by a Bus Rapid Transit and at a later stage by a commuter rail transit (LRT) system using existing rail infrastructure / right of way;
- Development of a graduated network with mainly fixed lines;
- Integrated feeder services through minibuses and taxis;
- Operation during the whole day, 7 days a week;
- Serving all types of areas, including low-, middle-, and high-income areas of Old Windhoek and New Windhoek, as well as locations in the vicinity of Windhoek, such as Finkenstein, Hosea Kutako International Airport, Groot Aub, Omea, Aris and Kappsfarm;
- Service with selected types of rolling stock adopted to the individual needs. The market offers a wide range of diesel rail cars for commuter services. Most diesel multiple units (DMUs) such as the ones shown below come from Europe, Asia, and Northern America. The capacity of an approx. 40 m unit for example is about 120 seats and 120 standees (variable, according to needs of customers, width between 2,5 and 3 m);
- Efficient interchanges;
- Priority installations for public transport at junctions;
- Integrated tariff and ticketing system that can be used for BRT, BHLS, commuter railway, minibuses and all other potential transport modes in Windhoek; and
- Adequate passenger information systems.
A stepwise development of the integrated PT system is recommended with regard to:

- Steadily increasing demand patterns are addressed by the gradual extension of the system which starts on relations with highest demand;
- Following optimised cost, revenue and subsequent cost coverage calculations for determining the optimum graduated PT system;
- Giving rise to the implementation capacity in terms of financing, planning, tendering and construction as well as due to hazards for the existing traffic during construction phases.

Consequently, the implementation process is divided into four phases. Since most PT demand is generated in the northern neighborhoods of Windhoek, such as Katutura, Wanaheda and Goreangab, the first two lines (Line 1 and 2) are proposed from a Central Bus Station (CBS) to be established in the CBD to the northern neighbourhoods. These should be developed during Phase 1 (2013-2017). As seen in the pictures below, there is adequate space for the proposed public transport infrastructure investments for both lines, i.e. along the Independence Avenue and along Monte Cristo Road.

After the first phase illustrated in the map above, both BRT lines ought to be extended southwards and two further lines are proposed to be built during the second phase (2017-2022) as shown in the next page together with phase 3 and the final phase 4. Line 3 and 4 and all other lines will have lower demand than Line 1 and 2. Thus, the requirements for those lines are a little lighter and will be built as Bus Service offering High Quality Service (BHLS).
Figure 12 New PT System Phase 2 & 3

Figure 13 Proposed Public Transport Network
Phase 3 (2022-2027) will involve extending/constructing BRT and BHLS lines on trunk roads serving most of the Windhoek city region. For example, Line 3 makes amongst others Khomasdal and Rocky Crest accessible. Line 4 connects the Avis District with the CBD and goes farther in the northern direction. Line 5 BHLS will provide access southwards (i.e., Kleine Kuppe) where a new mall is being developed and is expected to bring a significant travel demand in the area.

In the final phase, Phase 4 (2027-2032) the graduated PT network with BRT (Line 1 and 2), BHLS (Lines 3 - 7), and Commuter Railway Line connecting the new development area of Brakwater ought to be completed and operational.

Of course, those phases need to be accompanied by establishing and adapting adequate concessioning, marketing, passenger information and ticketing systems, and, by integrating and rezoning existing PT services with buses, minibuses and taxis around the integrated PT backbone system.

For the connection to the new development area of Brakwater, a commuter railway is proposed as a backbone system starting operation from the year 2032 onwards. Considering that the already existing railway right-of-way passes the CBD, the planned new Central Bus Station, the new development area of Brakwater (250,000 inhabitants estimated for 2032) and the two industrial zones of Windhoek (with many workplaces), it is obviously advantageous to use this railway corridor also for public transportation within the Windhoek agglomeration (Windhoek and Northern Corridor).

Positive factors about the commuter railway line:
• the existing right of way (ROW) allows a cost efficient extension of rail services for commuters,
• small inclines on the stretch,
• connection from industrial zones to CBD, central bus station, other bus lines to the new development area of Brakwater and vice versa,
• high capacities;
• high riding comfort,
• higher average speeds;
• several interchanges via crossing bus lines.

The corresponding proposed rail based public transport network is shown on the next page.

The blue line is part of the SUTMP time horizon. The grey one is an option outside the SUTMP. In the course of the regular updating of the master plan the option to run certain commuter rails also beyond the City borders to the cities of Okahandja and Rehoboth are to be kept in mind.
Figure 14 Proposed Commuter Railway Network to be operational in 2032
3.1 Present Bus Service

The City of Windhoek operates the public passenger bus service. The service runs from Monday to Friday in the mornings and afternoons. In the morning, all buses depart from most areas of the north-western residential suburb of Katutura, including Goreangab and parts of Otjomuise to various employment locations in the east, the south and in the city centre, in the afternoon it is vice versa. In 2012, the Municipal Bus Division recently introduced the student after hour bus line primarily for non-resident students of the International University of Management, Polytechnic of Namibia and University of Namibia. However, the Municipal Bus Service still faces a number of challenges, chief among them being that the service is only available during certain times of the day and therefore not readily accessible to the commuting public throughout the day as in most other cities. Furthermore, there are no interchanges and the present bus fleet cannot satisfy at all peak hour demands. The operations and maintenance of the bus fleet are also a challenge due to the poor conditions of the buses most of which are old and unreliable.

3.1.1 Infrastructure

Windhoek has an extensive road network. Several arteries with four or six lanes deliver fast access to most suburbs where the bus service operates. There are a total of 160 bus stops along the entire bus route network. Out of this number, 8% have "shelter in both directions", 47.2% have "shelter in one direction" and 44.8% have "no shelter". Results of a survey done by the Polytechnic of Namibia
students attached to the SUTMP project shows none of the bus stops has either timetable or fare information, and 85% do not have a bus stop sign. In terms of the condition of the existing shelters, the majority of the shelters is either in "good" or "very good" condition.

![Shelter conditions at bus stops in Windhoek](image)

**Figure 16** Shelter conditions at bus stops in Windhoek

3.1.2 Fleet size and capacity

Currently, the service has a fleet of 79 buses, although only 55 are operational at any given time, due to the poor conditions of the buses most of which are old and unreliable. On average, this is equivalent to 10.7 seats per 1,000 population (or 7.3 seats for operational buses) assuming an average seating capacity of 45 per bus. This indices of the capacity of the City of Windhoek buses compares favourably in the continent where the average capacity in most cities as a share of the population is 6 seats per 1,000. However, the present bus fleet cannot satisfy the peak hour demands. The operations and maintenance of the bus fleet are an additional challenge. Yet, Windhoek is the capital city with characteristic high transport demand during peak hours. The expected distribution of passengers over a 18 hour period along Independence Corridor, for example shows that 75% of the demand is generated during the morning and afternoon peak times, which coincides with the opening and closing of business cycles in the city. The new public transport system will take this into account.

![Passenger distribution](image)

**Figure 17** Expected distribution of passengers [%] over time along Independence Corridor
3.1.3 Fares

City of Windhoek bus fare is NAD 5 (approx. USD 0.5) per trip for the Smart card which is available at 3 sales points in the Municipality in Independence Avenue, Katutura Customer care and Wanaheda. If the commuter pays in cash the fare is a fixed NAD 6 (approx. USD 0.6) no matter where the destination is. Although this information is currently not publicised at bus stops as is the tradition in most other countries, it will soon be made available on the SUTMP Website via this link: http://www.movewindhoek.com.na. Compared to average bus fares in other cities in Africa of USD 0.31 per trip, passengers in Windhoek pay approx. USD 0.3 more per trip.

![Figure 18 Average bus fares in USD per trip](image)

3.1.4 Service delivery

a) **Access:** The general impression is that access to bus service is low in Windhoek. While the geographical coverage of the city bus service can be said to be good in the sense that the service is available in areas of highest population densities in the north-west, access remains low by regional and global standards primarily because of limited offer of service to morning and evening, lack of interchanges and unpredictable travel times. These issues and others are addressed in the new public transport system.

b) **Affordability:** Although affordability varies with the level of household income, the low income households tend to spend a disproportional amount of their income of up to 24% on transport. Currently, and likely so in the future, the poor under a BAU scenario will spend relatively more on minibus/taxi. This would change under a ST2032 path in favour of the bus, a more affordable PT mode. Similarly, predictability concerning routes, schedules and fares contributes to the affordability of the city bus service as fares are unlikely to increase with demand nor do the routes change as is common with taxis. Such predictability will be a hallmark of the new public transport system.

c) **Quality of service:** User perception is key to understanding the quality of public transport systems. Users combine - conscious and unconscious - the following factors in their perception: route network, intervals, reliability, travel time, fleet, stops, stations, terminals, information, communication, customer service, travel experiences and interaction between passengers. Some of the public comments made recently regarding the City of Windhoek bus service have been either to compliment, disapprove something, or make suggestions like in the figure given below.
3.1.5 Regulation

The proposed PT system for Windhoek should be a whole day service with a short frequency during peak hours. This should be accompanied by several other elements secured from vandalism and malicious actions:

- stops and stations with regular service and maintenance
- stops and stations with state of the art service equipment, such as: sun-/rain-protection shelters (vandalism resistant); seats; wastepaper baskets; lightning; timetables; information about travel conditions; and dynamic passenger information systems (at important stations and interchanges)
- if applicable: fencing or other physical separation from the surrounding
- segregation of right of way (ROW), minimum in cases of high PT demand and high volume of individual transit in the concerned corridor
- Integrated Ticketing System
- Intermodal Transport Control System (ITCS), this includes: Automatic Vehicle Location System (AVLS); communication from Central Control Centre (CCC) to drivers, passengers inside vehicles, passengers at stations; and provision of data for the dynamic passenger information system.

These improvements will bring more safety, security, reliability and other amenities to passengers.

3.2 Present Taxi Service

Taxis dominate the market for urban public transport services in Windhoek and the surrounding region. Being the predominant mode of public transport, taxis account for 35-45% of all trips made in Windhoek. Being the most visible form of public transport in Windhoek, it is generally acknowledged by senior officials of Government and key advisors that the taxi industry will have a major influence on the SUTMP as taxi owners and operators are a key stakeholder with vested interest in the public transport subsector.
3.2.1 Infrastructure

There is a concentration of taxi ranks in the city centre as well as in the middle to low income areas of Khomasdal, Rocky Crest, Hochlandpark, Dorado Park, Hakahana, Wanaheda, Goreangab, Katutura and Otjomuise due to the high need for transport services and relatively low volumes of car ownership in those areas. Until recently, there were only a few or no taxi ranks at all designated in the upper and high income areas (such as Eros Park, Olympia, Pioneerspark, Klein Windhoek, Academia, Prosperita, Cimbebasia, Auasblick) due to the relatively high car ownership in these areas. However, the Public Transport Division of the City of Windhoek continues to designate and provide additional taxi ranks based on application received from stakeholders.

3.2.2 Fleet size and capacity

The size of Windhoek’s registered fleet is about 6,815 registered taxis, equivalent to 190 taxis for every 10,000 inhabitants. The fleet tend to be mostly Sedans, the most popular models are Japanese, imported second-hand through Botswana. The maximum capacity for these vehicles is four passengers, but most of the time they operate with less than full load except during the morning and evening peak hours. This has implications in terms of high fuel consumption per passenger kilometre (pkm) and thus high pollution, high vehicle operation costs per pkm, higher space consumption per transported passenger and last but not least higher accident costs. Overall, this increases the cost of travel for mostly low-income earners compared to an integrated public transport system delivering higher capacities on main transit corridors as recommended in the Master Plan.

3.2.3 Fares

The fares for taxis range from NAD 9 per trip if there is a taxi rank at destination, to double the fare (NAD 18) if there is no designated taxi rank at drop-off point. While taxi fares in Namibia are regulated, they still are far higher than the average for most African cities. While the Windhoek taxi fares translate to 1 United States Dollar at current exchange rate, the average minibus fare per trip in nine African cities samples is USD 0.26, which is nearly a ¼ of a single trip taxi fare in Windhoek. Even taking into account differences in standard of living between these cities and Windhoek, it still would not fully explain such a discrepancy.
3.2.4 Service delivery

a) **Access:** taxis are ubiquitous in Windhoek and given that they operate as shared taxi, they are reasonably accessible. The evidence seems to suggest that most taxi users are within easy geographic reach of a taxi rank. In addition, if the seating capacity relative to demand is considered, there are approximately 76 seats available per thousand residents. The average for most African cities is 31 per 1,000 inhabitants.

b) **Affordability:** With 52% of the low income earners hardly able to afford public transportation as it will require more than half of their monthly income (NAD 0-1,500), it is clear that non-motorised modes of transport are the most "affordable" to the largest segment of the population.

c) **Quality of service:** A glance at Letters to the Editor of most dailies as well as comments sent through to the SUTMP Facebook page (http://www.facebook.com/movewindhoek) reveals a general sense of user dissatisfaction with the predictability, level and quality of service provided by taxis. As one recent article summed it: "We expect a basic level of respect between the taxi driver and passenger when we take a taxi. We also should have somewhere to complain when we receive poor service from taxi drivers. There should be a governing board that holds drivers accountable and suspends or disciplines those who cannot comply."

3.2.5 Regulation

The Windhoek taxi industry is currently regulated by the Ministry of Works and Transport and the City of Windhoek. Representing the taxi industry are the Namibian Bus and Taxi Association (NABTA), the Namibia Transport and Taxi Drivers Union (NNTU), and one that was most recently launched in 2012, the Namibia Public Passenger Transport Association (NPPTA). In view of the importance of taxis in the public transport sector, meetings were held with all key stakeholders (i.e., CoW, MWT and the taxi industry operators/officials) to discuss the Master Plan’s strategic objective of integrating taxis in the new public transport system. As a result of these discussions and negotiations, the following recommendations are proposed:

**Medium Term Options for addressing the interest of the taxi owners might be:**
- Incentive Schemes, e.g. special credit schemes to replace taxi cars with bigger vehicles (minibuses and buses) and deliver services within the integrated PT system, e.g. as feeder services
- Tendering feeder lines/zones for the exclusive servicing by a specific taxi owner or a group of taxi owners
- Selling shares of newly established PT service companies to the taxi industry
- Enabling participation in bus leasing schemes for intercity and innercity operations

**Medium Term Options for addressing the interest of a part of the taxi drivers might be:**
- Offer prioritised employment opportunities in the integrated PT system.
- Incentive schemes for becoming owner drivers and transforming their business in door-to-door services or integrated in the overall PT system.

**Medium-to-long term options in the overall interest of the society:**
- Revision of the admission standards, i.e. professionalising the industry and combining the renewal of licenses with specific training measures.
- Introduction of taximeters for the door-to-door services increases transparency of taxi for the users and allows a clear distinction between PT services on fixed routes and taxi services.
- Inclusion of Taxis which are officially integrated into the overall public transport scheme in the fare integration, ticketing and revenue distribution schemes.
3.3 Present and Future Intercity Transport

3.3.1 Current Intercity Transport Demand

Relatively high volumes are currently experienced for all types of vehicles travelling to and from Rehoboth, Okahandja and Hosea Kutako. Ten percent of persons interviewed were through traffic i.e. not starting or ending their trip in Windhoek.

<table>
<thead>
<tr>
<th>Link</th>
<th>Light Vehicle</th>
<th>Taxi</th>
<th>Minibus taxi</th>
<th>Heavy vehicle</th>
<th>Bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Okahandja to Windhoek</td>
<td>1,709</td>
<td>0</td>
<td>156</td>
<td>333</td>
<td>43</td>
</tr>
<tr>
<td>Windhoek to Okahandja</td>
<td>1,647</td>
<td>1</td>
<td>187</td>
<td>312</td>
<td>62</td>
</tr>
<tr>
<td>Hosea Kutako to Windhoek</td>
<td>1,562</td>
<td>1</td>
<td>156</td>
<td>185</td>
<td>36</td>
</tr>
<tr>
<td>Windhoek to Hosea Kutako</td>
<td>1,677</td>
<td>5</td>
<td>175</td>
<td>210</td>
<td>34</td>
</tr>
<tr>
<td>Rehoboth to Windhoek</td>
<td>1,328</td>
<td>0</td>
<td>117</td>
<td>236</td>
<td>24</td>
</tr>
<tr>
<td>Windhoek to Rehoboth</td>
<td>1,333</td>
<td>5</td>
<td>133</td>
<td>208</td>
<td>19</td>
</tr>
</tbody>
</table>

Figure 20 Results of Origin-Destination Survey (Vehicle Volumes per day) by Mode

<table>
<thead>
<tr>
<th></th>
<th>Okahandja to Windhoek</th>
<th>Rehoboth to Windhoek</th>
<th>Hosea Kutako International Airport to Windhoek</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily public transport passengers</td>
<td>1,400</td>
<td>900</td>
<td>-</td>
</tr>
<tr>
<td>Morning hour peak traffic</td>
<td>10%</td>
<td>25%</td>
<td>14%</td>
</tr>
<tr>
<td>Main trip purpose</td>
<td>&quot;To work&quot; 34%</td>
<td>71%</td>
<td>&quot;From Airport&quot; 67%</td>
</tr>
<tr>
<td></td>
<td>&quot;Other&quot; 66%</td>
<td>29%</td>
<td></td>
</tr>
</tbody>
</table>

Figure 21 Traffic counts and Origin-Destination survey results
3.3.2 Future Intercity Transport Demand

Future transportation demand is based on a number of factors, including population growth, economic growth and quality of intercity public transport.

- Okahandja is expected to grow from 22,500 inhabitants to 31,000 inhabitants by 2032.
- Rehoboth is expected to grow from 28,800 inhabitants to 40,000 inhabitants by 2032.
- Almost 2,000 and 1,500 jobs are expected to be created in Okahandja and Rehoboth respectively by 2032.

3.3.3 Integration of Intercity and Intracity Transport

The intercity public transportation should be integrated with the intracity PT interchange stations. First, there needs to be a dedicated part for intercity buses within the envisaged central bus station in the CBD. In the long run the same applies for integration with the commuter train stations. Two to three further interchange stations depending on the direction intercity passengers intend to travel (northbound, eastbound or southbound), ought to be considered for convenience of all travellers. Altogether the linkage of intercity and intracity services allow easy transfer of those passengers and especially Rehoboth and Okahandja commuters, tourists and air travellers will also have a considerable advantage in terms of convenience and travel times. As both systems become more advanced, time schedule integration between inter- and intra-city traffic is feasible in the medium- to long-term.
3.4 Railway Service

3.4.1 Infrastructure

The existing railway line passes through the two main industrial areas in Windhoek, one in the North (Northern Industrial, Lafrenz), another one in the South (Southern Industrial), where most of the manufacturers and companies are located and therefore major employment zones. The railway also goes through the CBD where offices, businesses, and other types of institutions and areas of public administration are concentrated.

With the railway connecting the planned new Central Bus Station (CBS), the new development area of Brakwater, as well as Northern and Southern Industrial areas, the recommendation is to use the railway corridor for PT within the Windhoek agglomeration (Windhoek and Northern Corridor). As part of a graduated holistic PT network, a commuter railway is proposed as a backbone system to be established by the year 2032 to connect “Old Windhoek” to the new development area of Brakwater with a potential of 250,000 inhabitants.

In the proposed PT network, the CBS is the central point, where all bus lines and the railway line come together, allowing passengers to interchange between bus lines and other transit modes. It is proposed to build the CBS at the space next to the Wernhill Shopping Mall (north side), where BRT and BHLS lines converge. Also the new planned regional minibuses and radio taxis will have an area for their services in the CBS. Generally, PT lines leave the CBS in an astral form, so that the whole city area is accessed via trunk roads. Additionally, the railway passes the CBS. The railway platforms will have direct access to the CBS. Last but not least, there should be reserved a part inside the CBS for intercity bus services.

Figure 22 Proposed Public Transport Network
The railway is the future transversal backbone system. It will run from the south of Windhoek to the north and then farther to the new development area of Brakwater. The existing railway right of way (ROW) is adequate for additional tracks. On this ROW are no strong inclines. The investment costs on that stretch are moderate. Furthermore the track layout and the station spacing would allow higher speeds as the following pictures show.

The implementation of railway infrastructure for the commuter railway is foreseen for the last implementation Phase 4 (2027-2032). While the interval during peak time is very short (5 min headway), the railway needs one track in each direction, independent from the existing railway tracks. The existing railway corridor allows in most cases the relative easy adoption of further tracks (clearing of ROW to left and/or right side of existing track). Stations with platforms on each side of the tracks are needed (for examples, pictures below).

In terms of railway depot and workshop, the necessary facilities (e.g., sidings, crane/jacks, inspection pits, walkways, and test facilities) can be kept rather small and could be located along the tracks close to the existing maintenance facilities or in the new development area Brakwater. Furthermore there is a need of a sort of managing and signaling system with a control center.

The railway control centre can be integrated into the same building. There is the possibility to integrate the control centre for the CRS into a Central Control System (CCC) of the bus system.
3.4.2 Fleet size and capacity

The capacity of an approximately 40m unit commuter service rail car, for example, is about 120 seats and 120 standees (variable, according to the needs of customers). Coupling of multiple units during peak hour service is possible as the following example of Gautrain demonstrates. In case of two coupled units for example, the capacity or the interval is double. The initial calculation for the SUTMP identifies the need for 14 rail cars.

Gautrain rail car features

The Gautrain system is designed to have 24 train sets, each consisting of four cars, which is equivalent to 96 rail cars designed to run at an operational speed of 160 kilometres per hour. Of the 96 rail cars, ten are specially customised for use on the airport link, and contain additional features such as extra luggage space and wider seats. The other 86 rail cars are designed for commuter services. While the standard train set comprises four rail cars, the configuration can be varied to ensure flexibility of service. To increase capacity after the initial period, an increasing number of train sets will be operated as eight-car train sets, comprising two four-car units coupled together. The train sets serving the airport link will be made up of either 1x4 car or 2x4 car sets, with the two front cars of the leading train set being the specially customised airport cars.
4. Walking and Cycling

The goals and objectives regarding the development of non-motorised transport are meant to address the current transport situation facing the City of Windhoek as earlier described. They have been formulated to address the city as a whole, both in terms of its dual urban form and economy.

- Create an interconnected NMT network that supports equal opportunity and celebrates sustainability
- To allow walkers and cyclists to arrive at their destinations safe from vehicle conflict and crime activity
- To increase walking and cycling modal share
- Continually improving the health and well being of the Windhoek population through physical activity
- Providing a sustainable transport system that minimises negative impacts on the natural environment

- To empower residents with walking and cycling access to education and work opportunities
- Ensuring that accessibility is provided for those with mobility challenges and those without ready access to a motor vehicle
- To confront poverty with affordable mobility

- To reduce the stigma generally associated with walking and cycling
- Make NMT an attractive travel alternative to motorised vehicles

To satisfy these objectives, three levels of NMT network are proposed:

a) The Principle NMT Network acts as the ‘core’ or primary routes within Windhoek. These routes were identified to have the greatest potential to distribute people effectively and efficiently.

b) Western Bypass Path as requested through stakeholder consultation to serve recreational and long distance riding purposes.

c) NMT Links are informal or feeder routes for the principle NMT network through river beds, residential areas or open spaces.

It is vital that these routes be formalised as they will ultimately increase overall access, safety and mobility for all in Windhoek. The proposed principle NMT network routes have been colour coded to signify implementation priority as follows:

Red Route: Major CBD route, through Independence Avenue and will potentially form part of the future pedestrianised zone.

Yellow Route: Low-income residential hub circulation route. There is no existing formal pedestrian infrastructure within these areas. It is evident that there is a great need to provide infrastructure to the population in these areas, as they generally cannot afford private vehicles and primarily make use of NMT for commuting.
**Pink Route:** “Emergency routes” which provide quick and effective accessibility to Hospitals, as well as linking the Windhoek North-West to the CBD. These two routes consist of a section of Independence Avenue and Florence Nightingale Road.

**Light Red Route:** Inner-city routes, encouraging the CBD to move towards a pedestrian and cyclist friendly environment.

**Orange Route:** North-South corridor, which will ultimately link up to all the other proposed routes.

**Brown Route:** Connects Windhoek South-East to the CBD and links through to the University.

**Green Route:** Generally the lowest priority routes with existing infrastructure present on these routes. Thus, they do not require a high level of investment at this stage to make them NMT friendly.

**Blue Route:** Western Bypass Path as requested through stakeholder consultation to serve recreational and long distance riding purposes. This route is seen as the primary recreational route that will provide adequate cycling facilities next to the highway for recreational cycling groups in Windhoek but also for commuters living west of the Bypass or heading towards Prosperita.
The methods of intervention are summarised in the red boxes below. As shown, there is a distinct approach in terms of soft measures (such as campaigning) that need to be addressed in terms of low-income areas and higher income areas. In order for the proposed NMT routes to be implemented successfully and sustainably, it is vital that both hard (e.g., infrastructure provision) and soft (e.g., raising awareness) issues are targeted simultaneously.
4.1 Pedestrian and Cycling facilities

Levels of NMT facilities to be provided are dependent on:
- Road classification (traffic volume and speed): these two factors directly correlate to the potential severity of any collisions between vehicles and NMT user. Also affects the comfort of NMT infrastructure use – the higher the volume and speed of vehicles the more space between pedestrians/cyclists is required
- NMT route classification: Path hierarchy and importance in overall NMT network for Windhoek
- Expected type / age / vulnerable NMT user

4.2 Hierarchy of pedestrian and cycling (NMT) facilities

Depending on the trip type, NMT users have differing needs. Examples of NMT path types include:
- Footpath
- Shared user path
- Off road cycle path
- Separated on road cycle lane
- On road cycle lane
- Wide kerbside traffic / transit / bus lane which can accommodate cyclists
- No formal space provision for cyclists, however route advisory signage provided

As a minimum, a pedestrian path should be provided on at least one side of the road carriageway. The types of cycling facilities to be provided are based on road speed and daily volumes.

Figure 24 Shared use paths away from roadside environment
Figure 25 Shared paths, dedicated cycle lane and pedestrian path, parallel to the road on one or both sides
Figure 26 Paths, physical separation (painted on kerbs), and on-road markings
4.3 Road classification and speed

Whether a walking and cycling facility should be segregated from vehicular traffic or not is dependent on the speed and volume of the motorised traffic. The following figure illustrates the relationship between road speed and the recommended bicycle facility.
Transferred to Windhoek condition, the following road classes could determine the facilities (please refer also to chapter 6.3.4 road safety):

- **Class I:** Speeds over 80 km/hr and over 5000 vehicles per day, e.g. Western Bypass
- **Class II:** Speeds under 80 km/hr and between 5000 and 9000 vehicles per day
- **Class III:** Speeds between 40 and 60 km/hr and below 5000 vehicles per day
- **Class IV:** Speeds lower than 40 km/hr and below 5000 vehicles per day

5. **Motorised Individual Transport**

Car ownership in Windhoek is roughly 114 cars per 1,000 inhabitants, which is relatively high by African standards. Following the pattern of household income, car ownership is largely concentrated in the southern and eastern suburbs. Unlike the trend in most African countries where motorcycle dependence is growing rapidly, here in Windhoek it is the car that still dominates motorised individual transport. However, individual car users face a disproportionate high accident risk, 97 times higher than public transport users on regulated bus and train systems and therefore a sustainable PT system would also be good for those who, for whatever reason, prefer motorised individual transport.
With 13% of the population in the master planning area either owning or being in a position to afford a car, it is imperative that the interest of such a significant minority is considered. However, experience shows that transport infrastructure investment decisions have in the past favoured motorised relative to non-motorised transport and individual over public transport. To achieve a balance, the emphasis of the SUTMP is on public and NMT, not at the expense of motorised individual travel, but for more equitable application of resources sustainably for the benefit of all.

Under the Sustainable Transport 2032 Scenario, it is forecasted that there will be a relative decrease in car usage for individual transport as a result of better public transport services. The analysis, for example, shows a decrease in car vehicle-km as a result of mode shift from cars to public transport in comparison to the BAU scenario. The spill over effect of this is annual emissions reduction under ST2032 Scenario due to the decrease in vehicle-km for cars, as well as public transport vehicles.

<table>
<thead>
<tr>
<th>Modes of Transport/Green House Gases</th>
<th>Reference Scenario (2012)</th>
<th>Business as Usual Scenario (2032)</th>
<th>Sustainable Transport Scenario (2032)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Annual Vehicle-km</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>337 000 000</td>
<td>771 000 000</td>
<td>699 000 000</td>
</tr>
<tr>
<td>Public Transport</td>
<td>148 000 000</td>
<td>338 000 000</td>
<td>410 000 000</td>
</tr>
<tr>
<td><strong>Annual Passenger-km</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>539 000 000</td>
<td>1 172 000 000</td>
<td>1 049 000 000</td>
</tr>
<tr>
<td>Public Transport</td>
<td>451 000 000</td>
<td>757 000 000</td>
<td>917 000 000</td>
</tr>
<tr>
<td>Cycling</td>
<td>9 000 000</td>
<td>18 000 000</td>
<td>225 000 000</td>
</tr>
<tr>
<td>Walking</td>
<td>260 000 000</td>
<td>1 038 000 000</td>
<td>657 000 000</td>
</tr>
<tr>
<td><strong>Annual Emissions</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CO₂ (tonnes/year)</td>
<td>200 000</td>
<td>470 000</td>
<td>320 000</td>
</tr>
<tr>
<td>NOx (kg/year)</td>
<td>140 000</td>
<td>300 000</td>
<td>180 000</td>
</tr>
<tr>
<td>CO (kg/year)</td>
<td>470 000</td>
<td>1 500 000</td>
<td>740 000</td>
</tr>
<tr>
<td>SO₂ (kg/year)</td>
<td>20 000</td>
<td>60 000</td>
<td>30 000</td>
</tr>
<tr>
<td>HO (kg/year)</td>
<td>60 000</td>
<td>190 000</td>
<td>90 000</td>
</tr>
</tbody>
</table>

Figure 30 Key Performance Indicators under Different Scenarios

In addition to measure already identified to develop PT and NMT infrastructure and service, additional ones specifically targeting car drivers, including parking management, private vehicle restriction zones, park and ride, and congestion pricing are discussed in the next section.

6. Transport Demand Management and Road Safety

6.1 Transport Demand Management

Transport Demand Management (TDM) strategies are used in this Master Plan to encourage efficient and sustainable transport. TDM will reduce the number of vehicle trips and trip time, which as noted above increase substantially under the BAU2032 Scenario. Using TDM will make it possible to reduce
private vehicle trip demand on particular routes at certain times, for example on corridors where BRT and BHLS are proposed, while at the same time make better use of existing infrastructure and offsetting expensive infrastructure upgrades intended to increase the physical capacity of highways. This last point is quite important in determining the overall impact of all sustainable transport measures to be implemented under ST2032.

6.1.1 Implementing TDM in Windhoek

Both the analysis of the existing transport situation in Windhoek as well as a critical assessment of existing transportation plans suggests that Windhoek is in the early stages of TDM (refer to next figure below). This can especially be derived for example from the City of Windhoek Arterial Implementation Plan for 2030 which incorporates ring routes and improved access to the CBD.

Based on the above assessment, TDM should focus on the following:

a) Provision of non-motorised transport infrastructure,
b) Provision of public transport infrastructure,
c) Improving quality of existing modes of transport, and
d) Planning process to adopt an integrated transport approach, instead of focusing on private vehicle usage.

Accordingly, the priority for the City of Windhoek should be to achieve parity amongst all modes of transport in order to develop TDM strategies, specifically:

- Non-motorised transport infrastructure and facilities needs to be in place in order to provide a viable and formal means of transport for those who do not have access to a private vehicle and to protect vulnerable road users.
- Implement a cohesive public transport network with non-motorised transport links as recommended.
- Traffic data, such as traffic counts, traffic micro-simulation at crucial junctions and safety statistics should be more extensively collected, managed and analysed in order to develop detailed TDM measures and strategies in the future. With better travel information, for example, together with
traffic regulation and travel demand management it is possible to move Windhoek towards sustainable mobility.

6.1.2 Recommended Measures

In the short- to medium-term (the next 5 years), the following demand side and supply side TDM measures should be implemented in Windhoek, together with improving NMT and PT:

<table>
<thead>
<tr>
<th>Demand side measures</th>
<th>Stage</th>
<th>Description and objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Land use / Zoning policies</td>
<td>Parity</td>
<td>Should enable the provision of sustainable public transport, as well as opportunities for effective non-motorised transport. Mixed land use might reduce the need for travel between different land uses and high density development ensures sufficient demand for travel required for a sustainable high service level public transport system. <strong>Reduce the number of trips and reduce the travel distances of users.</strong></td>
</tr>
<tr>
<td>Parking management</td>
<td>Push</td>
<td>Management of the need for parking by adjusting the cost of parking. Some schemes even compensate employees if they wave their allocated parking bays, or allocate parking to car pool vehicles at a lower cost. Preferential parking can also be provided to off-peak travellers. This may include implementing or increasing parking charges for CBD areas. <strong>Reduce the number of required parking bays and promote carpooling.</strong></td>
</tr>
<tr>
<td>Improved walking, cycling and public transport image</td>
<td>Promotion</td>
<td>Make walking; cycling and public transport an attractive, safe, and accessible service in order to be able to encourage a mode shift to sustainable transport. <strong>Encourage walking, cycling and the use of public transport by making it a viable transportation option.</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply side measures</th>
<th>Stage</th>
<th>Description and objective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pedestrian and cycling facilities</td>
<td>Parity</td>
<td>The provision of cycle lanes and safe pedestrian walkways to ensure that these modes of transport are accommodated safely within the road reserve to minimise the risk of accidents and injury. <strong>Protect vulnerable non-motorised road users and increase accessibility.</strong></td>
</tr>
<tr>
<td>Traffic signal settings</td>
<td>Parity</td>
<td>Can be adjusted to favour certain movements if used by public transport, or pre-emption by public transport vehicles (e.g. bus/taxi priority systems). The provision of advanced traffic signal control systems can also optimise the flow of traffic and minimise lost time, thereby maximising the capacity of a section of road. <strong>Reduce congestion and optimise the flow of traffic and minimise lost time, thereby maximising the capacity of a section of road.</strong></td>
</tr>
<tr>
<td>Dedicated Lanes for Public Transport</td>
<td>Parity</td>
<td>Dedicated lanes for public transport and / or high occupancy vehicles (HOV). Such lanes can also be tolled in which case it is referred to High Occupancy Toll Lanes (HOT). <strong>Reduce the amount of trips buy promoting carpooling and use of public transportation.</strong></td>
</tr>
</tbody>
</table>
Parking Supply Limitations | Push
--- | ---
Parking provision requirements can be reduced during the development stages of development to encourage the use of public transport. However, such strategies are only effective where alternative modes of transport are available. **Reduce usage of private vehicles and promote the usage of public transportation and non-motorised transport**

6.2 Road Safety

6.2.1 The Existing Situation

The *Transport Safety Plan for the Khomas Region Namibia* (2011) noted the following:

- Approximately 21,000 crashes were recorded between 2007 and 2009 within the Khomas region
- 52% of all crashes and the highest number of fatalities occurred at uncontrolled intersections
- Most incidents involving pedestrians occurred at pedestrian crossings
- The CBD, greater Katutura area and Khomasdal have the highest number of crashes and highest number of fatal pedestrian incidents per suburb
- Okuryangava and Hakahana have the highest number of pedestrian crashes
- The number of fatalities per suburb correlates with the suburbs where the highest number of pedestrians can be expected
- Major roads, such as Independence Avenue, Sam Nujoma Avenue, Mandume Ndemufayo Avenue or Western Bypass within Windhoek linking the north and south have a high number of incident occurrences.

Overall, the CBD displays the highest number of accidents. Whilst the level of crashes has remained relatively stable in the majority of suburbs, the CBD, Wanaheda and Windhoek West show that from 2007 to 2009 the annual crash occurrence has been increasing. The National Road Safety Council (NRSC) with GIZ support is working on improving traffic accident data collection and capturing systems so that it satisfies better future analysis needs. There are also other ongoing initiatives, for example by the Private Sector Road Safety Forum (PSRSF), Ministry of Health and Social Services, Motor Vehicle and Accident Fund, Sub-Saharan Africa Chamber of Commerce, among other stakeholders to try and address the high rate of traffic accidents in Windhoek and the rest of Namibia.

![Figure 33 Traffic Accident Trends in Windhoek](image-url)
The current reality in the study area is illustrated by the spatial distribution of fatalities as seen in the next figure showing areas and roads with the highest number of fatalities.

Fatality statistics paint a gruesome as the following summary reveals:

- 50% of all Namibian accidents occur in Khomas Region
- 50% of all accidents in Khomas Region involves pedestrians
- The suburbs with the most accidents are the CBD, the greater Katutura and Khomasdal
- The number of fatalities per suburb correlates with the suburbs where the highest number of pedestrians can be expected

6.2.2  **Road safety as an integrated component of other measures**

Road safety is not a separate element but is embedded in all the other components of the Master Plan that contribute to building a safe road transport system.
6.2.3 Relationship between fatality and speed

Pedestrian fatality risk has long been established to be a function of car impact speed. Hence the truism "speed kills". Whereas all public roads in Windhoek has a general speed limit of 60km/h (40 km/h in some residential areas), a severe lack of facilities for pedestrians and cyclists along these roads and streets makes walking and cycling very dangerous. Moreso if we consider that the probability of death rises dramatically from impact speed of over 40km/h as shown in the following graph.

Figure 34 Pedestrian fatality risk as a function of vehicle impact speed

Figure 35 Influence of impact speed on probability of death
6.2.4 Road safety measures

The current road network within the City of Windhoek has developed over time and as such has been influenced by town planning and road planning strategies at the time when the road network was developed. The development of the city is also influenced by socioeconomic and political factors. The net result is that the road network layout (in terms of no. of lanes, lane widths, NMT facilities, and intersection control) does not necessarily reflect the current land use, the ever increasing traffic and the latest research. Accordingly, it is proposed to have minimum four levels of urban road classes, namely

- Main arterial roads,
- Feeder roads,
- Residential access roads, and
- Residential living streets.

The final road hierarchy definition and plan for the greater Windhoek areas should come out of an urban road reclassification and design study. However, it can be anticipated that it will be necessary for the reclassification to be accompanied by physical interventions to ensure that traffic operations on the road network are in line with the functional classification (i.e., optimising the road network). For example, whilst it is important to have arterial routes to ensure mobility within the CBD, the primary role of roads within the CBD is access to properties, shops and serves as attractive liveable urban space.

Some of the features suited to include in the new classification of urban roads in Windhoek are:

a) Roadway designs that reduce traffic speeds (different design speeds for different road categories). Chicane, chocker and speed bumps are examples of traffic calming measures.
b) Segregated sidewalks and bicycle lanes when car traffic has high speeds.

c) Integrated walking and bicycle lanes where vehicles travel at low speeds.

d) Speed limits according to road classes.

Improving NMT will enhance the safety of pedestrians and cyclists as the ultimate NMT network aims to be interconnected and continuous, increasing both the quantity and quality of provision such that pedestrians, cyclists and car drivers can interact in a safe manner.
Also the modal shift towards a high service integrated public transportation results in reduced accident risk per trip. The road safety benefits of sustainable transport will be further reinforced by a range of accompanying measures for safer roads in Windhoek such as taxi driver professionalization programme, vehicle inspections, operator licensing as well as promotional and educational campaigns. Altogether it is expected that more than 120 lives could be saved per year on Windhoek’s roads at the end of project time horizon and more than 1400 traffic caused injuries can be avoided.

7. Institutional and Legal Framework

The White Paper on Transport Policy submitted to Parliament by the then Ministry of Works, Transport and Communication on 23 June 1995, set out the broad policy framework for the transport sector. It specifically addressed the role of transport operators in various sub-sectors (e.g., taxi operators) and the regulatory policies which should apply and guide them. However, the White Paper did not cover the planning and operation of infrastructure for transport, a key aspect of this Master Plan. Similarly, the White Paper did not cover the organisational structure of Government in the transport sector, nor the relationship with its stakeholders. This gap can be bridged through reference to statutes and other regulatory instruments in the transport sector.

The Road Traffic and Transport Act, No. 22 of 1999, *inter alia*, provides for the control of traffic on public roads. Section 91 defines the power of the Minister of Works and Transport to make The Road Traffic and Transport Regulations. Local Authorities and Regional Councils are also empowered under Section 92 to make regulations. It is clear from these provisions that all levels of government - the Central, Regional and Local Government - exercise some “control of traffic” on public roads. In the context of the Master Plan this means also control over public and non-motorised transport.

7.1 Who is responsible for what?

Various agencies, both government and non-governmental, including Ministries, Statutory Bodies, Local Authorities and Regional Councils, State-owned Enterprises, private sector and non-state actors, perform key functions like planning/policy, regulatory, implementation, monitoring or enforcement. The regional and local governments (City of Windhoek, Okahandja Municipal Council, Rehoboth Town Council and Khomas Regional Council) are involved in all of these functions, while Statutory Bodies i.e. Road Transport Board or the National Planning Commission mainly deal with Policy/Planning, regulation and Monitoring.

Representing private sectors actors, the Namibian Bus and Taxi Association (NABTA), Namibia Transport and Taxi Drivers Union (NTTU) and Namibia Public Passenger Transport Association (NPPTA) as well as the and non-state sector actors such as Bicycle Empowerment Network and the organisation Physically Active Youth are especially involved in Implementation and Monitoring tasks. The state owned enterprises TransNamib is involved in the regulation as well as the implementation.

The list is by no means exhaustive as additional institutions, for example the Ministry of Health and Social Services, Ministry of Education, Ministry of Environment and Tourism, Ministry of Finance, to mention a few, are likely to come on board at different stages both during and after the implementation. A detailed stakeholder analysis has been conducted in the Master Plan development process.

7.2 The need to align policy, legislation and action

Lack of clear and coherent public and non-motorised transport policies to guide decision making is one of the challenges facing the sector. Amongst others the following issues need to be tackled:
a) **Funding:** There is the need to foster a sound financial base for public transport to ensure sustainable and dedicated funding for new passenger transport infrastructure both at the national and local level, maintenance of the existing infrastructure, upgrading of the existing infrastructure where there are capacity constraints or unacceptable level of service (e.g., lack of sidewalks and cycle lanes along urban roads), as well as operations and law enforcement. This is in line with the principles laid out in NDP4 for public infrastructure (see figure below), and has direct consequences on, for example, recapitalisation scheme of minibuses and funding of bus operations.

![Diagram](image-url)

**Critical public transport infrastructure in place to achieve social and economic objectives under NDP4 and Vision 2030**

**Figure 36 Policy objective of public infrastructure**

b) **Spatial balance:** In line with the 4th National Development Plan (NDP4) proposed strategy to speed up the review of outdated legislation pertaining to land delivery and registration so that the procedures will allow for speedy acquisition and ownership of land for business and housing development, there is a need to align land and planning laws to produce the desired outcome of an integrated land use and transport system as described under the polycentric scenario. In particular, it is necessary to create incentives for densification. Within the context of a revised spatial structure plan for the City of Windhoek, consideration should be given to ;(i) a new zoning scheme, (ii) incentives for higher rise developments, and (iii) a preference for mixed-use development. These measures will have the effect of reducing trip length, time, and costs while increasing speed due to lower traffic volumes as shown in the figure below. Additionally, use could be made of TDM (transport demand management) measures such as tele-commuting, -conferencing or –education, which uses telecommunication infrastructure (e.g. The World Wide Web) to ensure that work, shopping and education is done at the place of residence or in some cases as the place of employment to prevent travel to a different location to participate in one of these activities.

c) **Promote use of public transport over private travel** with the goal of achieving a ratio favourable to public transport, e.g., 80:20 between public transport and private car usage by 2032, or doubling public transport’s share by 2025 in line with the International Association of Public Transport Istanbul Bus Declaration.

d) **Bus stops service areas:** Bus stops should have a maximum service area (or catchment area) of 500 meters, which is an acceptable distance to walk or cycle also for pre-primary school children.
Under the envisaged polycentric development scenario, Brakwater, Elisenheim and other smaller centres such as Finkenstein, Groot Aub, Omea, Aris, and Kappsfarm will be development knots along transport corridors (i.e., mixed-use residential, commercial and business area designed to maximize access to public transport, often including measures to encourage transit ridership with higher densities around public transport stations).

![Present Structure vs Concept of Future Development](image)

**Figure 37 Transforming Windhoek Using Transit Oriented Development**

e) **Universal access**: ensure universal access principles are applied in PT to address user needs, including those of commuters, pensioners, the aged, mothers with children, learners, tourists and the physically challenged.

f) **Public transport service obligations**: Reduce usage of private vehicles and promote the usage of public transportation. Targeted subsidies could be considered e.g. for companies or developments which actively support public transport usage or for special user groups such as scholars. Public transport should be affordable; households should spend no more than 10% of their disposable income on public transport.

g) **Work schedules**: Institute flexitime and alternative working times, which will allow for off-peak travel. Compressed working hours allow employees to work the required number of hours in fewer days, thereby reducing the demand for travel.

h) **Operational**: (i) Empower and assist disadvantaged operators (e.g., those currently employed as taxi drivers) to participate meaningfully in the new public transport system; (ii) Ensure that where public transport can be rendered as profitable commercial services, competitive conditions are set to ensure that public transport operations become economically viable and sustainable, requiring the minimum financial support; (iii) Foster a stable investment environment in the public transport industry; (iv) Encourage a professional approach to the management and operation of public passenger transport; (v) Foster manpower and human resources development; (vi) Ensure that transport modes are integrated in respect of scheduling, routes and ticketing systems; (vii) Promote acceptable and fair labour practices in the transport industry; and (viii) Ensure that public transport operations are more environmentally sensitive and sustainable, and are energy efficient through, for example the deployment of bus technologies with higher environmental performance –i.e., CO reduction of 60-80%, NOx of 50-80% and non-methane organic gas up to 87%.

i) **Planning and regulatory framework**: (i) Provide appropriate institutional structures, which facilitate the effective and efficient planning, implementation, funding, regulation and law enforcement of the public transport system, devolved to the lowest competent level; (ii) Provide
for the registration of all public transport operators as formalised commercial entities, bound by the regulations pertaining to their permission to operate; (iii) Replace operator permits with permissions (authorities) issued in terms of approved passenger transport plans; and (iv) Promote and implement a system of regulated competition for tendered public transport routes or networks.

A means to set this SUT enabling policy and institutional framework might be a revised and up-dated White Paper on Transport Policy approved by the Cabinet and Parliament. It should then form the basis for amending pertinent laws relating to the administration of land use (e.g., Article 129 of the Constitution, Local Government Act, and Regional Councils Act), as well as transport sector legislation (e.g., Road Traffic and Transport Act 22 of 1999, Road Traffic Ordinance 30, Road Authority Act 17 of 1999, among others). See recommendations for reviewing some of the legal frameworks in the figure below.

The new legal frameworks must set the parameters to guide land use planning and spatial development decisions supportive of accessible, safe, affordable and reliable public and non-motorised transport systems in Windhoek and eventually in all other regions of Namibia. The new legislative and regulatory frameworks must also identify the legal, institutional and fiscal means to achieve policy goals and objectives. Equally, they must unequivocally clarify the roles and responsibilities of different levels of government, institutions and structures.

7.3 Moving from policy to action

Those institutions that are mandated by law to perform statutory functions like strategic planning, financial planning, resource allocation, transport corridor planning and implementation, and land use planning must gear up to execute, monitor and evaluate, and report on progress in their mandated areas. Some of the areas of priority attention include:

(a) Land use planning

• Revise existing planning laws and guidelines in the Town Planning Ordinance of 1954 and the Townships and Division of Lands Ordinance 11 of 1963 and the Local Authorities Act 23 of 1992 as amended with a view to ensure that PT and NMT considerations are better reflected in land use planning.

(b) Public transport

• Make legal provision (e.g., in the National Transport Services Holding Company Act, No. 28 of 1998, Road Traffic and Transport Act No. 22 of 1999, Local Authorities Act, No. 23 of 1992, State-owned Enterprises Governance Act No. 2 of 2006 – all as amended, and any other relevant laws, for the establishment of a Transport Agency (at national and or city level) that is/are sufficiently autonomous and independent to sustain the implementation of a modern state of the art public transport for the City of Windhoek.

(c) Non-motorised transport

• Provide adequate mechanisms for implementing all NMT proposals in an equitable and transparent manner consistent with the goals of increasing the modal share of NMT and reducing the number of cyclists and pedestrians killed or injured in traffic crashes. Some of the legal levers include (but not limited to) the Road Traffic and Transport Act of 1999 as amended, National Road Safety Act No. 9 of 1972 as amended, Roads Authority Act 17 of 1999 as amended, etc.

(d) Traffic management

• Codify and apply Transport Demand Management principles within, for example, the Roads Authority Act as amended, Road Traffic and Transport Act as amended, the Local Government Act as amended, etc., as well as in statutory agencies such as the City of Windhoek Traffic Management Division, Public Transport Division, and the City Policy.

(e) Financing

• Alignment between all relevant financing and legal instruments and procedures (e.g., State Finance Act No. 31 of 1991 as amended, Anti-Corruption Act No. 8 of 2003, Competition Act No. 2 of 2003, etc.) and the SUT proposals.
Institutional capacity to carry out assigned mandates

Capacities within existing entities cannot sustain a major shift towards more sustainable transport. It is also to be noted that the low implementation capacity observed during the master planning process can only be addressed in the medium and long term via a comprehensive capacity strengthening effort. The following six areas of competencies should be addressed as a matter of priority:

a) Sustainable urban transport master planning and up-dating of the Master Plan;
b) Public transport regulation;
c) Public transport planning, management, operation and maintenance;
d) NMT and transport management, planning, design and implementation;
e) Traffic law enforcement; and
f) Project Management and Coordination.

On the basis of a training-needs-analysis, an intensive skills enhancement programme ought to be conducted in the short run, i.e. within the next five years. It is recommended to have a mixture of components such as on-the-job training, internships, seminars and study tours for existing and additional staff. In addition, the programme should include longer-term train-the-trainer programme based on existing and newly established transport training institutes and curricula.

Implementing the SUTMP will require four more important accompanying measures:

a) There is a strong need for on-going stakeholder engagement in the phase of detailed SUTMP planning because SUTMP implementation will reshape the face of the City of Windhoek and will considerably affect the daily life of its inhabitants. The normal schedule of yearly CoW public hearings appears to be adequate for addressing future up-coming concerns and ideas of the public.

b) There is a need to rationalise urban and public transport policy, regulatory and operational functions at the Ministry of Works and Transport, at City of Windhoek and at the authority and enforcement level. For example, public transport falls under three directorates within the MWT. The picture is not much different across the CoW where the urban and public transport mandate falls under the Public Transport Division and the Urban Planning Division. However, the latest organisational reform started the process by combining land use and traffic planning functions under one roof. Besides existing tasks, there will be a number of new tasks such as administering public service obligations, which will require additional institutional set-ups.

c) It is important to note that governance and organising public transport will remain a challenge without there being in place a comprehensive enabling legislation on public transport that specifies the allocation of national and local powers, functions, tasks and resources to various entities.
d) A combined effort is required for tackling the multitude of legal, institutional and subsequent staff and funding issues necessary for a real shift towards more sustainable traffic systems in the country. Build on similar experiences in other sectors, a special commission for sustainable transport (SCST) ought to be founded.

Figure 38 Public Transport Sector Functions
8. Financial Planning

8.1 Capital Cost

Overall SUTMP investment costs within the next 20 years including investment costs for the implementation of a regular service to Okahandja, Rehoboth and the Hosea Kutako International Airport are given in the following tables separate for PT and for NMT.

The investment cost for the Central Bus Station (CBS) with approximately 14 bus bulbs for BRT and BHLS buses and approx. six bulbs for intercity services plus some bulbs in reserve and space for minibuses and taxis is roughly estimated at approximately NAD 50,000,000. This price can vary extremely according to the development state and the prestigious design of the station. Furthermore, experience shows that it is possible to cover the whole CBS costs e.g. via combining it with the development of a business centre or other facilities on top of the CBS. Therefore it was not included in the evaluated system cost but in accompanying measures.

Cumulative Investments in Scenario ST2032

<table>
<thead>
<tr>
<th>Unit</th>
<th>Infrastructure</th>
<th>Rolling Stock</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windhoek</td>
<td>1,484,125,000</td>
<td>369,600,000</td>
<td>1853,725,000</td>
</tr>
<tr>
<td>Northern Corridor</td>
<td>1,475,275,000</td>
<td>685,400,000</td>
<td>2,160,675,000</td>
</tr>
<tr>
<td>Southern Corridor</td>
<td>1,600,000</td>
<td>14,000,000</td>
<td>15,600,000</td>
</tr>
<tr>
<td>Eastern Corridor</td>
<td>1,300,000</td>
<td>7,000,000</td>
<td>8,300,000</td>
</tr>
<tr>
<td>Whole Scenario</td>
<td>2,962,300,000</td>
<td>1,076,000,000</td>
<td>4,038,300,000</td>
</tr>
</tbody>
</table>

Figure 39 Total investment costs/system cost for the whole examination area accept except CBS and minibuses

<table>
<thead>
<tr>
<th>Route</th>
<th>Length of Route</th>
<th>One/both sides</th>
<th>Investment Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Red Route</td>
<td>13.7</td>
<td>2</td>
<td>37'812'000</td>
</tr>
<tr>
<td>Pink Route</td>
<td>15.9</td>
<td>1</td>
<td>21'445'200</td>
</tr>
<tr>
<td>Orange Route</td>
<td>13.5</td>
<td>1</td>
<td>22'123'125</td>
</tr>
<tr>
<td>Yellow Route</td>
<td>19.7</td>
<td>1</td>
<td>32'283'375</td>
</tr>
<tr>
<td>Brown Route</td>
<td>25.6</td>
<td>1</td>
<td>32'678'400</td>
</tr>
<tr>
<td>Green Route</td>
<td>14.9</td>
<td>1</td>
<td>19'019'850</td>
</tr>
<tr>
<td>Yellow Link Network</td>
<td>42.0</td>
<td>1</td>
<td>53'613'000</td>
</tr>
<tr>
<td>Brown Link Network</td>
<td>17.0</td>
<td>1</td>
<td>21'700'500</td>
</tr>
<tr>
<td>Green Link Network</td>
<td>32.0</td>
<td>1</td>
<td>40'848'000</td>
</tr>
<tr>
<td>NMT around Schools, Shopping, Industries etc.</td>
<td>lump-sum</td>
<td>300'000</td>
<td></td>
</tr>
<tr>
<td>Pedestrianisation CBD</td>
<td>lump-sum</td>
<td>48'000'000</td>
<td></td>
</tr>
<tr>
<td>Western Bypass (accompanying measure)</td>
<td>20.0</td>
<td>1</td>
<td>185'000'000</td>
</tr>
<tr>
<td>Total NMT Network</td>
<td>194.3</td>
<td></td>
<td>514'823'450</td>
</tr>
</tbody>
</table>

Figure 40 Summary of route lengths and total costs for sidewalks and cycle lanes

Overall SUTMP implementation costs within the time horizon of 20 years, for PT infrastructure and vehicles + NMT infrastructure and facilities + CBD pedestrianisation and Western Bypass NMT structure and all accompanying measures, i.e. planning, awareness and promotion campaigns and capacity building measures are given in the table below.
Overall SUTMP Implementation Costs

<table>
<thead>
<tr>
<th></th>
<th>Investment</th>
<th>Accompanying Measures</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cross-Cutting Issues</td>
<td>0</td>
<td>87</td>
<td>87</td>
</tr>
<tr>
<td>Public Transportation</td>
<td>4'038</td>
<td>63</td>
<td>4'101</td>
</tr>
<tr>
<td>Non-motorised Transport</td>
<td>329</td>
<td>226</td>
<td>555</td>
</tr>
<tr>
<td>Transport Demand Management</td>
<td>95</td>
<td>9</td>
<td>104</td>
</tr>
<tr>
<td>Total</td>
<td>4'462</td>
<td>384</td>
<td>4'846</td>
</tr>
</tbody>
</table>

Figure 41 Total costs of SUTMP Implementation (in ’000 million NAD)

8.2 Operating costs of public transport

Whilst more detailed cash flow calculations, i.e. investments, operational costs and revenues are to be undertaken during the next phases of project implementation, i.e. the feasibility study and the detailed design phases, it can be already stated in this strategic planning stage that it is possible to cover the operational costs of the proposed PT system by the revenues from ticket sales. This is possible when the recommendation for a low-cost BRT option plus BHLS plus Commuter rail option is realised, implementation is stretched over four phases within the next 20 years, and with an average ticket fare level of NAD 7. This proposed fare level is slightly higher than the existing fare level of municipal bus service but lower than existing PT-taxi services and for a much better future service level in terms of frequency, reliability, access, travel times and comfort. The cost coverage ratios for other options and variants investigated, e.g. the LRT option, were less favourable. The amount itself will have to be reviewed in terms of its social appropriateness.

8.3 Public and Private Funding Sources

General funding options for transport sector investments are shown below:

- **Government funds** come from
  - the general budget or
  - dedicated funds such as the road fund or
  - loans which spread the burden on government budget over a number of years
- **Private sector funds** come through private development of transport infrastructure and systems and private provision of transport services
- **Public-private-partnership (PPP)** between the government and private sector

Figure 42 General funding options for transport sector investments

It is strongly advised that a mixture of all financing options ought to be considered when it comes to SUTMP implementation financing.

In addition, economic and fiscal instruments need to be optimised in view of the targeted modal shift towards public and non-motorised transportation without interfering too much in the transport market. This means that economic and fiscal policies should promote equal competitive opportunities among transportation modes and encourage cooperation among modes to enable each mode to realise its inherent advantages.
The following graph, showing the general cash flow in the transport sector, provides an overview of revenues, expenditures and budget provisions which need to be optimised in view of the SUTMP objectives.

For the City of Windhoek, capital investments for infrastructure (including PT in the new settlement area without roads and NMT in the new settlement areas), require large levels of financial resources and this cannot be solely met from local sources. Therefore, the role of the national government and international donors is crucial.

In principle, it is recommended that the government does not step in the administrative complexity of operating subsidies but bear the cost of the infrastructure. For example, the Government ought to provide the bus terminals, rail tracks and stations free of charge as well as land for depots at below-market costs, thus enabling commercialised rail and bus operators using the system.

8.4 Government Financing Options

The entire repairs and maintenance budget of the City of Windhoek is ca. NAD 300 million per year, thereof ca. NAD 115 million is dedicated for urban roads. Thus, there is some room for accommodating revisions of the road design of existing roads within the next 20 years and an increasing share of NMT and PT infrastructure. However, there is no room in the current budget to accommodate a major up-grading in the pace necessary. Additional funding sources are required.

The positive impacts of a shift towards more sustainable transportation for the entire society but also for the transport users could be proved by SUTMP impact calculation. Thus, it is economically and financially justified, that the Namibian Central Government steps in. The potential to do so is with the Ministry of Works and Transport (MWT), the Ministry of Regional and Local Government, Housing and Rural Development (MRLGHRD) and last but not least with the Road Fund Administration when their mandate and revenue basis is extended accordingly.

In addition, there are various International Financing Institutions (IFIs) interested in financing sustainable urban transport projects especially as those investments appear to be financially and economically viable, contribute to a considerable extent to reduce greenhouse gases and towards
poverty reduction and economic growth. They could spread the burden of the Government budget over a number of years enabling benefits to accrue earlier.

There is a need for clarification among the key stakeholders about which measures can or have to be taken over by the CoW itself, which measures are the obligation of the MWT and its affiliates, which measures can and should be supported by the line ministry of the cities and regions, i.e. the MRLGHRD, which parts could be possibly taken over by credit funding and which investments should be imposed on the private sector (see next chapter). The fourth Steering Committee Meeting decided about a coordination meeting in order to obtain clarification in this respect and this issue will also be an important first task of the Special Commission of Sustainable Transport (SCST) strongly recommended to be established.

8.5 Private and Public-Private Funding Options

Whereas infrastructure provision also for public transport and non-motorised transport infrastructure is the main domain of the State, eventually supported by international financing institutions, operations and services are more prone towards private provision and also private funding.

A commercialisation of operations and services was also envisaged in strategic directions given to the project team. A possible scenario could be that Government outsources bus operations and take a strategic and experienced private investors and private PT operators on board of the integrated PT system, in order to achieve an influx of know-how and capital. This applies especially for the envisaged BRT but also for the envisaged commuter train measures.

SUTMP mind shift requires promotion. There is a keen interest of the private sponsors as shown already in the past, present and future e.g. in private sponsoring of cycle race events or road safety campaigns or free of charge advertisements in some media or by the intended establishment of a velodrom with children traffic education facilities included. The state should actively encourage and initiate such promotional sponsoring measures not just for financial reasons but also for increasing private participation and ownership.

Last but not least the manifold SUTMP accompanying measures ought to be financed also by a combination of state and private stakeholders, eventually further on supported by the German–Namibian development cooperation for those parts requiring specialised technical expertise and inputs.

9. The Way Forward to Sustainable Urban Transport

The proposed implementation comprises five steps that will ensure the successful adoption, approval and implementation of the Master Plan. These steps are:

- Objectives and targets;
- Allocating finances;
- Assigning responsibilities;
- Adoption and approval;
- Monitoring, assessment and reporting.

9.1 Objectives and targets

The Vision for a sustainable urban transportation system for the City of Windhoek must be accompanied by clear objectives and relevant targets. The implementation and action plan defines public transport, non-motorised transport and cross-cutting measures and targets. The targets are defined in precise and
measurable terms, with a key for their achievement. These will be the basis for monitoring the SUTMP implementation process.

The first three measures and activities under each workflow area are illustrated in the figure below:
9.2 Alloting finances

The initial step towards integrating SUTMP measures into the sectoral ministry (MWT) and local government (CoW) strategies and action plans has already been taken via allocating financial means within the annual sector budget plan (ASEP) of the Ministry and via annual budget proposal for 2013-2014 of the CoW. These initial proposals are meant to give the implementation process a head start and possible ‘quick wins’. However, they should soon be followed by well-prepared medium to long-term plans and policies.

The essence of preparing sound plans and proposals is that they should be ‘bankable’, i.e., they should be able to attract sufficient and appropriate financial allocation. Therefore, the SUTMP implementation plan is in fact an investment plan setting out actions (short-, medium- and long-term) that must be implemented timeously. Each measure has been explicitly described in terms of who does what where and how, including all costs associated with its successful implementation. In this context, both the annual and 5 year budget cycle should be targeted for earmarking of resources.

9.3 Assigning responsibilities

The main justification for identifying the setting up of the intergovernmental institutional, legal and funding entity early in the implementation process is so that it takes up the responsibility of managing the SUTMP implementation. This unit must be given a clear mandate. Because of the inter-sectoral nature of the sustainable urban public transport work, it is recommended that responsibility for specific areas or fields of activity be distributed to different departments. For each area and task, responsible staff as well as goals and milestones should be defined even if many actions may need to be implemented through inter-sectoral cooperation or in partnership with stakeholders. The coordinating authority with the overall responsibility for the implementation of the SUTMP should ensure that progress is monitored and milestones reported.

9.4 Adoption and approval

It is extremely important for the successful implementation of the Master Plan that it is widely accepted, politically endorsed, and that its progress is reported to the political leadership. The intensive stakeholder engagement during master plan development as well as presentations to the ministerial and political leaders in various meetings and workshops, e.g. to the Minister of Works and Transport, the Minister of Local and Regional Government, the Windhoek City Council, as well as to Okahandja Municipal Council and Rehoboth Town Council earlier was a step in the right direction and will hopefully facilitate and accelerate the future adoption of the SUTMP. The Minister of Works and Transport will present the Master Plan to cabinet once the stakeholder feedback is concluded.

9.5 Monitoring, assessment and reporting

Monitoring and evaluation are essential management tools for systematic collection, analysis and use of information from projects and programmes for three basic purposes:

- learning from the experiences acquired (learning function);
- accounting internally and externally for the resources used and the results obtained (monitoring function);
- taking decisions (steering function) (PSO, 2004).

The SUTMP implementation and financing plan handed over to the key stakeholders recommends an explicit timetable for monitoring and evaluation of progress. Each measure can be further broken down and data that is required to examine whether targets are achieved need to be collected from now on. Documentation of evaluation and reporting is crucial if staff working on the various sub-projects is to learn and decision-makers improve performance. Evaluation reports should reference the evidence of the findings for future use. One of the benefits of publicly reporting findings of evaluation is that it offers local stakeholders opportunities to contribute to the debate over the choice of programmes and how resources
should be allocated. The interest about the Master Plan that has already been generated via the social media Facebook Page should be sustained as Windhoek moves towards a sustainable urban transport future.

www.facebook.com/movewindhoek

www.movewindhoek.com.na

#movewindhoek #geneva2013

www.youtube.com/movewindhoek
## Glossary and Definition of Terms

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Accessibility</strong></td>
<td>The ability to obtain desired goods, services and activities</td>
</tr>
<tr>
<td><strong>Affordability</strong></td>
<td>Refers to people’s ability to purchase basic goods and services. It can be defined as the situation in which household incomes can purchase basic goods (housing, food, medical care and transport), or simply that lower-income people need not worry too much about purchasing essential goods and services.</td>
</tr>
<tr>
<td><strong>Bus Rapid Transit (BRT)</strong></td>
<td>Refers to a set of bus system design features that provide high quality and cost-effective transit service. These include: (1) Grade-separated right-of-way, including <em>busways</em> (for bus use only, also called <em>O-Bahn</em> or <em>Quick ways</em>) <em>HOV lanes</em> (for buses, vanpools and carpools), and other Transit Priority measures. Some systems use guideways which automatically steer the bus on portions of the route; (2) Frequent, high-capacity service that results in passenger waits of less than 10-minutes during peak periods; (3) High-quality vehicles that are easy to board, quiet, clean and comfortable to ride.; (4) Pre-paid fare collection to minimize boarding delays; (5) Integrated fare systems, allowing free or discounted transfers between routes and modes; (6) Convenient user information and marketing programmes; (7) High quality bus stations with Transit Oriented Development in nearby areas; (8) Modal integration, with BRT service coordinated with walking and cycling facilities, taxi services, intercity bus, rail transit, and other transportation services; (9) Excellent customer service; and (10) Improved safety and security for transit users and pedestrians.</td>
</tr>
<tr>
<td><strong>Comprehensive Transport Planning</strong></td>
<td>Include an attention to liveability impacts, including effects on working conditions, streetscape aesthetics, safety, affordability, recreation opportunities, community cohesion, and other special community attributes.</td>
</tr>
<tr>
<td><strong>Demand</strong></td>
<td>The amount and type of travel people would choose under specific price and quality conditions.</td>
</tr>
<tr>
<td><strong>Densification</strong></td>
<td>Densification (also called <em>Compact Development</em>) refers to land use patterns in which related activities are located close together, usually within convenient walking distance. Densification improves accessibility by reducing travel distances and improving transportation options. It is an important part of land use management strategies including Transit Oriented Development.</td>
</tr>
<tr>
<td><strong>Diesel Multiple Units</strong></td>
<td>A multiple unit train consisting of self-propelled carriages powered by on-board diesel engines.</td>
</tr>
<tr>
<td><strong>Emissions</strong></td>
<td>Per capita fossil fuel consumption, and emissions of CO(_2) and other greenhouse gas emissions. Lower is better.</td>
</tr>
<tr>
<td><strong>Equity</strong></td>
<td><em>Equity</em> refers to the distribution of resources and opportunities. Transportation decisions can have significant equity impacts. Transportation represents a major portion of consumer, business and government expenditures. It consumes a significant portion of public resources, including taxes and public land. Transportation activities have external impacts (noise and air pollution, crash risk and barrier effects) that affect the quality of community and natural environments, and personal safety. Transport determines where people can live, shop, work, go to school and recreate, and their opportunities in life. Adequate mobility is essential for people to participate in society as citizens, employees, consumers and community members. It affects people’s ability to obtain education, employment, medical service and other critical goods.</td>
</tr>
<tr>
<td><strong>Grade Separated</strong></td>
<td>Paths, special lanes, freeways, transit and rail lines that are completely separated from regular roadways and so are not delayed by cross-streets or roadway congestion.</td>
</tr>
<tr>
<td><strong>High Occupancy Vehicle (HOV)</strong></td>
<td>A passenger vehicle carrying more than a specified minimum number of passengers. HOVs include carpools, vanpools, and buses.</td>
</tr>
<tr>
<td><strong>Level of Service</strong></td>
<td>Level of Service (also called Quality of Service or Service Quality) refers to the speed, frequency, convenience, comfort and security of transportation facilities and services as experienced by users.</td>
</tr>
<tr>
<td>---------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Mobility</strong></td>
<td>Refers to the movement of people and goods</td>
</tr>
<tr>
<td><strong>Modal Shift</strong></td>
<td>Is the number or portion of trips shifted from one transport mode (e.g. car) to other modes (e.g. bus, bicycle, walking).</td>
</tr>
<tr>
<td><strong>Modal Split</strong></td>
<td>Is the portion of travelers who use each transportation mode.</td>
</tr>
<tr>
<td><strong>Non-motorised Transport</strong></td>
<td>NMT, also known as Active Transportation and Human Powered Transportation includes Walking, Bicycling, Small-Wheeled Transport (skates, skateboards, push scooters and hand carts) and Wheelchair travel.</td>
</tr>
<tr>
<td><strong>Non-motorised Transport Improvements</strong></td>
<td>Refers to pedestrian improvements and bicycle improvements. Can help create attractive, safe and vibrant streets and improve transportation choice.</td>
</tr>
<tr>
<td><strong>Parking Management</strong></td>
<td>Strategies aimed at making better use of available parking supply. Parking management strategies include preferential parking or price discounts for carpools and/or short-term parkers, and disincentives, prohibitions and price supplements for those contributing more to congestion.</td>
</tr>
<tr>
<td><strong>Polycentric Development</strong></td>
<td>Polycentric development refers to multiple business districts, cities and towns within a metropolitan region, rather than a single large central business district and central city. In a growing city such as Windhoek, suburbanisation is not economically harmful if new nodes reflect smart growth principles, but dispersed, car-dependent sprawl reduces economic productivity. This suggests that regional bus or rail transit systems with transit oriented development around stations tends to support regional economic development by encouraging efficient polycentric land use development patterns.</td>
</tr>
<tr>
<td><strong>Sprawl</strong></td>
<td>Also known as urban-fringe, sprawl is a dispersed, low-density, single-use, car dependent land use patterns (Galster, et al, 2001).</td>
</tr>
<tr>
<td><strong>Stakeholder</strong></td>
<td>Individuals, organisations or groups that are affected by a decision and have an interest in its outcome.</td>
</tr>
<tr>
<td><strong>Sustainable Transport</strong></td>
<td>Sustainable transport refers to transportation systems that respond to long-term and indirect economic, social and environmental objectives. Sustainable transport planning can provide a framework for implementing community liveability improvements. Sustainable transport can be stated if the transportation system: (1) is affordable to all people, both rich and poor, operates fairly and efficiently, offers a choice of transport mode, and supports a competitive economy, as well as balanced regional development; (2) allows the basic access and development needs of individuals, companies and society to be met safely and in a manner consistent with human and ecosystem health, and promotes equity within and between successive generations; (3) enhances human health; (4) is safe for people and their property; (5) designed and operated to maximise economic efficiency and minimise economic costs; (6) environment, social and economic considerations are factored into decisions affecting transportation activity.</td>
</tr>
<tr>
<td><strong>Traffic Calming</strong></td>
<td>Is a Traffic Management measure and refers to various design features and strategies intended to reduce vehicle traffic speeds and volumes on a particular road.</td>
</tr>
<tr>
<td><strong>Transport Demand</strong></td>
<td>Transport demand refers to the amount and type of travel people would choose under specific conditions, taking account factors such as the quality of transport options available and their prices. Understanding demand is important for transport planning in general and is particularly important Transportation Demand Management, which includes various strategies that influence travel behaviour.</td>
</tr>
<tr>
<td><strong>Transport Options</strong></td>
<td>Transport Options (also called Transport Choice, Transport Diversity) refers to the quantity and quality of accessibility options available to an individual or group, taking into account their specific needs and abilities.</td>
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<tr>
<td><strong>Transit Oriented Development</strong></td>
<td>Transit Oriented Development (TOD) refers to residential and commercial centers designed to maximise access by transit and non-motorized transportation, and with other features to encourage transit ridership. A typical TOD has a rail or bus station at its centre, surrounded by relatively high-density development, with progressively lower-density spreading outwards one-quarter to one-half mile, which represents pedestrian scale distances. It includes these design features (Renne, 2009): (1) The neighbourhood is designed for cycling and walking, with adequate facilities and attractive street conditions; (2) Streets have good connectivity and traffic calming features to control vehicle traffic speeds; (3) Mixed-use development that includes shops, schools and other public services, and a variety of housing types and prices, within each neighbourhood; (4) Parking management to reduce the amount of land devoted to parking compared with conventional development, and to take advantage of the parking cost savings associated with reduced automobile use (NJDOT, 2007); and (5) Transit stops and stations that are convenient, comfortable and secure, with features such as comfortable waiting areas, vendors selling refreshments and periodicals, and washrooms.</td>
</tr>
<tr>
<td><strong>Transport Demand Management</strong></td>
<td>Also called <em>mobility management</em>, refers to various strategies that change travel behavior (how, when and where people travel) in order to increase transport system efficiency and achieve specific planning objectives such as reduced traffic congestion, road and parking cost savings, increased safety, improved mobility for non-drivers, energy conservation and pollution emission reductions.</td>
</tr>
<tr>
<td><strong>Universal Design</strong></td>
<td>Transportation systems designed to accommodate a wide range of users, including people with disabilities and other special needs.</td>
</tr>
</tbody>
</table>
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