AN ASSESSMENT OF THE LUSAKA DECONGESTION PROJECT (LDP): A CASE STUDY OF GREAT EAST ROAD

By

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DECLARATION

I, Lushomo Ng'andu, (Student No. 21000282) declare that this work is my original work achieved through personal reading and scientific research. This work has never been submitted to the University of Zambia or any other University for the award of a Master of Science in Geography Degree or for any other academic award. All sources of data used, and literature on related works previously done by others, used in the production of this dissertation have been dully acknowledged. If any omission has been made, it is not by choice but by error.

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APPROVAL

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ABSTRACT

Traffic congestion is becoming a common occurrence in many major urban centres in Sub-Saharan Africa as the numbers and users of motor vehicles increase. This results in a range of undesirable consequences. The purpose of the study was to investigate the decongestion of traffic on the Great East Road after completion of the Lusaka Decongestion Project. The study had four main objectives as follows: To assess the effectiveness of the Lusaka Decongestion Project in reducing traffic congestion along the Great East Road; to investigate the major causes of traffic congestion on Great East Road; to ascertain major points of traffic congestion on Great East Road; and to examine the perception of affected stakeholders on Great East Road after the Lusaka Decongestion Project. The study employed a case study design. It employed a mixed method approach, questionnaires and interview guides were used to collect quantitative and qualitative data. The respondents comprised of key informants from 4 government institutions namely; Ministry of Local Government and rural development, Lusaka City Council, Zambia police Traffic division, and Road transport and safety Agency; 22 public bus drivers; 30 passengers; and 8 private motorists. Observations were made by the researcher on the ground and car counts were done using a video recording device. The study found that indeed the Lusaka Decongestion Project has been effective in bringing about traffic congestion reduction, as it has been shown through the reduction of the queue length of traffic especially during peak hours. It further revealed that the leading cause of the continued traffic congestion is the increase of vehicles on the road. The major points of traffic congestion on Great East Road were Munali Flyover Bridge, up to NRDC bus stop mainly during peak hour. The study recommends that the government should construct road infrastructure to cater for the increase of vehicles, and the other roads should also be expanded and more alternative roads be constructed from where the LDP ended as these were the mostly congested areas. Lastly the city should also create a big bus station at NRDC so that mini-buses do not park on the main road and cause congestion.

KEY WORDS: *Decongestion, Congestion, Lusaka Decongestion Project, Traffic Congestion and Redesigning*

DEDICATION

This work is dedicated to my parents, Mr. and Mrs. P. M. Ng'andu, my siblings and the entire Ng'andu family, for the love and support. They believed in me and encouraged me that I could soar to the highest in my academic endeavours and this was my driving force throughout this study. As hard as it has been, both your love and prayers have done wonders in my academic life at the University. Thank you!

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ACRONYMS

CBD	Central Business District
GDP	Gross Domestic Product
GER	Great East Road
GRZ	Government of the Republic of Zambia
IRCP	Improved Rural Connectivity Project
JICA	Japan International Corporation Agency
LCC	Lusaka City Council
LDP	Lusaka Decongestion Project
MLGRD	The Ministry of Local Government and Rural Development
NRTP	National Road Tolling Programme
PSV	Public Service Vehicle.
RTSA	Road Transport and Safety Agency
RDA	Road Development Agency
SPSS	Statistical Package for Social Science
UNZA	The University of Zambia
ZP	Zambia Police

CHAPTER ONE: INTRODUCTION

1.1 Background

Traffic congestion is becoming a common occurrence in many major urban centres in Sub-Saharan Africa as the numbers and users of motor vehicles increase. Traffic congestion impedes economic development through the slow movement of goods from one place to another and hence loose on time and has a number of social and environmental impacts (such as air pollution). In Sub-Sahara Africa, road infrastructure presently remains the means of conveying about 75 percent of freights and passengers, making it the most important sector that supports development (Beuran et al. 2015). The World Bank (2020) postulates that, 56% of the world's population, about 4.4 billion inhabitants live in cities, and this trend is expected to continue by 2050. With the urban population more than doubling its current size, nearly 7 out of 10 people in the world will live in cities. This increase comes with an increase in the global Gross Domestic Product (GDP) which means more income and this result into increase in car ownership and hence increases in traffic congestion due to high volumes of cars on the roads.

There are a number of circumstances that can cause or exacerbate traffic congestion. These are population growth, road works, damage to roads and road crashes (Haq and Schwela 2012). With a fast-growing population and an increase in vehicle ownership, traffic is a challenge to motorists in the Sub-Saharan Africa. Kennedy (2015) argues that, the cumulative effect of population and income growth has brought about an increase of over 10 percent annually of motor vehicles in most African cities.

Additionally road works, damage to roads and road crashes can have a ripple effect across the road network reducing the road capacity at a given point or over a certain length and resulting in a sustained traffic jam (Haq and Schwela 2012). This results in a range of undesirable consequences, which include negative economic impacts (Such as slowing of business in the CBD). Sustainable development and sustainable road transportation are interlinked and influence the success of each other; in this context road, traffic congestion on most cities in Africa remains a challenge for their sustainable development. Despite various attempts to mitigate congestion, some cities are still facing the challenge, specifically in the Central Business Districts (CBDs) of many large and medium cities. These are severely affected by this mobility problem particularly during the peak hours.

In order to manage and decongest the city of Lusaka for instance various road infrastructure development interventions have been put in place, some of which include the Lusaka

Decongestion Project (LDP) focused on the expansion and upgrading of roads within the city to good-quality standards. The objective of the Lusaka Decongestion Project was to decongest the city, and it was directed at expanding roadway capacity through widenings, new fly-over bridges and overpasses which were constructed over three years. The LDP commenced in 2018 with AFCONS Company as the main construction company. This project was co-financed by GRZ (15%) and Exim Bank of India (85%), the scope of works included construction, rehabilitation and widening of 120.7 km of roads and the project was completed in April 2021 as planned to be completed in 36 months (Mutumweno, 2021). The project aimed at redesigning the major road network for Lusaka city with a view of reducing traffic jams, travel times, travel distances and saving fuel. Therefore, this study endeavored to investigate the decongestion of traffic on the Great East Road (GER) after the implementation of the Lusaka Decongestion Project.

It is presumed that the construction of roads, whether new or upgrading, has a range of impacts on the population, urban form, economic status and environment (Mackett & Edwards 1998). The impacts may be both positive and negative depending on the situated social, spatial, economic and environmental context. Khanani et al. (2020) argue that, most governments in the Global South are using such projects to scale up their cities' competitiveness, requiring structuring and re-structuring of their road networks, and in return, attract investments. These large-scale projects, for instance road infrastructure projects, touch on multiple stakeholders, possibly leading to all kinds of changes in adjacent areas. However, the attempt of scaling- up the city sometimes fails to consider the needs of the affected people during the infrastructural development (Aoun 2016). Studies on peri-urban areas have given little attention to the consequences of road infrastructure projects in local communities, leading to projects in such countries mainly being critiqued for their impacts on urban sustainability at the city level (Kennedy 2015). Thus, there has been need for further empirical studies on socioeconomic and spatial consequences of road infrastructural expansions at the community level (Doan and Oduro 2012).

1.2 Statement of the Problem

The cumulative effect of population and income growth has brought about increase in vehicle ownership by over 10 percent annually in most African cities, which has in turn increased traffic congestion despite road infrastructure projects (Chakwizira 2021). This project (LDP) aimed at redesigning the major road network of Lusaka city, with a view of reducing traffic jams, travel time, travel distances and saving precious fuel. But despite having experienced this

huge infrastructure development project in Lusaka it appears the city is still experiencing increased traffic congestion. With the completion of the project in 2021, there is need to assess the effectiveness of the LDP in traffic congestion reduction. There is inadequate information pertaining to the persistent traffic congestion despite the project having been implemented to curb traffic congestion. Therefore, the main question addressed in this study was how the Lusaka Decongestion Project had helped in traffic congestion reduction in Lusaka city along the Great East Road (GER) highway.

1.3 Aim of the Study

The main aim of the study was to investigate the decongestion of traffic on the Great East Road after completion of the Lusaka Decongestion Project.

1.4 Research Objectives

The above main objective was addressed through the following objectives:

i. To ascertain major points of traffic congestion on Great East Road.
ii. To investigate the major causes of traffic congestion along Great East Road.
iii. To assess the effectiveness of the Lusaka Decongestion Project in reducing traffic congestion along the Great East Road.
iv. To examine the perception (traffic congestion) of affected stakeholders on Great East Road after the Lusaka Decongestion Project.

1.5 Research Questions

The study was guided by the following research questions;

i. What are the major points of traffic congestion on Great East Road?
ii. What are the major causes of traffic congestion on Great East Road?
iii. How effective was the Lusaka Decongestion Project in reducing traffic congestion along the Great East Road?
iv. How has the Lusaka Decongestion Project helped in reducing traffic congestion?
v. How was traffic situation before the LDP?
vi. What was the perception of stakeholders and other road users on Great East Road after the Lusaka Decongestion Project?

1.6 Significance of the Study

The Government of the Republic of Zambia (GRZ) has actively developed suitable strategies to overcome urban planning challenges in the transport sector, this study will provide an opportunity for decision makers to evaluate the effectiveness of the newly re-designed roads in curbing traffic congestion challenges through the LDP. The study will help to inform city planners and researchers of the value and impact of the project and asses if the governments can continue to fund resources for building such infrastructure projects. Additionally, the study will generally contribute to the body of knowledge for future research in urban planning and will also be used as a reference material for urban planners and policy makers in decision making process.

1.7 Scope of the Study

This study only focused on the newly redesigned Great East Road (GER) of Lusaka City from Kabwe roundabout up to Chelstone turn off, and its effects on reducing traffic congestion. This part of GER was chosen because of it being part of the redesigned roads under the LDP.

1.8 Conceptual framework

The conceptual framework in figure 1 was adopted and modified by the researcher, the knowledge of the contributing factors were obtained from (Takyi *et al.* 2013). It seeks to explain that the rise in income and unreliable public transport system leading to an increase in automobile ownership culminates in increased traffic congestion. The potential results of this situation are high energy demand, environmental pollution and reduction in productivity, a situation that adversely affects the national socioeconomic development (as shown in Figure 1). In Lusaka just like any other expanding city in the Sub-Saharan Africa, the city sprawls outwards in all directions and new areas are underserviced with public transport. The increase in income by majority middle class coupled with problematic and poorly serviced public transport becomes a challenge to many to run their daily programmes and businesses. These challenges cause many people to shun public transport; as a result, cities are experiencing increased usage of private motor vehicles leading to traffic congestion hence traffic congestion increase, which brings about loss of productive hours and high demand for fuel (Zali et al. 2018). This poses a negative environmental impact of air pollution which results into less social and economic development. However, adequate infrastructure, effective traffic management and effective public transportation as key factors in place, will lead to effective transportation

system (ZIPAR 2023). This will improve energy efficiency, effective logistics system and increase productivity at both individual and national level (Takyi *et al.* 2013).

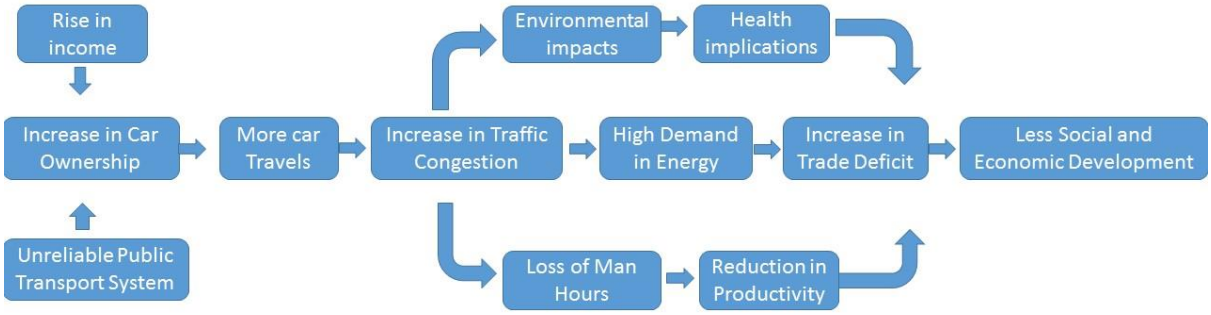

Figure 1: The conceptual framework

Source: Adopted and modified from Takyi et al. (2013:228)

1.9 Operation Definitions

The following terms have been operationalised to refer specifically to the conduct of this study:

Bus station: A structure or place in town where buses arrive and depart, usually that is where buses start and end their routes. Buses are allowed to stay longer at bus stations as they load and offload the bulk of their passengers at these points.

Bus stop: A designated place where a bus regularly stops for passengers to get on or off, usually marked by a sign along the road. Buses are not expected to stop for prolonged periods at such points along the route.

Congestion: The term congestion denotes any condition in which demand for a facility exceeds free-flow capacity at the maximum design speed (Altshuler 1979).

Highway: This is a main road intended for travel by the public between important destinations, such as cities and towns.

Public transport: Refers to buses, minibuses and taxis owned by private individuals, local authorities, governments and or companies but regulated and licensed by the local authorities. In Africa they tend to be colour coded and are painted with the same colour or have an

identification strip of the same colour as is the case in Zambia and are driven by public service vehicle (PSV) drivers.

Redesigning: A plan for making changes to the structure and functions of an artifact, building or system so as to better serves the purpose of the original design, or to serve purposes different from those set forth the original design.

Road user: A person using any part of the road system as a non-motorized or motorized transport road user (Peden *et al.* 2004). These include drivers, pedestrians, passengers, cyclists/riders.

Roundabout: This is a type of road junction at which traffic enters a one-way stream around a central island. Traffic follows a 'yield at entry' rule for motorists.

Traffic congestion: This is a condition on transportation networks that occurs as use increases, and is characterized by slower speeds, longer trip times, and increased queuing. The most common example is the physical use of roads by vehicles. When traffic demand is great enough that the interaction between vehicles slows the speed of the traffic stream, congestion is incurred. As demand approaches the capacity of a road (or of the intersections along the road), extreme traffic congestion sets in. When vehicles are fully stopped for periods of time, this is colloquially known as a traffic jam (Kibunja 2009).

1.10 Chapter Summary

This chapter provided an introduction and background to the present study. The chapter clarified what is meant by traffic congestion, as a concept, and how really it relates to economic development concepts. It was also in this chapter that the problem was stated and objectives to be achieved at the end of the study.

The same chapter clarified why it is of paramount importance to the world to reduce traffic congestion and in particular Zambia. Efforts towards reducing traffic congestion in the city were said to have been in existence through many infrastructure development projects, yet despite this it appears the city is still experiencing increased traffic congestion.

The next chapter will review literature relevant to the study in an attempt to establish what other scholars and writers have written about traffic congestion reduction in cities.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

Road infrastructure projects require massive investments since they have been used to achieve economic prosperity through haulage of goods and services from one place to another (Jedwab & Moradi 2016). Further Jedwab & Moradi (2016) are of the view that since about 50% of the roads in the Sub-Saharan region are yet to be constructed, this implies that road infrastructure development remains on the top list of physical infrastructure developments, potentially impacting on the socioeconomic and physical environment of the cities.

According to Rao and Rao (2012) traffic congestion has been one of the major issues that most metropolises are facing. It is believed that identification of congestion and its causes is the first step for selecting appropriate mitigation measures since congestion impacts the movement of people. There is no single definition of traffic congestion and the problem can be interpreted in different ways, although in general it is a situation in which demand for road space exceeds the supply (European Conference of Ministers of Transport 2007). Motorized public transportation is the go-to option for many ordinary Zambians who travel or need to ferry goods from one place to another. For many years now, they have depended on this mode of transportation to carry out their day-to-day businesses. However, recent years have witnessed a rise in traffic congestion due to the rise in car ownership leading to undesirable consequences such as loss of man hours, as long hours are required to reach places due to traffic congestion.

2.2. Causes of Traffic Congestion

Traffic congestion occurs when traffic is delayed due to the presence of excess number of vehicles on the same portion of the road way at a particular time resulting in slower than the normal or "free flow" speeds (Rao & Rao 2012). The result is long queues of vehicles, which move in constant start and stop basis, because the number of vehicles trying to use the road exceeds the design capacity of the road. Consequently, it results in delay in traffic movement and the traveller cannot move in a desirable manner. Further the constant ‘start and stop’ increase or accelerates the tear and wear of vehicles (Rao & Rao 2012).

The key factors behind traffic congestion are diverse depending on the area, but the common ones include bad roads, road works, accidents, traffic overload on the same route, and large numbers of pedestrians holding up the vehicles (Petit 2021). Although all these factors can be managed relatively easily, surprisingly not a lot of lasting solutions have been found thus far. In addition Kibunja (2009) divided the causes of traffic congestion to recurrent and no-

recurrent congestion, where recurrent congestion refers to the consequence of factors that cause regular demand surges on the transportation system, such as commuting, shopping or weekend trips and no-recurrent congestion refers to congestion caused by random events such as accidents and unusual weather conditions (rain, snowstorms, etc.), which are unexpected and unplanned. These can be summarized as follows: Recurrent; Insufficient capacity, unrestrained demand, ineffective management of capacity (e.g. poor signal timing) and Non-Recurrent; Incidents, work zones, weather events, special events and emergencies (e.g. hurricanes). Traffic jams cost several billion euros per year because employees are stuck in the tie-ups instead of being productive, and goods are on the road instead of on the shelf (Kibunja 2009).

2.3 Global Perspective of Traffic congestion

A study by Nugmanova et al. (2019) indicates that, across Africa it is common to increase road capacity by constructing ring roads to reduce traffic congestion in city areas, although this is often found to be ineffective in the long run. This study investigated various traffic congestion management approaches and their effectiveness in major cities, and explored an identical transport (congestion related) problem in Almaty, Kazakhstan: the 'Big Almaty Ring Road' (BAKAD). In addition, many cities in developed countries have taken 'Push and Pull' measures (Measures such as decentralizing of the functions of the CBD by taking the much needed services near residential areas in the suburban places. For example creating major shopping malls and markets away from the CBDs which pull people away from frequenting the CBD) that ensure more efficient use of existing capacity and have initiated environmentally friendly alternative transportation modes such as decreased car usage; promotion of public transport, biking and walking; minimization of the necessity of people's movement by changing urban land use patterns; and so on. These approaches have been found to be effective in providing sustainable transportation solutions. Nevertheless, push and pull measures might not be enough for managing traffic congestion, and it might be necessary to increase the road capacity through heavy engineering measures, especially if the city experiences heavy transit traffic.

Koźlak and Wach (2018) argue that in Poland the dynamic development of urban areas poses increasingly more challenges for the provision of transport services for the population. The concentration of the economic potential and population in the metropolitan areas results in the occurrence of large transport needs, and when these needs are met at the same time, the phenomenon of congestion occurs. In trying to solve these congestion challenges when effectively applied, transport policy instruments can play a special role. These instruments can contribute to reducing congestion in various ways, for instance by implementing various sub-

objectives, which include reducing the need to travel, reducing the use of passenger cars, improving the functioning of public transport and use of the infrastructure.

Additionally on urban streets with bus stops a study done in China by Zhang et al. (2018) indicates that, bus arrivals can disrupt traffic flows in the neighbouring areas, this means that different stop designs have distinct influences on the road users and they can be a source of congestion. The study done revealed that, data collected from eight sites in two cities, showed that different bus stop designs have quite different impacts on the neighbouring traffic flows.

2.4 African Perspective of Traffic congestion

In Kenya, a contemporary study was done which investigated the existing traffic management system for Uhuru Highway with a view of establishing its effectiveness in facilitating traffic movement along the highway. The study sought to examine the major factors contributing to traffic congestion along Uhuru highway which stretched from between Haile Selassie Roundabout and University Way Roundabout based on the fact that traffic congestion at this section directly affects traffic flow into and out of CBD Nairobi (Kibuja 2009). The study found that there is one designated bus stop along Uhuru highway that is used to pick and drop passengers along the way, located between Hailesellasie roundabout and Bunyala road Junction. However, matatus (public buses) opt using the exit of the petrol station at the Hailesellasie roundabout as a terminal to pick passengers, thus inconveniencing traffic flow along the highway. Further, the location of the bus stop at the University way interrupts traffic flow along the highway as it is located very close to the roundabout and thus contributes to traffic congestion NUTRANS (2004). Traffic congestion was found to be the major traffic challenge experienced along Uhuru highway with 45% response, with the leading cause of traffic congestion being, the mixing of through traffic with city centre traffic. The study showed that, lack of an alternative link for through traffic makes it inevitable for it to use the same road with the traffic destined for the city centre, the numerous intersections of the highway interferes with smooth flow of through traffic as they have to be stopped at very close intervals to give way for city center traffic (ibid). Furthermore, most of the through traffic includes the large slow moving trucks that take time to accelerate after stopping. And the Government of Kenya through the ministry of Roads intends to open all the Nairobi bypasses and link roads to divert through traffic away from the CBD (Kibunja 2009). Further the Nairobi Urban Transport Study (NUTRANS) (2004) postulates that, the car ownership rate per household in the Nairobi Metropolitan Area has been raising rapidly with the increase in income levels. It was projected to increase from 23% in 2004 to 31% in 2010, and 49% in 2025 with an average annual growth

rate of 3.6%. This means more and more traffic is pouring into the highway each day. And this increase in income is happening without correspondent increase in the existing transport infrastructure, considering that the highway is still the same width it was at the start of the city. This exacerbated traffic congestion in Uhuru Highway especially during peak hours.

In Ghana a study was done in Kumasi Metropolis, which assessed the extent to which congestion affects worker productivity. The study focused on the transportation system of the metropolis and its strategic location as a transit point to the north, south, central and western parts of Ghana, which makes it prone to traffic congestion. The study results showed that mobility in Kumasi Metropolis is restricted due to congestion, causing excessive travel delays, particularly, during peak hours and negatively affecting productivity. Therefore, it suggested that attention should be given to expanding transport infrastructure as well as improvement in the traffic management and control system in order to improve the transportation system in the metropolis. This would enhance worker productivity and ultimately increase GDP.

Additionally still in Ghana the government of Ghana has continued to invest in road infrastructure to further open up the country, and to boost trading activities by reducing travel time (Jedwab and Moradi 2016). In developing countries including Ghana, one obvious characteristic of road transport system is the over-reliance on the use of low carrying-capacity vehicles including taxis, private cars and 'trotros' this creates congestion in the CBDs with the small road capacity developed to handle low traffic of vehicles(Kwablah, 2008). For instance in Accra, available figures indicate that in 2010, 4.3 million passengers commuted the Central Business District on a daily basis. Out of this figure, 3 million used trotro or taxi (Ghana Institution of Road Engineers, 2012). While majority of the trotros are old and badly maintained, their carrying capacities are between 12-15 and 22-33 passengers (Ghana Institution of Road Engineers, 2012).

In South Africa in the Great Johannesburg Area, a massive project to decongest the city was undertaken in 2000 to boost trading activities by reducing travel time (Chakwizira 2021). From the study it was highlighted that a gap exists between the traffic and transport images hypothesized and conceptualized in the plans and professional practice on the one hand, and the traffic and transport realities as experienced on the ground. The major conclusion of the study was that an integrated and comprehensive land, air and road based strategic transportation framework and perspective plan reflecting input from all stakeholders could lay the foundation

on which an appropriate, responsive and sustainable congestion and decongestion framework, mitigation and response mechanism can rest in South Africa (Chakwizira 2021).

Despite all the above projects, recent years have witnessed a spate of traffic congestion in most large African cities leading to undesirable consequences. Specifically, the Central Business Districts (CBDs) are facing this challenge and businesses are severely affected by this mobility problem. Traffic congestion is in part a by-product of a growing population and thriving economy (Cambridge Systematics Inc. 2008).

2.5 Zambian Perspective of Traffic congestion

According to Ministry of Transport and Logistics, (2019), highlights that about 46% of Zambia's population resides in urban areas and predominantly relies on public transport for daily commuting. They further acknowledges that the quality of public transport is poor and more expensive especially when compared to other countries in the region, leading to high usage of private cars and subsequent congestion particularly for cities like Lusaka (Ministry of Transport and Logistics, 2019). Further Lusaka and other Zambian cities are experiencing increasing traffic congestion, making it difficult for residents to access economic and educational opportunities among other opportunities. Increasing congestion is therefore a major impediment to economic growth, competitiveness, and poverty alleviation. Vehicle pollution also contributes to respiratory ailments and climate change, and hence the need to improve the road standards and designs (World Bank 2015). To overcome such challenges, cities need to adopt urban planning strategies and transport system interventions that promote a shift to sustainable modes, including efficient public transport, walking, and cycling.

2.6 The Legal Framework

There are several legislations that are responsible governing transport; these are the Roads and Road Traffic Act, Urban and regional planning act of 2015, the public roads act of 2002, Disability Act of 2012, National transport policy of 2019 and the local government Act of 2019.

The National Transport Policy (NTP) (2019) serves as the primary guide for all government plans and intentions in the transport sector, including NMT and public transport strategies. The vision of the Policy emphasizes the aspiration "to have an efficient and integrated Transport System in Zambia by 2028" (Ministry of Transport and Logistics, 2019). The Road Traffic (Amendment) Act, 2022, is the legal framework that guides roads and their operations in Zambia we also have the National transport policy of 2019.

The Persons with Disabilities Act 2012 mandates the provision of a built environment and transport facilities that are accessible to persons with disabilities and the Roads and Road Traffic Act Cap 464 of the Laws of Zambia prevents people with disabilities from acquiring a driving license (National Assemblies of Zambia 2012). The Public Roads Act No.12 of 2002 assigns the responsibility for public roads to RDA, while the Local Government Act Cap 281 the Ministry of Local Government and Rural Development (MLGRD) and Local Road Authorities (LRA) the responsibility for managing urban and rural roads. RDA remains resolved and determined to oversee the completion of all key infrastructure projects such as the Link Zambia 8000, Pave Zambia 200, Improved Rural Connectivity Project (IRCP), National Road Tolling Programme (NRTP), and other major projects with a focused approach and renewed vigor as set forth in the Strategic Plan in its quest to transform the nation into a truly land-linked country. However, in practice RDA continues to develop and maintain major roads in urban areas.

RTSA was formed by the Road Traffic Act No. 11 of 2002, while NRFA received its mandate from the National Road Fund Act No. 13 of 2002 (National Assemblies of Zambia, 2002). The formation of RTSA in 2002 represented a major step toward ensuring greater safety for road users and became fully operational in 2006. The Agency's mandate include the following: *To effectively implement policy on transport, traffic management and road safety; To effectively and efficiently register motor vehicles and trailers in accordance with the road traffic act; To timely issue licenses and permits in accordance with the road traffic act; To implement international protocols and treaties on road transport efficiently; To conduct effective road safety education; To coordinate road safety programs effectively; and To approve and monitor the effectiveness of road safety programs undertaken.*

Further, the Urban and regional planning act of 2015, provides with respect to local government the establishment of city councils, municipal councils and district councils, township councils or management boards and Provincial Local Government Appeals Boards and defines their functions and powers including the acquisition of land. The spatial planning in Zambia is guided by the Urban and Regional Planning Act No 3 of 2015 of the laws of Zambia.

Additionally the Ministry of Local Government and Rural Development (MLGRD), this is charged with the responsibility of promoting a decentralised and good local governance system, facilitating delivery of quality municipal services in order to contribute to sustainable socio-economic development. And lastly the Zambian Police traffic department, Zambia Police

Traffic Officers are mandated for the enforcement of the Road Traffic Laws (Act No 11 of 2002 of the Laws of Zambia). They enforce the law by ensuring that those who break it are brought to book. Law breakers are subjected to payment of Admission of Guilty money and an official receipt Accounts Form 72 is issued. Perpetual offenders are taken to subordinate courts (Zambia Police 2023).

And lastly Lusaka city has the Lusaka Urban Development Plan; this is a proposed land use plan up to 2030 for Greater Lusaka. In trying to promote economic development in the city the plan promotes the establishment of satellite cities in adjacent areas of the city for example Chibombo, Chongwe and Kafue Districts using the garden city development concept. As development in satellite towns happens more people are relocating to these satellite towns whilst still commuting for work in the CBD and hence put pressure on the highways like GER due to high number of vehicles daily.

2.7. The Brief History of the LDP

In order to manage and decongest the City of Lusaka various road infrastructure development interventions were put in place, some of which include the Lusaka Decongestion Project (LDP) focused on the expansion and upgrading of roads within the city to good-quality standards. This is consistent with the National Road Traffic Safety Policy and Action Plan, which envision "a safe road network for all road users" in line with the United Nation's Decade of Action for Road Safety, which declared a goal of reducing road fatalities by 50 percent by 2020 (Ministry of Transport and Communications 2016).

The stated objective of the Lusaka Decongestion Project was to decongest the city, by redesigning the major road network, with a view to reducing traffic jams, travel time, travel distances and saving precious fuel. Mutumweno (2021) indicated that, this dream was being realised following the conception of the project planning in 2008 when the Ministry of Local Government, its local authority Lusaka City Council (LCC) and the Japan International Cooperation Agency (JICA) re-planned the road network. The LDP commenced in 2018 with AFCONS Company as the main construction company. AFCONS International, an Indian firm, was contracted to build the roads, fly-over bridges and overpasses at a cost of US$389mn. It was co-financed by the Government of the Republic of Zambia (GRZ) (15%) and Exim Bank of India (85%).

The ground-breaking ceremony for the project took place on April 12, 2018. Three years along the line saw a massive change in Lusaka roads, with many of them transformed into four lanes,

thus facilitating the easy flow of traffic, enhancing movement of people and indeed the conduct of business. Scope of works include construction, rehabilitation and widening of 120.7 km of roads (Lusakatimes.com 2017). The project also includes improvement of nine junctions along with four new fly-over bridges. Three bridges are already operational on Kafue Road; Longacres and Arcades roundabout and the project was completed on time in April 2021 (Mutumweno 2021).

Mutumweno (2021) further indicated that, one of the main features of the project was a new outer ring road from Kafue Road near Makeni area to the new Mumbwa Road and it stretch to Lusaka West and join the Great North Road on Chikumbi Road in Kabwe. Dubbed the 'Lusaka West Ring Road', it has since become the new highway for heavy goods trucks, easing traffic within the Central Business District (CBD), as a less congested CBD entails fast moving haulage (including inter-country) from Livingstone in the south to the Copperbelt in the north.

In addition, other salient features of the project included; dedicated bus lanes (though not implemented) in the middle of the road; modern street lights to be installed, Some roads such as Kasangula, Lake, Mwapona, Nangwena, Alick Nkhata, Munali- Mutumbi, Kamloops and Buyantanshi to be extended from two to four lanes, Ben Bella, Kafue; Great East (from Kabwe roundabout to Palm Drive), Independence and Kalambo Roads are being extended to six lanes; and Further road expansions are being made at the Church-Cairo junction, Kabulonga roundabout, High Court roundabout, Longacres roundabout and Mosio-Tunya Road (Mutumweno 2021).

2.8. Conclusion

Generally, the studies which deal with the traffic congestion mitigation, have however demonstrated that increasing the size of infrastructure could be only part of the answer (Erkul et al. 2016) as many measures are intrinsically interactive, which may need to be addressed jointly. With increased growth of traffic flow, it is crucial to develop cost-efficient measures, which would alleviate traffic congestion and address negative externalities in terms of social-economic impacts and cost to the economy (Khanani et al. 2020). Therefore, this study provides an opportunity for decision makers to investigate the decongestion of traffic on the GER. Lusaka is a city of concern, because of its central characteristics and requirement of the mobility of both light and heavy vehicles from all parts of the country and region, this makes the city face typical traffic congestion challenges in the CBD area, particularly during the peak

hours, which warranted this investigation. Lusaka has also received massive investments in road infrastructure compared to other cities and towns in the country.

2.9. Research Gap

Traffic congestion is a global problem that is affecting cities more especially the CBDs and as discussed by literature from various scholars it is not only in Zambia where the cities are facing this mobility problem in urban areas but it's a global problem that needs address. Various governments have come up with various measures to mitigate this problem of traffic congestion and the government of the republic of Zambia has also used various measures to solve this persistent problem such as expansion of roads. The government of Zambia in 2018 embarked on the construction of urban roads network under the LDP, with the aim of reducing congestion and travel time which was completed in April 2021 (Mutumweno 2021). But despite the completion of this massive project there has been inadequate information pertaining to the persistent traffic congestion, and there was need to assess the recently massive infrastructure project amidst the traffic congestion problem and hence this study.

2.10. Ethical Consideration

The ethical consideration for this study was sought from Natural and Applied Sciences Research Ethics Committee (NASREC), Road Transport and Safety Agency (RATSA), and Lusaka City Council (LCC). Participants for this study were treated with respect, consent was obtained from participants before they participated in the study, they had the right to understand what the researcher is doing and the researcher will share the findings with them for their reactions among others.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This section discusses the various methodologies that were used in the collection and analysis of data. The study used a mixed method approach by combining quantitative and qualitative methods of data collection. Creswell (2007) indicates that, a mixed method approach combines both qualitative and quantitative approach in a single study in order to see the same phenomena from different perspective so as to understand the problem more completely. Further mixed methods increase confidence in the findings, improve accuracy and completeness and enhance overall validity (McKim 2017). This chapter also outlines the research design, study site, target population, inclusion and exclusion criteria, sampling and sample size determination, data collection and analysis.

3.2 Research design

The study used a case study design so as to enable the researcher delve into the intricacies underlying traffic congestion on the GER. Welman and Kruger in White (2003: 68) explain that, "the term case study has to do with the fact that a limited number of units of analysis (often only one), such as an individual, a group or an institution, are studied intensively". The intent of employing a case study approach is to be able to describe the unit in detail (traffic congestion), in context and holistically. Therefore, by using this design, the researcher was able to have a deeper insight into the underlying causes of traffic congestion on GER. It used a mixed methods approach where qualitative and quantitative methods of data collection were used to enable the researcher triangulate the data to be collected. This entails that, the researcher was studying the participants in their natural settings for instance in bus stops and along the road, observations and vehicle counts were used. It involved the use and collection of a variety of materials that describe routine and meanings in individuals' lives (Denzin and Lincoln 2000). Quantitative methods, on the other hand, use numerical data to collect and analyze information from the respondents or participants.

3.3 Study site

Data was collected from selected parts of the newly redesigned Great east road in Lusaka. The study site was GER from Kabwe roundabout to Chelstone turn off and bus stops along GER. Lusaka City was chosen because of its central characteristics and requirement of the mobility of light and heavy vehicles from all parts of the country and region. GER due to the expanding city has a number of residential areas that depend on this road to access the CBD, the satellite town of Chongwe also has been greatly recorded population increase of late with many of its

residents still depending on Lusaka city's CDB for many services and hence GER housing a number of vehicles on a daily basis. This makes the city face typical traffic congestion challenges in the CBD area, particularly during the peak hours. Further the GER to be specific was selected because of it being one of the roads that were redesigned and improved to help reduce traffic congestion in Lusaka through the LDP. Using a non-random convenience/availability sampling method, public bus drivers, motorists and pedestrians were selected and data was collected from these people in Lusaka. The information collected included age, sex and the hours spent on the road. Thus, Figure 2 below gives the spatial orientation of the study area in terms of a map

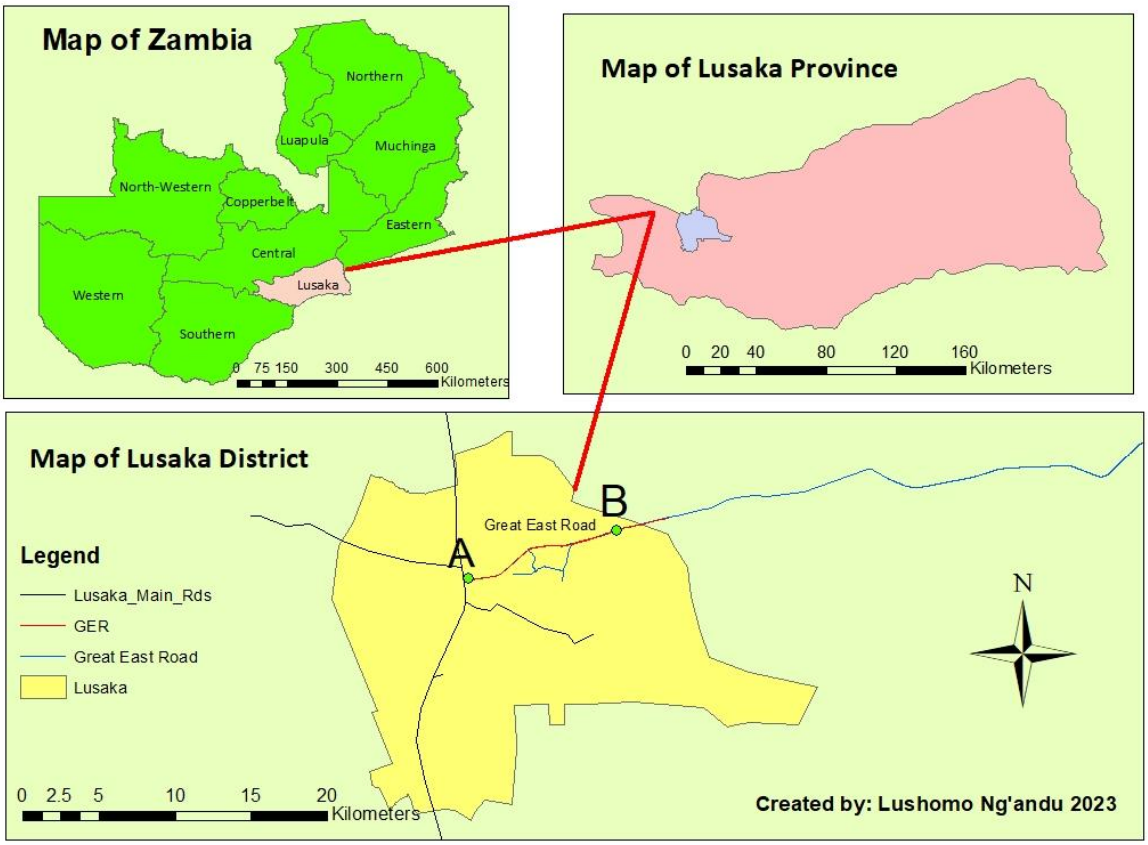

Figure 2. Map of Lusaka *Source: Composed by Lushomo Ng'andu (2022)*

3.4 Study population

In research, the term population is used to refer to the entire set of entities or members which the conclusion or generalization to be made is to embrace. It refers to all members of a hypothetical set of people to which the results of a research can be generalized (Denzin and Lincoln 2000).

According to Zambia Statistics Agency, Lusaka province had a total population of 3,079,964 in 2022 (Zambia Statistics Agency 2022). However, the population of interest in this particular study was the people who have been using the GER before and after the LDP. This included all motorists, public bus drivers, passengers and pedestrians. It was therefore not possible to know the exact population in this case.

3.5 Study Sample and Sampling Technique

It is a procedure a researcher uses to gather people, place or things to study (Creswell 2007). Lusaka City has a total of 5 bus stations that receive more than 50 buses on a daily basis, namely Inter-city, Lima tower, Lumumba, Millennium and City Market Bus stations. From the 5 bus stations, using convenience/availability sampling method, a total of 22 public bus drivers were selected for interviews from bus stations (only those that use the GER), a total of 30 passengers and 8 motorists were randomly selected from bus stops and shopping malls along GER (the researcher requested passengers and motorists from the named areas and those that agreed to be part of the study questionnaires were administered to them till saturation was reached). The selection of the 60 participants was based on convenience sampling techniques. Shopping malls along the area of interest GER (Manda hill, Arcades and East Park shopping malls) were visited by the researcher where questionnaires were administered to motorists using convenience/availability sampling techniques. Further observations and traffic counts were made on the GER at Bwinjimfumu Road (the location was chosen due to high volume of traffic as many people go for work around that area), this was done using the video recording device to capture the traffic flow for two separate times during peak hours and when there is normal traffic flow.

Lastly 4 institutions were visited namely Lusaka City Council Engineering Department; Ministry of Local Government and Rural Development; RATSA and Zambia Police–Traffic Section. Interviews were conducted using an interview guide to the officers in the traffic section department that were assigned to the researcher, were information of interest was collected. As the responses, (from passengers and drivers) reached above 30 they developed a pattern of common answers. Data saturation was reached as evidenced from common answers that were coming from the respondents, just like Francis et al. 2010; Guest et al. 2006). Grady (1998: p. 26) provides a similar description of data saturation as the point at which. New data tend to be redundant of data already collected. In interviews, when the researcher begins to hear the same comments again and again, data saturation is being reached; it is then time to stop collecting information and to start analysing what has been collected.

Table 1.0: Type of Respondents and Instruments Used

Type of respondent	Number	Instrument used to collect data
Public Bus drivers	22	Questionnaire
Motorists	8	Questionnaire
Passengers	30	Questionnaire
Key informants	4	Interview Guide

3.6 Data collection and extraction

The study collected both qualitative and quantitative data from selected participants. Primary data was collected from the study site through observation and traffic counts. A questionnaire was used for the public bus drivers, motorists and passengers, which was prepared by the researcher, where information of interest was recorded from participants in selected areas. Both self-administered (38 in total) and interviewer-administered (22) questionnaires were used for the study, with most self-administered questionnaires being with the bus drivers who were 15 in total representing 15% of the total respondents. This allowed for responses from the respondents of varying literacy levels to participate, some of whom required further assistance in providing responses. The questionnaires had open ended questions, which gave respondents the opportunity of writing any answer in the open space. In other words, respondents were able to express themselves through their responses. Closed ended questions were employed too, more especially in the biographical data. The closed questions are advantageous when a substantial amount of information about a subject exists and the response options are relatively well known to the respondent an example is the biographical data. Key informant interviews were used for the key informants from the selected institutions, where information of interest was recorded. The tools used were interview guides and a questionnaire. Remote sensed Imagery (Google Earth) and Observations were used to observe the flow of traffic during peak hours. Variables observed included public bus drivers, motorist and other road user behaviour, and traffic conflict points. It also included observing the challenges faced by road users while using the highway; this was done through the collection of live remotely sensed images during peak hours and during normal flow of traffic on the highway. Further traffic counts were made using the video recording device to capture the traffic flow for two separate times during peak hours and when there is normal traffic flow the data was recorded.

3.6.1 Inclusion criteria

The study considered participants who only use or have used GER in Lusaka, it considered every adult person (who qualify) regardless of the race and sex in the study. If a person is a

non-Lusaka resident but has used/ or uses the newly redesigned and upgraded great east road, such a person was also included in the study.

3.6.2 Exclusion criteria

On the other hand, the study did not include motorists and passengers that use other roads that are not GER and those that use other redesigned and constructed roads but not GER, because such roads were not part of the study, unless they were office bearers from the offices of interest; as such there were no participants from that category. The study further excluded people who use other means of transport except road transport.

3.7 Data collection procedure

The researcher got permission from each bus station manager to administer questionnaires to bus drivers, and only those that operate on great east road were conveniently considered as they were awaiting to load. The researcher later visited the bus stops and shopping malls on the newly constructed roads and administered questionnaires to other motorists and passengers and also made observations and traffic counts. The researcher also visited Bwinjimfumu along GER and mounted a video recording device on two separate occasions and recorded the traffic flow for both peak hours and normal traffic flow. Lastly the researcher visited the 4 institutions and interviewed officers from there.

3.8 Data analysis

The data obtained was analysed both qualitatively and quantitatively. Data analysis is an activity whose main purpose is to let the collected data '*speak for itself*.' In data analysis, the data obtained is summarized in a way that it will be easy to interpret and understand. The analysis was done with respect to the questions of the study. Therefore, the analysis of content of the responses obtained was done under various themes (Creswell 2009). Quantitative data, which is in numerical summaries, was analysed using descriptive statistics generated by Statistical Package for Social Science (SPSS) which is a data analysis software. The data was analysed using tables, percentages as well as totals to present and summarize data for easy analysis. Cross-tabulation was used, in order to make tabulation easier, a code book was developed where all the data was coded. The data coding sheet was then developed and used to permit data entry in code form. Qualitative data was analysed by categorizing the data into common themes.

3.9 Chapter Summary

This chapter delved into the methodology that was used for the study. A case study design was adopted in order to enable the researcher have an in-depth understanding of the subject under study. The researcher employed both qualitative and quantitative methods in data collection and this was mainly for the purpose of triangulation. Questionnaires and interview guides were used for data collection. The study population was public bus drivers, motorists and passengers who use GER. A sample size of 60 respondents was drawn. An inclusion and exclusion criterion was described in this chapter. Furthermore, data collection and data analysis procedures were also explained in this chapter.

The next Chapter is a presentation of the research findings.

CHAPTER FOUR: FINDINGS

4.1 Introduction

This chapter outlines the results of the data collected from the field. Issues covered include socio-demographic characteristics of respondents, causes of traffic congestion within the city, points of congestion, perceptions of road users on traffic congestion and efforts by road traffic management institutions in curbing traffic congestion.

4.2. Socio-demographic characteristics of respondents

The key variables analysed include sex, age, marital status, level of education, driver category and number of years spent as a driver. The respondent's sex is shown in Figure 3.

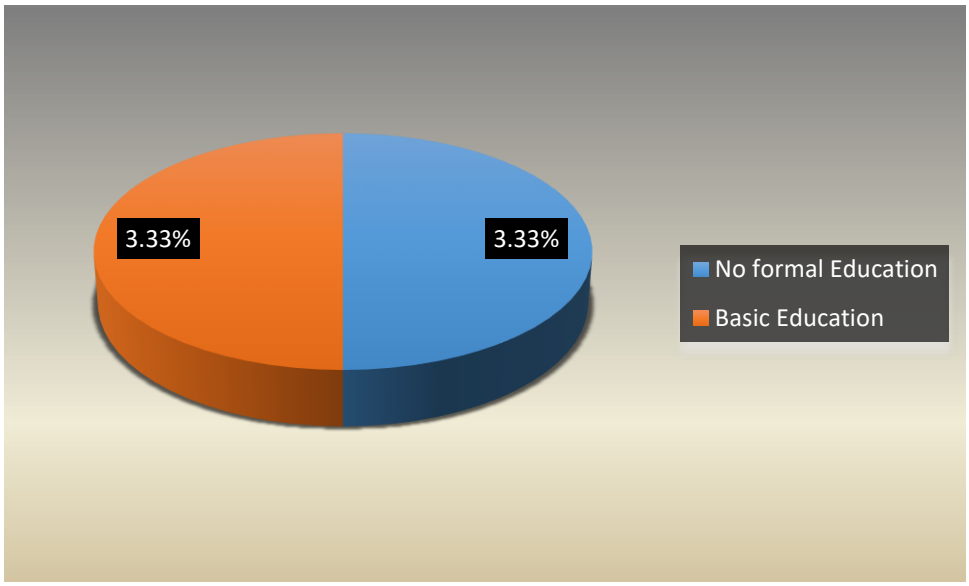

Figure 3: Sex of respondents
Source: Field Work, 2022

The findings revealed that out of the total number of respondents, which was 60, 44 were males while 16 were females. These findings represented 73.3% males and 26.7% females out of the total number of facilitators interviewed.

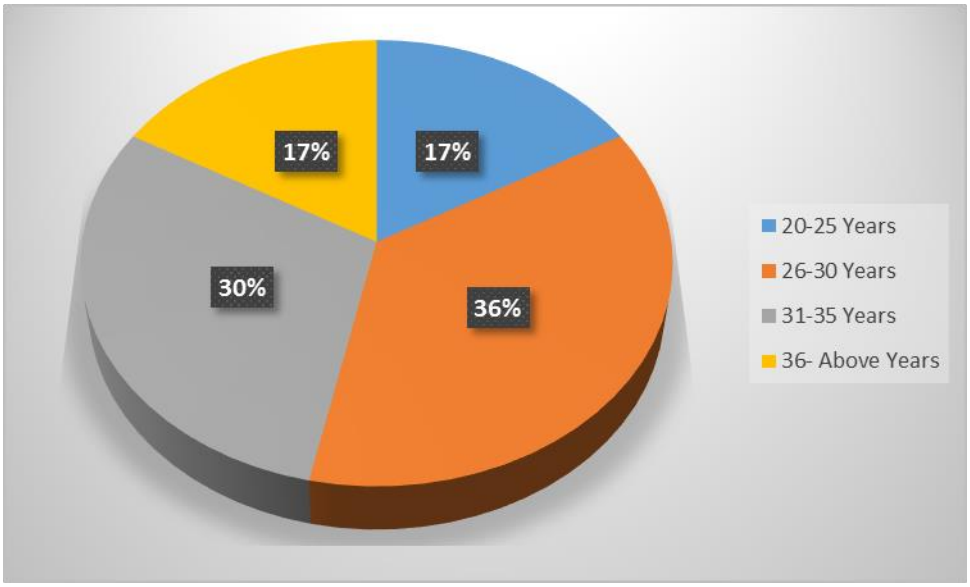

Figure 4: Age of respondents
Source: Field Work, 2022

From the age of the respondents ranges, it was revealed that age 26 to 30 years were the majority with 36% representation and the least with 17% were those aged between the age cohort of 20 to 25 and those above 36 years.

Table 2 gives more details of the age and category of the respondents.

Table 2. **Category of participants and their age group**

Age Range (Years)	Public Bus Drivers	Passengers	Motorists	TOTAL
20-25	4	6	0	10
26-30	6	14	2	22
31-35	6	8	4	18
36 and Above	6	2	2	10
TOTAL	22	30	8	**60**

Source: Field Work, 2022

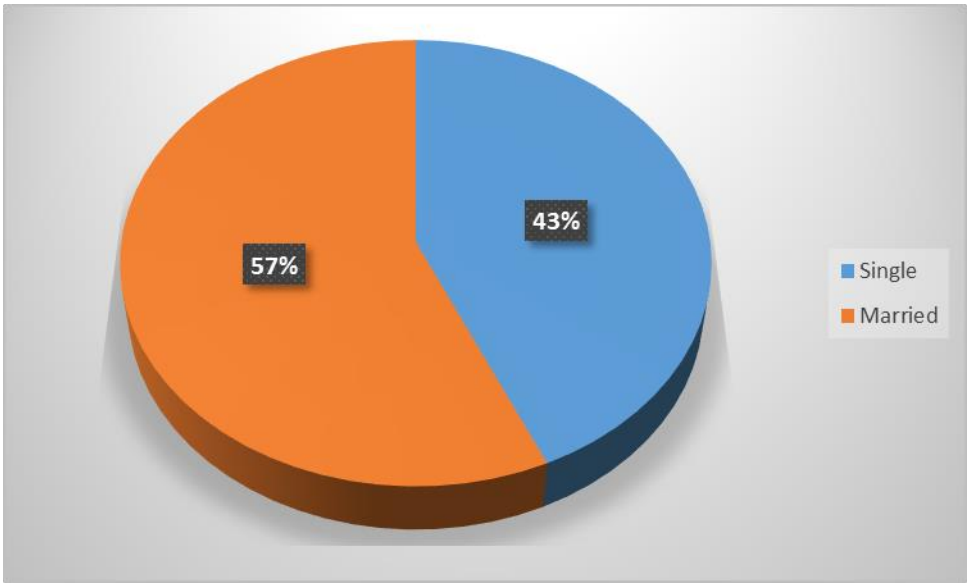

Figure 5: Marital Status of Respondents
Source: Field Work, 2022

It was established that 43% respondents were single and 57% respondents were married.

Figure 6 shows the category the respondents belonged to.

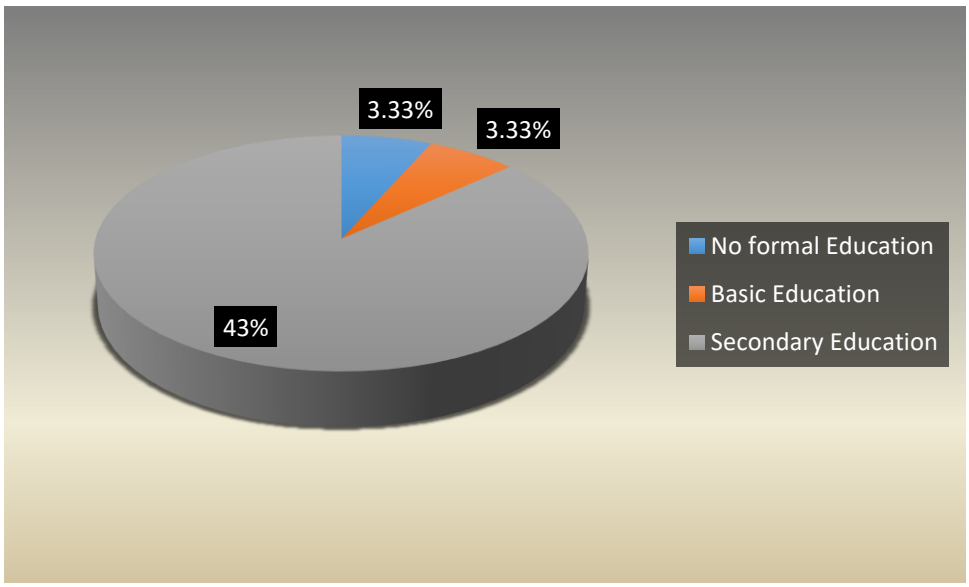

Figure 6: Type of a Respondent
Source: Field Work, 2022

The results revealed that 50% half of the respondents were passengers.

With respect to level of education, the findings in Figure 7 indicated that majority (50%) had attained tertiary education (college and university) levels, whereas 43% had completed secondary education.

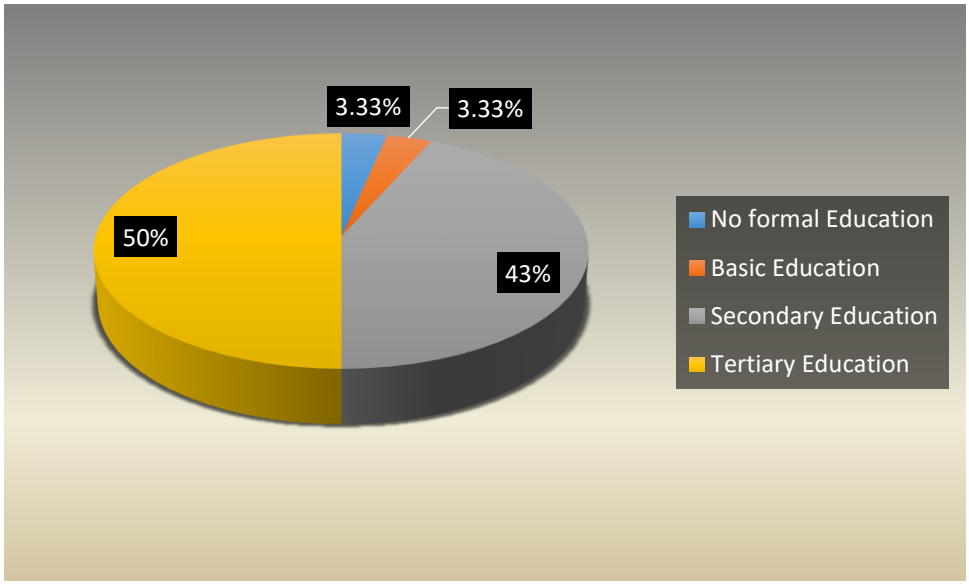

Figure 7: Highest level of education attained by respondents
Source: Field Work, 2022

Furthermore, the study explored the level of experience of respondents, in terms of how long they had been driving on Great East Road. The results presented in Figure 8 indicated that more than one third (33.3%) of the respondents had been driving on Great East Road Road for 6-10 years. These were followed by those who had been driving on GER for 2-5 years (23.33%). The least were those who had been driving for 16 and above years (6.67%).

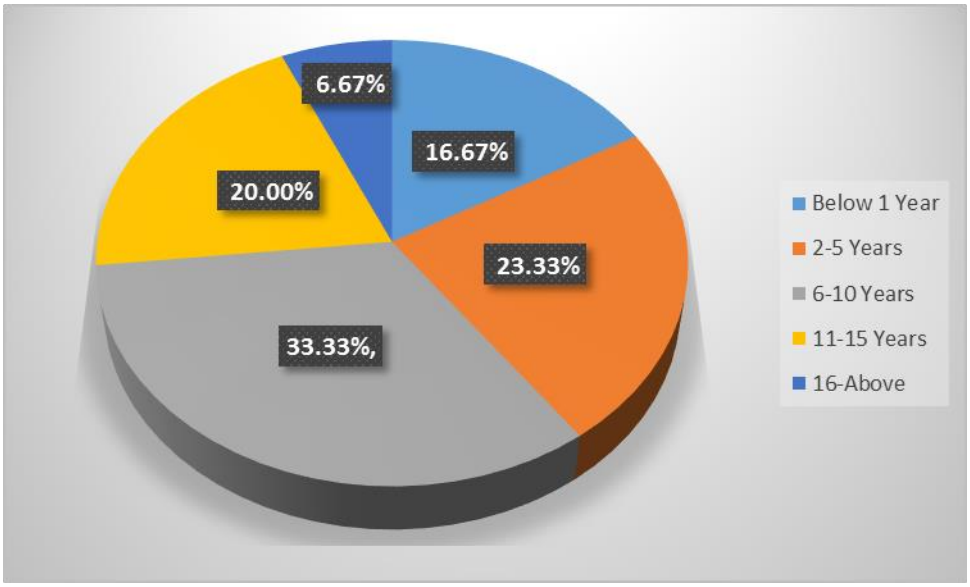

Figure 8. Number of years Using Great East Road
Source: Field Work, 2022

The detailed breakdown of the respondents according to their experience on GER and their categories is shown in Table 3.

Table 3: Years of Driving on GER

Years	Public Bus Drivers	Motorists	Passengers	Total
Below 1	4	2	4	10
2-5	6	2	6	14
6-10	4	0	16	20
11-15	8	2	2	12
16 & Above	0	2	2	4
TOTAL	22	8	30	**60**

Source: Field Work, 2022

Table 3 shows that the majority of public bus drivers that took part in the study (8), had been using GER for over 11 years and the majority passengers (16) had been at least using GER for 6-10 years giving them more details about how the road has evolved.

On reducing traffic congestion after implementation of the LDP, the findings indicated in Figure 9.

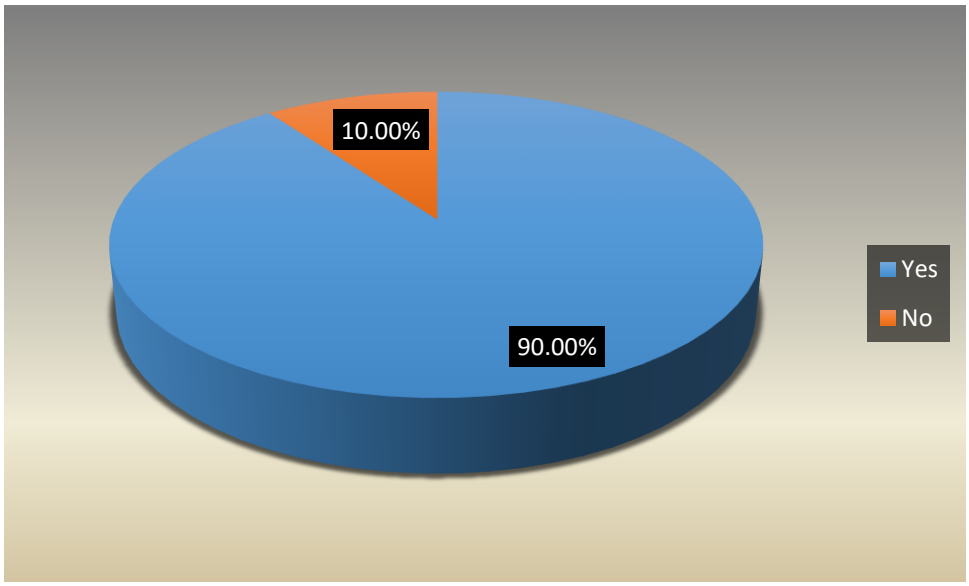

Figure 9: Reduction in Congestion
Source: Field Work, 2022

The study revealed that the majority (76.67%) of respondents were of the view that the LDP has helped in reducing traffic congestion and only 23.33% of the respondents said the LDP had not reduced traffic congestion.

4.3. Major points of congestions on GER

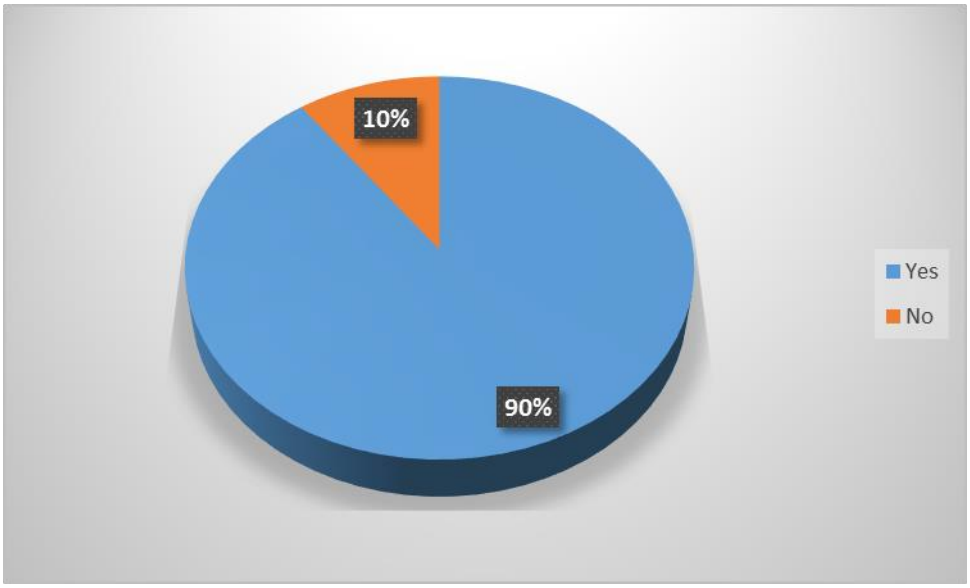

Figure 10: Awareness of points of Heavy congestion along GER
Source: Field Work, 2022

The results indicated that almost all (90%) of the respondents agreed that there points that were heavily congested and not the whole length of the road. Additionally, the areas mentioned by respondents and also from observation mostly were between the Munali Roundabout and the Chelstone turn off. From observations this is the area that has not yet been expanded to three lanes and is still only has double lanes.

Additionally, the engineer at MLGRD gave areas that are highly congested which are Chelstone, Hybrid area and Kabwe roundabout. The study revealed that the reason why the Kabwe roundabout area is congested is because of the spill over of traffic from Freedom Way in town centre that is heavily congested due to a lot of business activities happening there. Further at RTSA the engineer highlighted the zones of traffic congestion on GER which are at various points. He indicated that the major points are segmented into two for West bound it's from Chelstone tank to Chainama, and for east bound is from Chainama to Hybrid Roundabout. According to the LCC engineer, there are specific points where traffic congestion is highly experienced and these are Hybrid area and roundabout after working hours between 16:00hrs till 19:00hrs (East bound) and 07:00hrs to 09:30hrs for West bound early in the morning.
And lastly the traffic officer at Zambia Police, indicated that the main points of congestion are at intersection areas. He gave the following areas on GER, ZRA round about, Hybrid Roundabout and Munali Roundabout.

4.4. Causes of traffic congestion

This section of the chapter deals with specific objective two which sought to investigate the major causes of traffic congestion on GER.

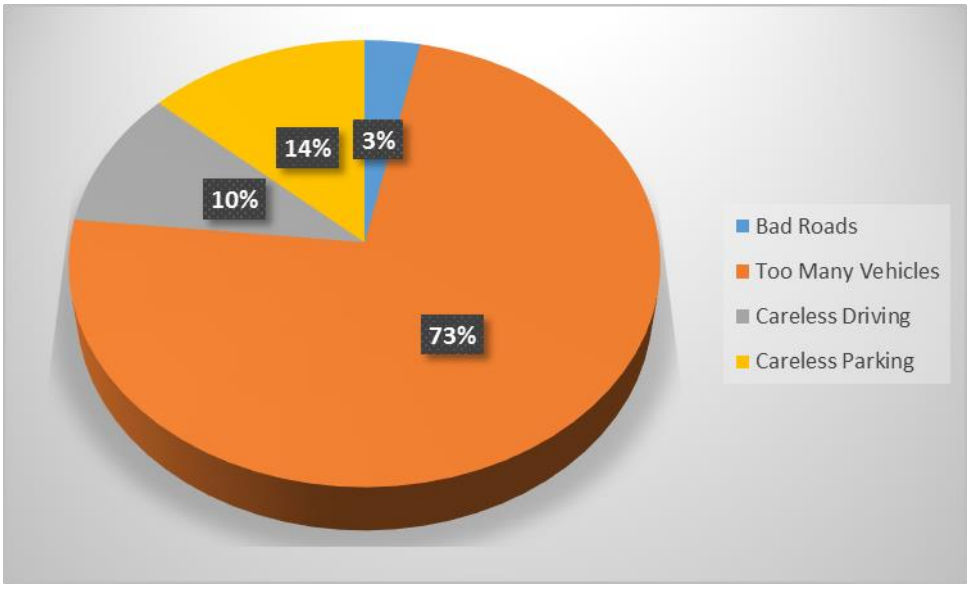

Figure 11: Causes of traffic congestion on Great East Road.
Source: Field Work, 2022

The results showed that most (73%) of the respondents considered too many vehicles on the road, as the main cause of traffic congestion only (3%) of the respondents stated that traffic congestion was caused by bad roads. See figure 11.

On periods of the day when there is traffic congestion peak hours on both directions (west bound those travelling from Chelstone to town and east bound those travelling from town to Chelstone). The majority (93.3%) of the respondents noted that congestion for west bound traffic usually occurs during early morning hours, between 06:00-09:00hrs am and 6.7% indicated mid-morning.

Further the respondents noted that congestion for East bound usually occurs during late afternoons. As shown in Figure 12, most (83.3%) of them opined that congestion usually occurs between 16:00-19:00hrs and only 3.3% indicated early afternoon hours between 12:00-16:00hrs.

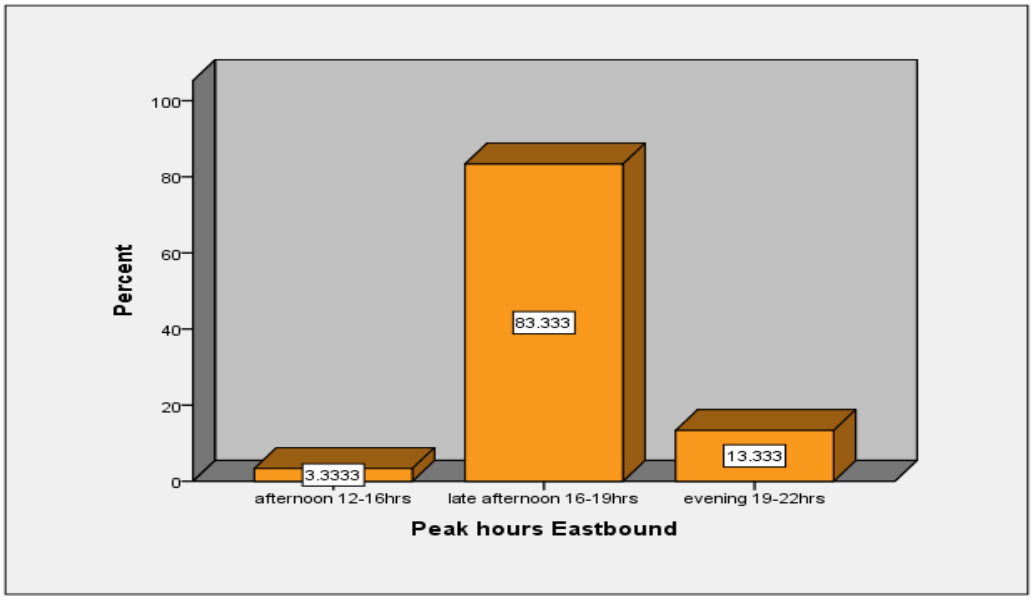

Figure 12: Peak hours East Bound
Source: Field Work, 2022

From the results in Table 4.***a***, it was established that almost half (43.3%) of the respondents noted that it took them over 60 minutes to move through GER during periods of traffic congestion. About one third (30%) indicated that it took them 45-50 minutes, where as 20% indicated that it took 31-45 minutes to move from their point of origin to their destination during peak hours.

Table 4: Duration of drive through with and without traffic

a) Duration spent on the Road with Traffic

		Frequency	Percent
Valid	< 15 minutes	2	3.3
	15-30 minutes	2	3.3
	31-45 minutes	12	20.0
	45-60 minutes	18	30.0
	> 60 minutes	26	43.3
	Total	60	100.0

Source: Field Work, 2022

b) **Duration spent on the road without Traffic**

		Frequency	Percent
Valid	< 15 minutes	6	10.0
	15-30 minutes	24	40.0

31-45 minutes	12	20.0
45-60 minutes	16	26.7
> 60 minutes	2	3.3
Total	60	100.0

Source: Field Work, 2022

Additionally, the study found that, 40% of the respondents claimed to use between 15 to 30 minutes to move from their origin to their destination when there was no traffic congestion on the road whereas, 26.7% of them took approximately 45 to 60 minutes. Only 3.3% indicated that it still took them over an hour to reach their destination. In this regard it could be deduced that it took less than 30 minutes to move from one point (point of entry on GER) to the other (point of exiting GER) within on GER during periods of less congestion. For instance, it could take a driver less than 15 minutes from Chelstone tank to town during periods of less congestion.

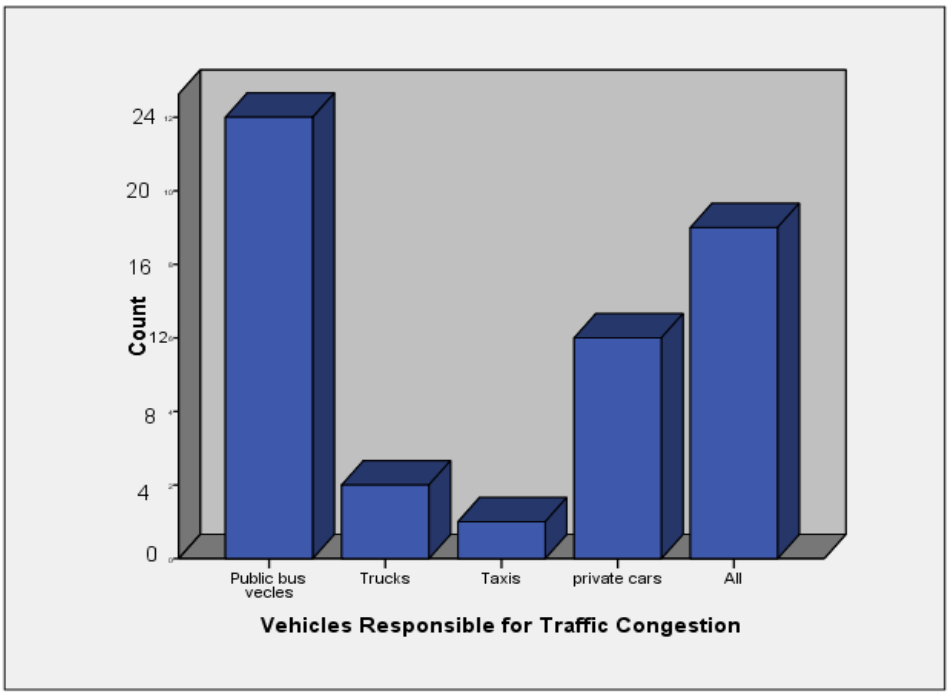

Figure 13: ***Categories of Vehicles Responsible for Traffic Congestion***
Source: Field Work, 2022

The results showed that more than one third (40%) of the respondents indicated that public buses were responsible for traffic congestion on GER, whereas 30% indicated that it was all the vehicles that were responsible not one single type. Those who indicated that it was the least (3.3%). See figure 13.

From information collected at the Ministry of Local Government and Rural Development, the study revealed that one of the biggest causes of traffic congestion is the limited road capacity, the engineer made mention that the road capacity compared to the increased number of vehicles, is the leading cause of traffic in many urban areas of Zambia, for many roads are single or double lanes, and on GER the engineer referred the part after Munali Flyover bridge the road is small with two lanes compared to the three lanes from Kabwe Roundabout. He also added that, 'with increase in vehicle ownership, more people have built residential houses in Silverest, Ndeke Meanwood and Kwamwena areas where they commute every day to the CBD for work and business', and GER is one of the major highways in Lusaka City.

Additionally, the engineer further indicated that there are other factors that contribute to traffic congestion on GER, which are lack of alternative routes or roads; lack of separate turning lanes at junctions and lastly lack of proper town planning. The engineer indicated to the researcher that the ministry is facing a challenge of road reserve encroachment due to poor town planning and hence it is often difficult to expand certain urban roads. According to RTSA's engineer the major causes of traffic congestion were attributed to the following; the bottle necks at intersections; unnecessary stoppages on the middle of the road to board passengers by public buses; and lastly the bottlenecks caused by quick drivers who are always rushing trying to skip the queues.

At LCC, among the causes of traffic congestion, the engineer mentioned, poor public transport, bad driver behaviour and poorly designed junctions that need improvement. The researcher was informed that there is unnecessary opening and u-turning points from one lane to another, and these have exacerbated the issue of traffic congestion and the bad driver behavior on highways which is usually portrayed by the public bus drivers.

At Zambia Police Traffic Section the Traffic Officer also indicated that the main cause of traffic congestion especially on GER is, increase of car ownership, which is coupled with poor behaviour of some road users. The traffic officer stated that, there are other road users who pack anywhere and anyhow causing some blockages on the normal traffic flow.

4.5 Effectiveness of the LDP

The Ministry of Local Government and Rural Development assigned a representative from the engineering department on urban roads. The engineer was interviewed to establish the extent of congestion on government urban roads and also to establish the extent of the traffic

congestion challenges before and after the implementation of the LDP in Lusaka District and if it is being monitored by the government.

The engineer alluded to the fact that, 'generally the LDP has been effective in reducing traffic congestion. This is evident from what he termed as 'a reduced queue length' which is the length of cars stuck in traffic from the point of congestion to the last one stuck, and also the time people start off from home has reduced for example if someone was starting off 1hr early before work they are now starting off about 30 minutes after the time they used to start off because of the improved traffic flow.'

In comparison to how traffic congestion used to be before the implementation of the LDP the engineer indicated that, 'it used to take about 4hours at peak hours for traffic to be cleared and have normal traffic flow, but now congestion at peak hours has reduced to about 2 hours and also the queue length has also reduced'. According to the engineer the peak hours are 07:30-08:30hrs west bound (traffic heading into town) and 15:30-18:30hrs East bound (traffic leaving town) as shown by the traffic jams in Figures 14 and 15 respectively. Further the key informant indicated to the researcher some of the noted economic benefits of the LDP to the road users which are; reduced travel time which allows people to move and do business quickly and suppliers can deliver goods within a short period of time.

Figure 14: **Peak Hour Traffic Congestion Kabwe round about**
Source: (Field Work, 2022)

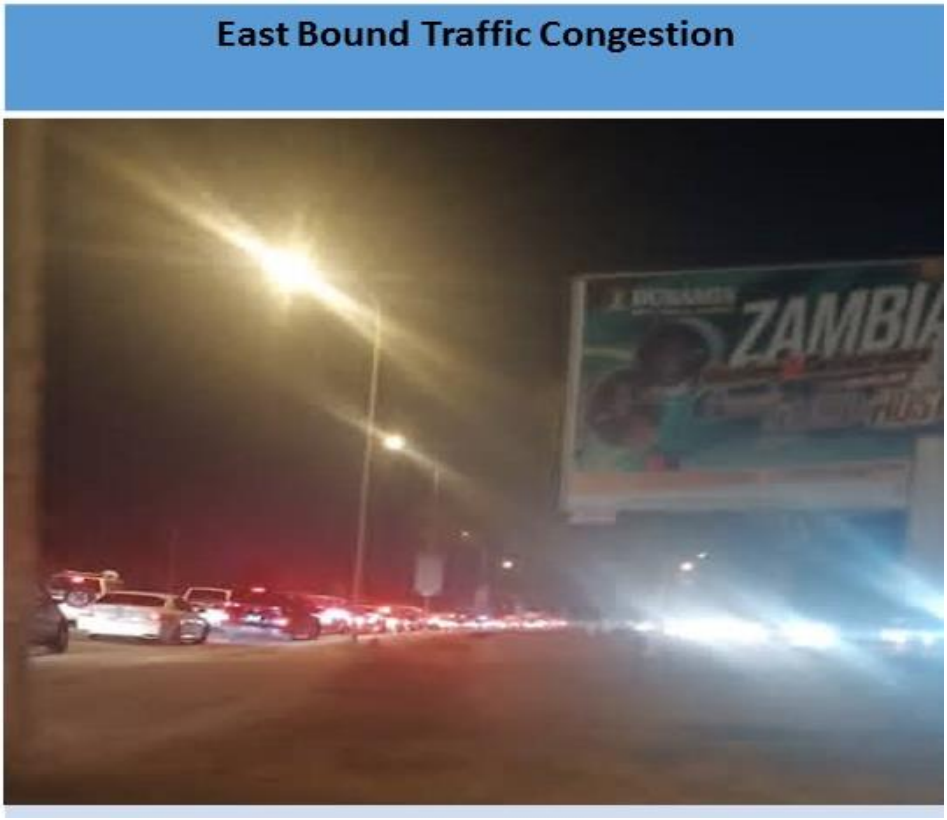

Figure 15: **Peak Hour Traffic Congestion Chainama College junction at 18:30hrs**
Source: (Field Work, 2022)

Further at the Road Transport and Safety Agency through the Road and Safety Engineer who was assigned to help the researcher with the information related to traffic congestion on GER, alluded to the fact that 'the LDP has helped in reducing congestion because it has reduced the conflict at Munali and Arcades Junction through the creation of the flyover bridges. Before the implementation of the LDP traffic stretched all the way back up to Manda Hill from Kabwe Roundabout.' RTSA also indicated that the LDP has been effective in traffic congestion reduction in the city, the bypass roads have helped reduce traffic on the highways. Further the engineer informed the researcher that this project has additionally come up with the economic benefits to many road users through the less hours spent on the roads and to the drivers this project reduced amount of fuel used and reduces the wear and tear of the vehicles caused by the frequent 'start-stop' motions during traffic jams, for the passengers it has reduced travel time and enhanced business activities that depend on travel time.

At LCC the researcher interviewed one engineer who was assigned by the Director of Engineering Department to help with the information related to traffic congestion in the city. The engineer from LCC alluded that the LDP has brought about the reduction in travel time. He indicated that before the LDP travel time was taking more than it is now. The researcher

was informed that the expansion of the roads has made it easy to move to work and on time. It is LCC's mandate to manage traffic lights, implementation of Road Acts and they are overly the custodians of the land inclusive of the road reserves.

At Zambia Police Traffic Section, the representative (Traffic Police Officer) assigned from the Traffic Department was interviewed and has served for 5 years indicated that the LDP has greatly helped in congestion reduction. He stated that *'some bottlenecks to normal traffic flow have been worked on, areas like the roundabouts have been a barrier to normal traffic flow'.*

4.6. Perceptions of road users on traffic situation after the LDP

On the perception of road users the results are in Figure 16.

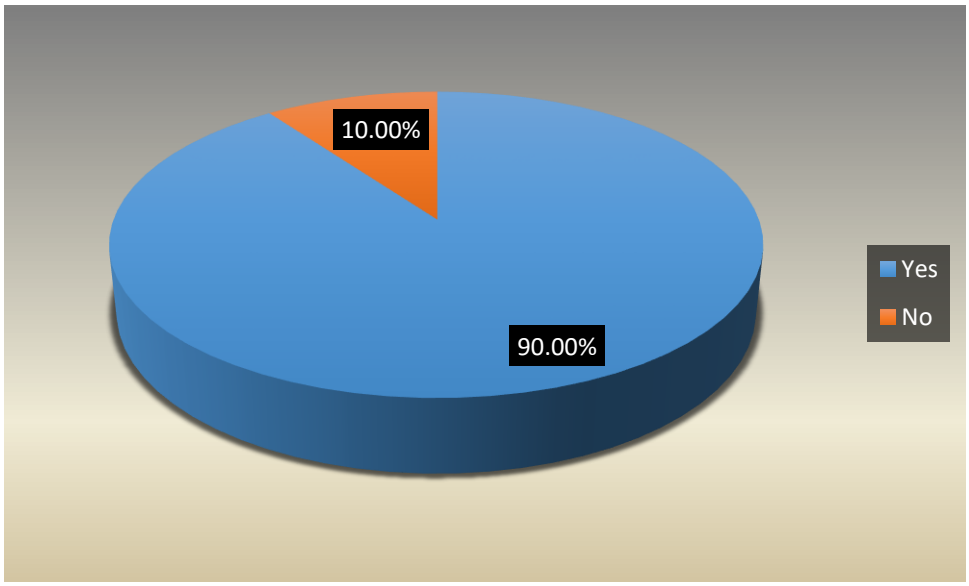

Figure 16: Perception of road users on traffic congestion
Source: Field Work, 2022

As indicated in Figure 16, the majority (90%) of the respondents perceived that traffic congestion was a challenge to road users.

Further the results show that almost all (93.3%) of the respondents attested to the fact that traffic congestion impacts negatively on their productivity, and only 6.7% said that no their daily output is not affected. The results also show that the majority (80%) of respondents agreed that the LDP has brought some economic benefits.

At MLGRD commenting on the perception of the stakeholders on the implementation of the GER the engineer indicated that 'generally they are all happy', he further said that the reason is because it boosted their economic benefits, citing the public bus drivers who are making more trips due to reduced traffic congestion. The engineer informed the researcher that the

institution has coordinated well with the LCC, RDA and RTSA in trying to solve the traffic congestion problem. The institution is mandated to support local authorities (council) and manage traffic through the construction of roads with the council jurisdictions. And the engineer was confident and alluded to the fact that the institution has been able to play its roles as seen in the completed LDP and that he can say that the stakeholder's perception with the LDP is good, they are generally all happy. Nevertheless the engineer also gave out some challenges that have been brought by the LDP, he mentioned that, "*despite the LDP having many positives it has brought about the following challenges; issues of road safety as the increased road capacity has become a challenge, there is an increase of road traffic accidents; right and left turn issues from highway due to a free flow of cars on the road such as the UNZA main campus entrance and Levy Mwanawasa University turn off which was recently closed and put on observation to assess the risks."* He further stated that shopping mall developers have complained about right and left turn access to their properties which have been closed.

At RTSA the researcher was informed that the perception from the public is that they are excited, especially about the fly over bridges that have helped in easing traffic flows especially on junctions. The institution has been having joint operations and there is collaborative efforts from the stakeholders on remedial engineering projects for managing traffic. Concerning the mandate of their institution in traffic management, the researcher was informed that the mandate of RTSA is to develop and implement policy on road traffic management and road safety, hence on GER they have put some practical measures in trying to bring safety such as the closure of right turn junctions to reduce bottlenecks and they have deployed officers to manage traffic on the ground. The engineer argued that to some extent the institution is playing its role in traffic management. Though the institution has faced some challenges as they try to play their roles, with the major ones being the compromised safety of pedestrians because of the widened roads. The other challenges which were given by the engineer are as follows; there is limited uptake of recommendation from RTSA by partnering institutions like RDA and the city council and there is also inadequate enforcement of bus drivers.

Generally at LCC the engineer indicated that, stakeholders are happy about the LDP because it has greatly improved their travel time and there is less tear and wear of their vehicles due to the improved road network. According to the engineer the institution is collaborating well with other institutions responsible for traffic management, the researcher was informed that there is a Road Safety Engineering Committee in which stakeholders such as RDA, RTSA take part to dialogue road related Issues. Despite the seemingly positive gains of the LDP, the engineer also indicated that, the project has brought the following challenges to other road users; over

speeding due to clear and widened roads. This has resulted into an increase in the recorded road traffic accidents. The engineer argued that the institution LCC has tried to play its roles fully the only challenge that they are facing is inadequate funds in order to effectively execute the duties on time and with improvements.

At Zambia Police the traffic officer equally indicated that the stakeholders are happy about the newly expanded roads and that they are helping out to boost the businesses of those who frequently use the roads for business such as bus drivers.

4.7. Observations

The researcher went on site to observe and record the traffic flow of vehicles on GER during peak hours and normal flow to try and see the difference. This was done using the video recording device to capture the traffic flow near Bwinjimfumu bus stop along Great East Road. The results are presented in Table 5.

Table 5: Volume of Traffic Flow Analysis

Road Times	Peak Total Volume Per Hour	Peak Total Volume Per minute
Peak hours 7-8am weekday	1545	36
Normal Traffic Flow 10-11am Sunday	325	10

Source: Field data, 2022

The results show that there were approximately 325 cars passing on the road per hour and 10 per minute and on the contrary the same place during peak hours recorded 1,545 cars per hour and 36 cars per minute.

Further after Munali the four lanes ends and flows into a two lanes which causes congestion on GER as shown in Figure 18 and also at Kabwe Roundabout near Zambia Revenue Authority (ZRA) there is traffic congestion which is as a result of the congested Freedom Way in the CBD where light trucks park to load and offload their goods (shown in figure 18).

Figure 17: Traffic flow on Great East Road Munali
Source: Google Earth, 2022

Figure 18: Traffic flow on Great East Road Kabwe Round About.
Source: Google Earth, 2022

Through the researcher's observation, it was revealed that many traders conducted their businesses by the road sides to catch a glimpse of people who are going home, so as to allow people using the roads to buy merchandise. This was prevalent in the CBD and this unregulated practice of drivers and passengers or traders results in traffic congestion on the affected roads (Great East Road).

4.8. Role of road management institutions in managing traffic congestion

Road traffic institutions play various roles in their day-to-day operations. Institutions such as Road Transport and Safety Agency (RTSA), Zambia Traffic Section of the Zambia Police, Lusaka City Council (LCC) and Ministry of Local Government and Rural Development play diverse roles in ensuring that the roads in urban areas are safe for users. On the effectiveness of the institutions in helping to deal with the road traffic congestion, the results are shown in Figure 19.

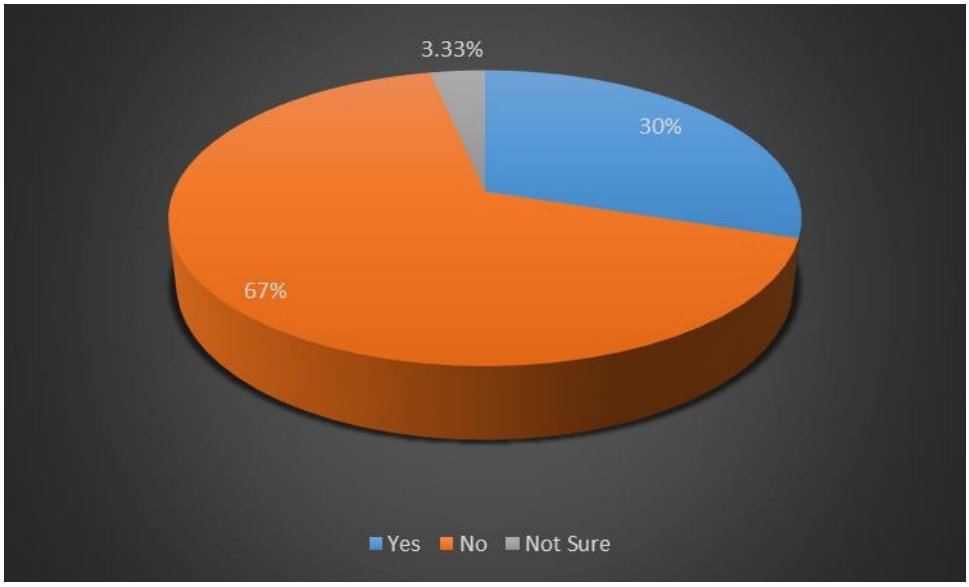

Figure 19: Road Traffic Institutions performing their Roles.
Source: Field Work, 2022

The results shown that majority (67% of the respondents) opined that these road management institutions are not effectively undertaking their roles as expected and only 3.33% of respondents indicated that they are not sure if the institutions are performing their roles or not.

Further **t**he results also indicated that the majority (90%) of the respondents do not know any institutions for channelling their challenges or grievances concerning traffic management and only 10% know established channels for expressing their challenges and grievances.

4.9. Chapter Summary

The Chapter was a presentation of the research findings on the investigation of traffic congestion on GER after the completion of LDP. The findings were presented according to the category of respondents.

From the findings, it was revealed that there was an array of factors that led to traffic congestion with the increase of vehicles being the leading cause of the persistent traffic congestion. The

points of heavy traffic congestion on GER were identified, the most affected area, being the area between Munali Roundabout to Hybrid bus stop. This is an area that was not expanded to many lanes with the LDP. Additionally, the findings revealed that the majority of the stakeholders are happy about the implementation of the LDP as it has helped reduce some congestion challenges faced in the city. With regards to the effectiveness of the LDP in reducing traffic congestion, the participants expressed happiness and agreed that the travel time has reduced and hence the LDP has helped them do their businesses well.

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 Introduction

In this chapter, findings presented in Chapter four are discussed in relation to the set objectives. Some of the things discussed include the effectiveness of the LDP in reducing congestion, the causes of traffic congestion on GER, the major points of congestion and the stakeholder's perception on whether the LDP has helped in reduce traffic or not.

5.2 Effectiveness of the LDP in reducing Traffic congestion

The study set to assess the effectiveness of the LDP in reducing traffic congestion along GER. The results established that, the LDP has indeed been effective in reducing traffic congestion in that it had helped in reducing the travel time and improved traffic flow and hence boosting the business in the CBD. This finding was in tandem with Kibunja (2009) who postulates that, traffic congestion leads to wastage of time and money and inconveniences commuters in accessing the CBD. The study showed that indeed the LDP has brought about reduced travel time and the widening of the roads have helped in having a reduced queue length in traffic jams. In his study Arasan (2012) postulates that, a good road with smooth traffic flow reduces travel time and encourages investments, at the same time an effective transportation system helps to maximize the economic efficiency of the city, while an inferior system retards economic progress. Eddington (2006) added that travel reliability is critical to some business sectors, especially those that deal with perishable goods as well as those that rely on just- in-time (JIT) deliveries.

It is very important in sustaining economic growth in contemporary economies since it provides linkages between different parts of the country and the global world. It links to work, deliver products to market, underpins logistics and supply chain, and support local and international trade (Eddington 2006). A good-established transportation system is not only key to national growth but also serves as catalyst for economic development of a country. This view is further shared by Weisbrod and Reno (2009), when they state that effective transportation system increases productivity in terms of job creation, reduction in business operation cost, improved output, expanded market and increase in economic competitiveness. The direct benefit of an efficient and effective transportation system reflects in the reduced travel time, which translates into cost saving, increase in output and ultimately GDP (Kulash 1999).

An effective transportation system is therefore key in sustaining economic growth in the contemporary economies by its capacity to link people to job, deliver products to markets

where there is demand, drives supply chain and logistics and enabling domestic and international trade.

5.3. Major Causes of Traffic Congestion

The findings of this study revealed that the major cause of the persistent traffic congestion is the increase in car ownership caused by a growing economy, this is in line with the study by Takyi et al. (2013) who argued that whereas traffic congestion disrupts business activities and reduces productivity level, research has shown that it may also be a symbol of growth in an economy. As the economy grows and real income of household increases, vehicle population surges up, contributing to traffic congestion, particularly within cities. Given the critical importance of productivity on the Gross Domestic Product (GDP) growth, it is economically worthwhile, and of policy importance to recognize the deleterious effect of traffic congestion on productivity (Takyi et al. 2013). Further Rodrique (2009) stated that congestion can be perceived as unavoidable consequences of scarce transport facilities such as road space, parking area, road signals and effective traffic management.

Further a study by Broadstock et al. (2011), states that increasing wealth and high population, result in more car ownership than current transportation network can handle. It can be argued that there is a relationship between income level and car ownership and that the dominance of private car usage, particularly within cities, is likely to increase even further as a result of rise in household income with its attendant traffic congestion. This situation has contributed to excessive traffic congestion within the city especially at the CBD and thus affects the logistics system and business activities in Lusaka.

The study further revealed that careless parking is also a leading contributor to traffic congestion. This is mostly as a result of the public bus drivers who are trying to compete in business to pick-up passengers even on areas that are not designated for packing and hence disturb the normal traffic flow. Downie (2008) adds that high urban mobility rate also contributes to the congestion menace. Downie (2008) further states that road parking, which consumes large amount of space has become a land issue that greatly inflates the demand for urban land, causing congestion in cities. Ministry of Transport and Communications (2016) indicated that, the increasing number of private cars leads to traffic congestion as drivers often spend time on the road looking for a suitable parking near their destination.

5.4. Major points of congestions

The study revealed the improvements that have been brought by the LDP such as expanded roads, the bypass roads to avoid traffic and the implementation of the fly over bridges at roundabouts and intersections such as at arcades roundabout and Munali roundabout traffic situation has improved. The flyover bridge act as a control system at intersections that are key for ensuring effective transportation system in the urban areas. The improved area by the LDP has improved road space and road signs in tandem with Shapiro et al. (2002) who assert that improving road space promote mass transit which is a prerequisite for ensuring efficient and effective transportation system in urban areas and reduce traffic congestion.

The study reviewed that Hybrid roundabout is another point that is characterized with massive traffic congestion especially during peak hours. The major cause of congestion at this point mainly is the smaller bus stop that is coupled with many buses converting the bus stop to a bus station and loading people to Chongwe a satellite town of Lusaka. The bus stop is smaller to accommodate the high traffic in Lusaka and has clearly reached capacity hence the call for a bigger bus stop away from the highway. The many smaller bus stops have been in existence from a long time ago when there was a small population and few vehicles in the city. Most public bus drivers load and offload passengers on the road instead of the bus stops. This is similar to the study done by Zambia Institute for Policy Analysis and Research (ZIPAR) (2019) who argued that, most bus operators take to unloading and loading passengers from outside the stations, causing obstruction to the normal flow of traffic, thus perpetuating congestion.

5.5. Perception of the stakeholders

The study revealed that stakeholders expressed satisfaction with the LDP in easing traffic flow. Just like Mutumweno (2021) indicate that Zambia has more than 780,000 cars, with Lusaka accounting for 60%, representing around 480,000 cars and a recent University of Zambia (UNZA) report showed that motorists lose an average of US$100 on a monthly basis due to high fuel consumption and low productivity in view of the traffic congestion in Lusaka. While the city population and the number of cars has been on a rapid upswing over the years, road infrastructure development has lagged behind with no meaningful and sustainable works being undertaken for years on end. The completion of the LDP curbed this loss in fuel due to delays in traffic congestion. Many drivers have over the years complained about regular occurrences of wear and tear to their vehicles due to bad roads, teeming with potholes, for instance AFCONS executive director for surface transport, Akhil Gupta, said at the launch of the project, "*because people spend a lot of time in traffic, vehicles consume a lot of fuel, but*

implementation of the project will reduce the government's fuel import bill and commuting time will be faster,'' (Lusakatimes 2017).

The stakeholders are said to be benefiting from the LDP with economic benefits, because of less time spent on the road. According to the project cost benefit analysis, the city was losing a lot of time in commuting due to congestion, and this also resulted in high levels of pollution emissions from vehicles (Mutumweno 2021). The increase in vehicle population, brings about Greenhouse Carbon gas emission increase which is then coupled with the loss of forests and steadily compromise the capacity of the eco-system to balance the process of trees to absorb Greenhouse carbon gases and reproduce oxygen gas that supports life and good health. Reduced traffic congestion boosts the business of most road users and public bus drivers indicated that working/expanding more roads following the design used by the LDP in the city is a welcome move which they would like the government and local authorities to look into. Results are similar to Weisbrod et al. (2003) who emphasize that increased traffic congestion imposes cost upon commuters and affect business operations and Crowther et al. (1963), indicated that, cutting traffic congestion by half will bring huge economic benefit to economies. This statement lends credence to the fact that traffic congestion has negative impact on productivity. For instance, in August 2010, Habee, one of the provinces of China experienced what is considered the world worst traffic jam ever, as traffic congestion stretched more than 100km from August 14 to 26 (Hickman 2010). This situation obviously had implication on productivity and the socio-economic development of the province at large.

5.6. Chapter Summary

The findings of the study were discussed as they contributed to assessing the effectiveness of the LDP in reducing traffic congestion along GER. The results established that, the LDP has indeed been effective in reducing traffic congestion to a greater extent. One of the findings was that the, participants attested that the LDP has helped in reducing the travel time and improved traffic flow and hence boosting the business in the CBD. Some stakeholders agreed that, the widening of the roads have helped in having a reduced queue length in traffic, and the participants appreciated the fact that they were able to do their businesses in a quick manner when traffic flow is not blocked and the project just responded to their needs.

Further the factors that lead to traffic congestion were discussed and among them was careless parking. Mostly public bus drivers load and offload passengers on the road instead of bus stops and this brought traffic. In relation to a need for effective traffic management, the study

revealed that effective traffic management and control system is key to ensuring effective transportation system in the urban areas.

CHAPTER SIX: CONCLUSION AND RECOMENDATIONS

6.1 Introduction

In this chapter, conclusions and recommendations are drawn and made, respectively, based on the research findings and discussions of the study. The conclusions will be presented as they were aligned to each of the objectives that were set for the study followed by the subsequent recommendations for possible future research.

6.2. Conclusion

The main objective of this study was to investigate the decongestion of traffic on the Great East Road after completion of the Lusaka Decongestion Project. The study was set to assess the effectiveness of the Lusaka Decongestion Project in reducing traffic congestion along the Great East Road, to investigate the major causes of traffic congestion on Great East Road, to ascertain major points of traffic congestion on Great East Road and to examine the perception of affected stakeholders on Great East Road after the Lusaka Decongestion Project.

It was concluded that the Lusaka Decongestion Project (LDP) has helped reduce traffic congestion and hence bringing a positive effect on the road users (stakeholders). More than 76% of the respondents agreed that the LDP has helped reduce traffic congestion and 36.7% of these were public bus drivers, 13.33% were motorists and 50% were passengers who were the majority.

From the study it can be concluded that despite the successful implementation of the LDP there is still a problem of traffic congestion within the City. The study found that the causes of traffic congestion on Great East Road, as indicated by the respondents ranged from increasing number of vehicles using the roads (as the major contributor of traffic congestion), careless parking by drivers along the highway, careless driving by some drivers and smaller roads (bad for many vehicles) especially on the parts that were not expanded by the Project. In addition, the reviewed literature shows that congestion has become part of everyday life in the city, authorities should devise policies to help manage congestion on affordable basis to relief commuters of the difficulties imposed upon them by traffic congestion.

The study revealed that traffic congestion on roads does not occur every day and all day, but during specific periods or times of the day. For east bound traffic, congestion is at its peak during week days around 16:00-19:00hrs as indicated by the majority respondents and this is because these are periods during which people commute from their place of work to their respective homes (evening). For West bound the majority indicated during early morning 6:00-

9:00hrs as these periods are usually noted as ‘rush hours’, the period during which people commute from their homes to their respective place of work.

The study also found that there are specific places or points that are heavily congested. These are the area between Munali Roundabout to Chelstone turn off, as this area was not expanded with the LDP it is still a double lane and also the Kabwe Roundabout as it experience a spill over traffic jams from freedom way in the CBD where there is poor parking and some light trucks loading and offloading their goods.

Findings revealed that the respondents perceived traffic congestion as a challenge to road users. It constituted a major challenge to drivers and road management institutions and thus more than half of the respondents are excited about the LDP for it has reduced travel time and helped reduce traffic congestion. Motorists and public bus drivers requested for the government to expand this project even to other roads that were not touched by the project in order to ease their business.

The study also revealed that many respondents indicated that road traffic management institutions are not playing their roles as expected of them. Their request was for more traffic officers on junctions to ensure that rules were followed properly by every road user and in response to this the institutions responsible complained of low funds to carry out their duties effectively hence seeking for more funding and support from the central government. Besides, road traffic management institutions are expected to strengthen the existing measures being used to address traffic congestion in the city as they are collaborating well with all responsible institutions responsible for traffic management.

Lastly from the study it can be deduced that congestion impedes us from moving freely and that it disrupts business activities in cities and reduces productivity, it affects speed and smooth traffic flow. This affects a wide range of activities, services, goods, markets opportunities in the cities which can best be delivered through transport mobility. Traffic congestion also reduces productivity for most business activities that depend on timely delivery of logistics and therefore there is need for everyone to ensure that traffic congestion is minimized at all cost.

6.3 Recommendations

In connection with the key findings, the study suggests the following recommendations:

- The Government to embark on developing smart infrastructure. Smart infrastructure describes the concept of equipping the existing road infrastructure with technology, such as GPS, cameras, and sensors, to collect data through constant traffic monitoring. This can make decisions regarding urban challenges easier through data and feedback collected through constant monitoring.
- As the government expand major roads into the CBD, there is need to create safe turning lanes create more alternative routes on the highways to minimize accidents.
- The government through relevant agencies should sensitize the road users on available channels of registering their traffic related challenges and complaints to authorities. Hence public education should become a priority by the responsible institutions.
- There is need by the government to encourage use of public transport as possible effective strategies available in dealing with congestion situation, caused by many private car usage.
- Government should phase out the small mini buses and introduce larger buses which will be fewer on the roads.
- Creation of a big bus station at Hybrid to allow free flow of traffic at highbred roundabout.

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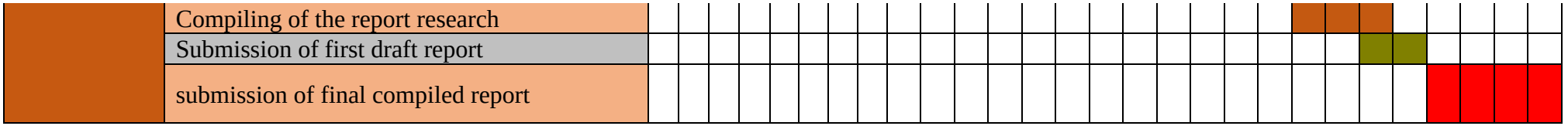
APPENDIX 1: WORK PLAN

The table below shows a work plan of this research from proposal development to the submission of the final dissertation

5.1 Work Plan

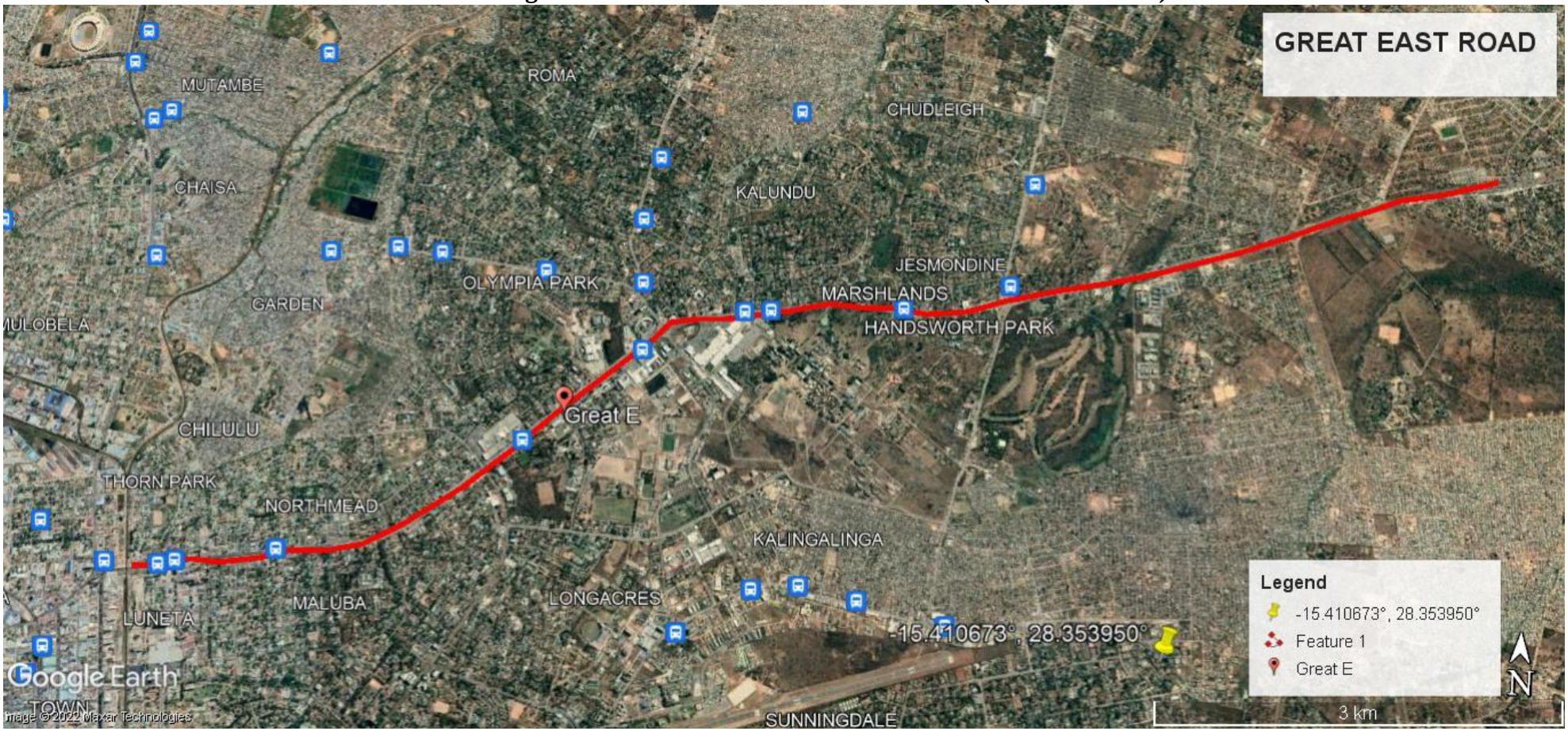
Phase	Research Activities	Timing (2021-2022)																											
		November-February				March - July				August				September				October				November				December			
										1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Preliminary	Proposal development																												
Planning and proposal development	Presentation of proposal at the post-graduate forum																												
	Making of corrections on the proposal and submission to the school																												
Field Work Activities	Going in the field to gather required data																												
Processing of Field Data	Carefully analysing and interpreting of data																												
	Presenting and discussing of results																												


Compiling of the report research
Submission of first draft report
submission of final compiled report

APPENDIX 2: BUDGET

Item Description	Quantity	Estimation of duration in days	Unit Cost (ZMK)	Total Cost (ZMK)
Stationary				
1. Note book	5		K15	K75
2. A4Bond paper	1 reams		K70	K70
3. Pens	5		K2	K10
5. Stapler	1		K40	K40
7. File	1		K30	K30
8. Staples	1box		K10	K10
Sub total				K**235**
Services				
9. Ethics				k1000
10. Printing, Photocopying and binding of proposal				k500
12. Data collection (Transport and Lunch)	1	2 visits per institution for data collection.	K200	K5,000
13. Printing, Photocopying and binding of reports				k1,500
Sub total				**K8,000**
14. Contingence funds				K1,078
GRAND TOTAL				**K9,313**

APPENDIX 3: Google Earth Orientation of Great East Road (Area of interest)



APPENDIX 4: QUESTIONNAIRE FOR PASSENGERS, MOTORISTS AND DRIVERS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
MASTER OF SCIENCE IN GEOGRAPHY

QUESTIONNAIRE FOR DRIVERS, MOTORISTS AND PASSENGERS

I am a post graduate student from the University of Zambia. My research is entitled **"**An assessment of the Lusaka decongestion project: A case study of great east road." The main objective of the study is to investigate the decongestion of traffic on great east road after the Lusaka Decongestion Project in the city of Lusaka. This questionnaire is designed to produce information regarding to this research work. You have been purposively selected to participate in this study by means of an interview. You are requested to respond as truthfully as possible. All the data gathered will be treated with anonymity and confidentiality. Information given will solely be used for this research. You should therefore feel free to give the right information to ensure the success of this work. Kindly sign in the space provided below.

I hereby declare that I have freely given my consent to the said Lushomo Ng'andu computer No: NS2100028, to answer the questionnaire in relation to his Master of Science in Geography Programme. I do understand and accept that the contents of the interview would be used for strictly academic purposes and the said Lushomo Ng'andu would ask my permission before quoting me even indirectly.

…….. Date ……
Lushomo Ng'andu
Respondent signature…… Date …….. .

Section A: Background information

1. Sex
Male [ ]. Female [ ]
2. Age
Below 18 [ ]. 18-19 [ ] 20-25 [ ] 26-30 [ ] 31-35 [ ] 36 and above [ ] Others Specify …..
3. Marital status
(a) Single [ ]. (b) Married [ ]. (c) Divorced [ ]. (d) Widowed [ ]
4. Level of education
(a) No formal education [ ]. (b) Basic [ ]. (c) Secondary [ ]. (d) Tertiary [ ]. (e) Others Specify.....

Section B: Issues of traffic congestion

5. Are you a driver [ ] or a passenger? [ ] (Others specify).....
a) If you are a driver, in what category are you in?
   i) Public transport [ ]
   ii) Private transport [ ]
   iii) Other [ ] Specify.....
b) What type of a vehicle do you drive?

i) Public bus [ ]
ii) Private Car [ ]
iii) Others Specify ……..

c) How many number of years have you been driving?
i) 1 year and below [ ]
ii) 2-5 [ ]
iii) 6-10 [ ]
iv) 10-15 [ ]
v) 15 and above [ ]

d) Number of years driving on Great East Road? (Specify)
i) 1 year and below [ ]
ii) 2-5 [ ]
iii) 6-10 [ ]
iv) 10-15 [ ]
v) 15 and above [ ]

e) License category? .....

6. If you are a passenger for how long have you been using Great East Road?
i) 1 year and below [ ]
ii) 2-5 [ ]
iii) 6-10 [ ]
iv) 10-15 [ ]
v) 15 and above [ ]

7. In your view what do you think are the major causes of traffic congestion on Great East Road?
i) Bad Roads [ ]
ii) Too many vehicles [ ]
iii) Careless driving by motorists [ ]
iv) Careless parking [ ]
v) Others Specify……

8. Are there points that are heavily congested with traffic on Great East Road? Yes [ ] No [ ]

9. If Yes to Q. 8, what are those major points of traffic congestion on Great East Road?
I. ……,
II. ……,
III. ……

10. Which times of the day do you experience much traffic congestion?

a) Eastbound
i) Early morning [ ] between …… and ……..
ii) Mid-morning [ ] between …… and ……..
iii) Mid-day [ ] between …… and ……..
iv) Late afternoon [ ] between …… and ……..
v) Evening [ ] between …… and ……..
vi) Others specify……..

b) Westbound
i) Early morning [ ] between …… and ……..
ii) Mid-morning [ ] between …… and ……..
iii) Mid-day [ ] between …… and ……..
iv) Late afternoon [ ] between …… and ……..
v) Evening [ ] between …… and ……..
vi) Others specify……..

11. How often do you get trapped in traffic?

i. Every week day [ ]
ii. At least 3-4 days a week [ ]
iii. At least 1-2 days a week [ ]
iv. Others specify [ ]

12. Has traffic congestion reduced on Great East Road after the LDP? Yes [ ] No [ ]

a) Give reason for your answer.

……

13. In your opinion, what are some of the benefits of the LDP if any? (List)

i. ……..,
ii. ……..,
iii. ……

14. What are some of the challenges faced with the development of the LDP if any? (List)

i. ……,
ii. …….

15. In the morning how long does it take you (driving) to reach your destination? (Location from.....…… to ……..)

I. With traffic congestion……..
II. With normal traffic flow…….

16. In the afternoon/ evening how long does it take you to get back home (point of origin)?

i) With traffic congestion……..
ii) With normal traffic flow…….

17. In your view, is traffic congestion on Great East Road a big challenge to road users?

Yes [ ] No [ ]

Give reason for your answer…….....

18. In your opinion, is there a category of vehicles responsible for traffic congestion on Great East Road? Yes [ ] No [ ].

19. If Yes, which category?

i. Public bus vehicles [ ]
ii. Trucks [ ]
iii. Taxi's [ ]
iv. Private cars [ ]
v. Others [ ] Specify ……..

20. In your own view, do you think that traffic congestion has significant impact on your daily output? Yes [ ] No [ ]

21. If yes, explain.

I. ……
……

22. Has the LDP brought about economic benefits? Yes [ ] No [ ]

a. If Yes, what benefits have you seen?

i. ……., ……
ii. ……., …….

b. If No, Give a reason……, ……, …….

23. Do you think institutions responsible for managing traffic are performing their roles as expected? Yes [ ] No [ ] (Explain your answer)

……
……

24. Is there any established mechanism that you know for channelling complaints regarding traffic congestion to traffic management institutions? Yes [ ] No [ ]

a) (If yes name them).

……
……
……

25. What measures do you think should be put in place to ensure effective traffic management?

……
……
……

THE END

THANK YOU FOR YOUR TIME

APPENDIX 5: INTERVIEW GUIDE FOR LUSAKA CITY COUNCIL

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
MASTER OF SCIENCE IN GEOGRAPHY

INTERVIEW WITH LUSAKA CITY COUNCIL

I am a post graduate student from the University of Zambia. My research is entitled **"**An assessment of the Lusaka decongestion project: A case study of great east road." The main objective of the study is to investigate the decongestion of traffic on great east road after the Lusaka Decongestion Project in the city of Lusaka. This interview is designed to produce information regarding to this research work. You have been purposively selected to participate in this study by means of an interview. You are requested to respond as truthfully as possible. All the data gathered will be treated with anonymity and confidentiality. Information given will solely be used for this research. You should therefore feel free to give the right information to ensure the success of this work. Kindly sign in the space provided below.

I hereby declare that I have freely given my consent to the said Lushomo Ng'andu computer No: NS2100028, to answer the questionnaire in relation to his Master of Science in Geography Programme. I do understand and accept that the contents of the interview would be used for strictly academic purposes and the said Lushomo Ng'andu would ask my permission before quoting me even indirectly.

…….. Date ……
Lushomo Ng'andu
Respondent signature…… Date …….. .

1. How long have you worked for the Lusaka City Council?
2. What is your current position at the Lusaka City Council?
3. What are the major causes of road traffic congestion on Great East Road?
    b. ……..;
    c. …….;
    d. ……..;
    e. ……..
4. At what times does the road experience peak hours of congestion?
    a. Westbound…….
    b. East bound …….
5. Has the newly designed road infrastructure helped in reducing traffic congestion?
6. If YES, Please Explain.
    a. ……
    ……
7. Are there major points of traffic congestion on Great East Road?
8. Which areas (points) is traffic congestion more serious?
    a. ……
    …….

9. How was the traffic situation, before the LDP was implemented? (Give statistics if possible).
    a. ……
10. In your opinion, what factors account for road traffic congestion on Great East Road?
    a. ……
    ……..
11. What are some economic benefits of the LDP to road users, if any?
    a. ……
    ……..
12. What is the mandate of your institution in road traffic management?
    a. ……
    ……
13. Are there some practical measures your institution have put in place to manage traffic congestion along Great East Road?
    a. …….
    b. ……
    ……
14. In your opinion, has your institution been able to play its roles in traffic management as expected?
    a. ……
    ……
15. What are some of the challenges your institution is facing in managing traffic congestion?
    a. ……
    ……..
16. Are there some challenges brought about the LDP in relation to traffic congestion management?
    a. ……..
17. What is the perception of stakeholders (drivers, passengers, marketeers etc) on the traffic situation on Great East Road after the implementation of the LDP?
    a. ……
    …….
18. What is the extent of collaboration between your institution and stakeholders in the road sector in managing traffic congestion?
    a. ……

THANK YOU FOR YOUR TIME

APPENDIX 6: INTERVIEW WITH THE ZAMBIA POLICE TRAFFIC DIVISION

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
MASTER OF SCIENCE IN GEOGRAPHY

INTERVIEW WITH ZAMBIA POLICE TRAFFIC DIVISION

I am a post graduate student from the University of Zambia. My research is entitled **"**An assessment of the Lusaka decongestion project: A case study of great east road." The main objective of the study is to investigate the decongestion of traffic on great east road after the Lusaka Decongestion Project in the city of Lusaka. This interview is designed to produce information regarding to this research work. You have been purposively selected to participate in this study by means of an interview. You are requested to respond as truthfully as possible. All the data gathered will be treated with anonymity and confidentiality. Information given will solely be used for this research. You should therefore feel free to give the right information to ensure the success of this work. Kindly sign in the space provided below.

I hereby declare that I have freely given my consent to the said Lushomo Ng'andu computer No: NS2100028, to answer the questionnaire in relation to his Master of Science in Geography Programme. I do understand and accept that the contents of the interview would be used for strictly academic purposes and the said Lushomo Ng'andu would ask my permission before quoting me even indirectly.

…….. Date ……
Lushomo Ng'andu
Respondent signature…… Date …….. .

1. How long have you worked for the Zambia Police Traffic division?
2. What is your current position at the Zambia Police Traffic division?
3. What are the major causes of road traffic congestion on Great East Road?

a……..;
b. ……;
c. ……..;
d. ……..

4. At what times does the road experience peak hours of congestion?
   a. Westbound…….
   b. East bound …….
5. Has the newly designed road infrastructure helped in reducing traffic congestion?
6. If YES, Please Explain.
   a. ……
   ……

7. Are there major points of traffic congestion on Great East Road?
8. Which areas (points) is traffic congestion more serious?
    a. ……
    ……
9. How was the traffic situation, before the LDP was implemented? (Give statistics if possible).
    a. ……
10. In your opinion, what factors account for road traffic congestion on Great East Road?
    a. ……
    ……..
11. What are some economic benefits of the LDP to road users, if any?
    a. ……
    ……..
12. What is the mandate of your institution in road traffic management?
    a. ……
    ……
13. Are there some practical measures your institution have put in place to manage traffic congestion along Great East Road?
    a. …….
    b. ……
    ……
14. In your opinion, has your institution been able to play its roles in traffic management as expected?
    a. ……
    ……
15. What are some of the challenges your institution is facing in managing traffic congestion?
    a. ……
    ……..
16. Are there some challenges brought about the LDP in relation to traffic congestion management?
    a. ……..
17. What is the perception of stakeholders (drivers, passengers, marketeers etc) on the traffic situation on Great East Road after the implementation of the LDP?
    a. ……
    …….
18. What is the extent of collaboration between your institution and stakeholders in the road sector in managing traffic congestion?
    a. ……

THANK YOU FOR YOUR TIME

APPENDIX 7: INTERVIEW GUIDE FOR MINISTRY OF LOCAL GOVERNMENT AND RURAL DEVELOPMENT

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
MASTER OF SCIENCE IN GEOGRAPHY

INTERVIEW WITH MINISTRY OF LOCAL GOVERNMENT AND RURAL DEVELOPMENT

I am a post graduate student from the University of Zambia. My research is entitled **"**An assessment of the Lusaka decongestion project: A case study of great east road." The main objective of the study is to investigate the decongestion of traffic on great east road after the Lusaka Decongestion Project in the city of Lusaka. This interview is designed to produce information regarding to this research work. You have been purposively selected to participate in this study by means of an interview. You are requested to respond as truthfully as possible. All the data gathered will be treated with anonymity and confidentiality. Information given will solely be used for this research. You should therefore feel free to give the right information to ensure the success of this work. Kindly sign in the space provided below.

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…….. Date ……

Lushomo Ng'andu

Respondent signature…… Date …… .

1. How long have you worked for the Ministry of Local Government and Rural Development?
2. What is your current position at the Ministry of Local Government and Rural Development?

3. What are the major causes of road traffic congestion on Great East Road?
   e. ……..;
   f. …….;
   g. ……..;
   h. ……..
4. At what times does the road experience peak hours of congestion?
   i. Westbound…….
   j. East bound …….
5. Has the newly designed road infrastructure helped in reducing traffic congestion?
6. If YES, Please Explain.

a. ……
……

7. Are there major points of traffic congestion on Great East Road?
8. Which areas (points) is traffic congestion more serious?
    a. ……
    ……
9. How was the traffic situation, before the LDP was implemented? (Give statistics if possible).
    a. ……
10. In your opinion, what factors account for road traffic congestion on Great East Road?
    a. ……
    ……..
11. What are some economic benefits of the LDP to road users, if any?
    a. ……
    ……..
12. What is the mandate of your institution in road traffic management?
    a. ……
    ……
13. Are there some practical measures your institution have put in place to manage traffic congestion along Great East Road?
    a. …….
    b. ……
    ……
14. In your opinion, has your institution been able to play its roles in traffic management as expected?
    a. ……
    ……
15. What are some of the challenges your institution is facing in managing traffic congestion?
    a. ……
    ……..
16. Are there some challenges brought about the LDP in relation to traffic congestion management?
    a. ……..
17. What is the perception of stakeholders (drivers, passengers, marketeers etc) on the traffic situation on Great East Road after the implementation of the LDP?
    a. ……
    …….
18. What is the extent of collaboration between your institution and stakeholders in the road sector in managing traffic congestion?
    a. ……

THANK YOU FOR YOUR TIME

APPENDIX 8: INTERVIEW GUIDE FOR ROAD TRANSPORT AND SAFETY AGENCY

THE UNIVERSITY OF ZAMBIA

SCHOOL OF NATURAL SCIENCES
DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES
MASTER OF SCIENCE IN GEOGRAPHY

INTERVIEW WITH ROAD TRANSPORT AND SAFETY AGENCY

I am a post graduate student from the University of Zambia. My research is entitled **"**An assessment of the Lusaka decongestion project: A case study of great east road." The main objective of the study is to investigate the decongestion of traffic on great east road after the Lusaka Decongestion Project in the city of Lusaka. This interview is designed to produce information regarding to this research work. You have been purposively selected to participate in this study by means of an interview. You are requested to respond as truthfully as possible. All the data gathered will be treated with anonymity and confidentiality. Information given will solely be used for this research. You should therefore feel free to give the right information to ensure the success of this work. Kindly sign in the space provided below.

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…….. Date ……
Lushomo Ng'andu
Respondent signature…… Date …… .

1. How long have you worked for the Road Transport and Safety Agency?
2. What is your current position at the Road Transport and Safety Agency?

3. What are the major causes of road traffic congestion on Great East Road?
   k. ……..;
   l. …….;
   m. ……..;
   n. ……..
4. At what times does the road experience peak hours of congestion?
   a. Westbound…….
   b. East bound …….
5. Has the newly designed road infrastructure helped in reducing traffic congestion?
6. If YES, Please Explain.
   a. ……
   ……
7. Are there major points of traffic congestion on Great East Road?

8. Which areas (points) is traffic congestion more serious?
    a. ……
    ……
9. How was the traffic situation, before the LDP was implemented? (Give statistics if possible).
    a. ……
10. In your opinion, what factors account for road traffic congestion on Great East Road?
    a. ……
    ……..
11. What are some economic benefits of the LDP to road users, if any?
    a. ……
    ……..
12. What is the mandate of your institution in road traffic management?
    a. ……
    ……
13. Are there some practical measures your institution have put in place to manage traffic congestion along Great East Road?
    a. …….
    b. ……
    ……
14. In your opinion, has your institution been able to play its roles in traffic management as expected?
    a. ……
    ……
15. What are some of the challenges your institution is facing in managing traffic congestion?
    a. ……
    ……..
16. Are there some challenges brought about the LDP in relation to traffic congestion management?
    a. ……..
17. What is the perception of stakeholders (drivers, passengers, marketeers etc) on the traffic situation on Great East Road after the implementation of the LDP?……
    …….
18. What is the extent of collaboration between your institution and stakeholders in the road sector in managing traffic congestion?
    a. ……

THANK YOU FOR YOUR TIME

APPENDIX 9: LETTER FROM RTSA

ROAD TRANSPORT AND SAFETY AGENCY

Head Office: P.O. Box 32167, Dedan Kimathi Road, Lusaka
Tel: +260 211 226 909 / 230 539, +260 965 429 499, **Toll free: 983**, **Email**: info@rtsa.org.zm, **Website**: rtsa.org.zm

RTSA101/1/23

28th September 2022.

Mr. Lushomo Ng'andu,
University of Zambia,
School of Natural Sciences,
LUSAKA.

Cell: +260973302427
Email: Ngandulushomo@gmail.com

Dear Sir,

RE: COLLECTION OF DATA

We acknowledge receipt of a letter dated 26th September 2022 in which you requested RTSA for information to aid your research.

We have no objection in releasing information to you as long as the information is used for research purposes only.

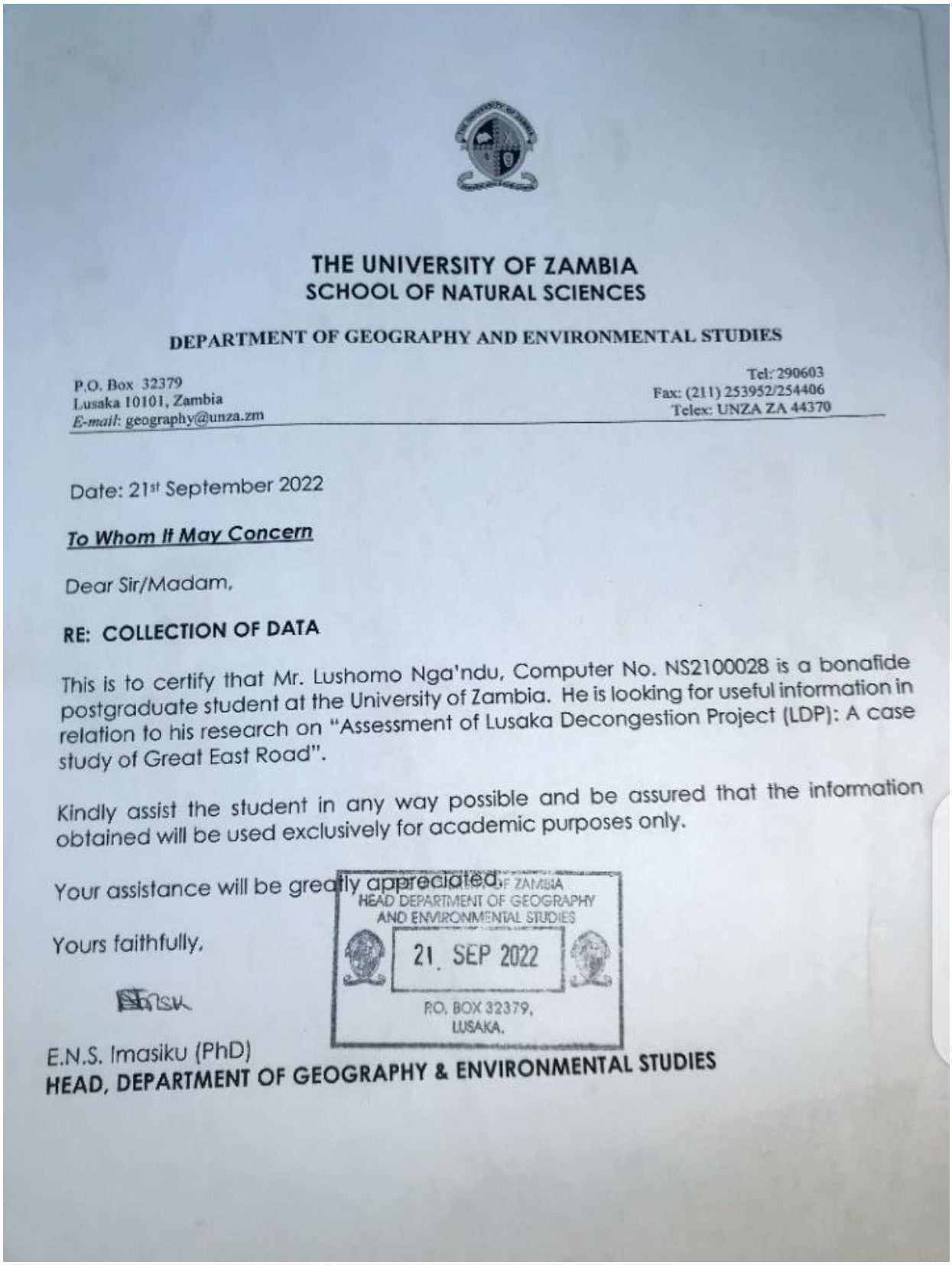
Overleaf the Agency provides a completed questionnaire for your study on the Lusaka Decongestion Project.

We would like to wish you good luck in your research.

Yours faithfully,

Eng. Alinani Msisya
Acting Director and Chief Executive Officer
Road Transport and Safety Agency.

APPENDIX 10: DATA COLLECTION CLEARANCE LETTER



THE UNIVERSITY OF ZAMBIA
SCHOOL OF NATURAL SCIENCES

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

P.O. Box 32379
Lusaka 10101, Zambia
E-mail: geography@unza.zm

Tel: 290603
Fax: (211) 253952/254406
Telex: UNZA ZA 44370

Date: 21st September 2022

To Whom It May Concern

Dear Sir/Madam,

RE: COLLECTION OF DATA

This is to certify that Mr. Lushomo Nga'ndu, Computer No. NS2100028 is a bonafide postgraduate student at the University of Zambia. He is looking for useful information in relation to his research on "Assessment of Lusaka Decongestion Project (LDP): A case study of Great East Road".

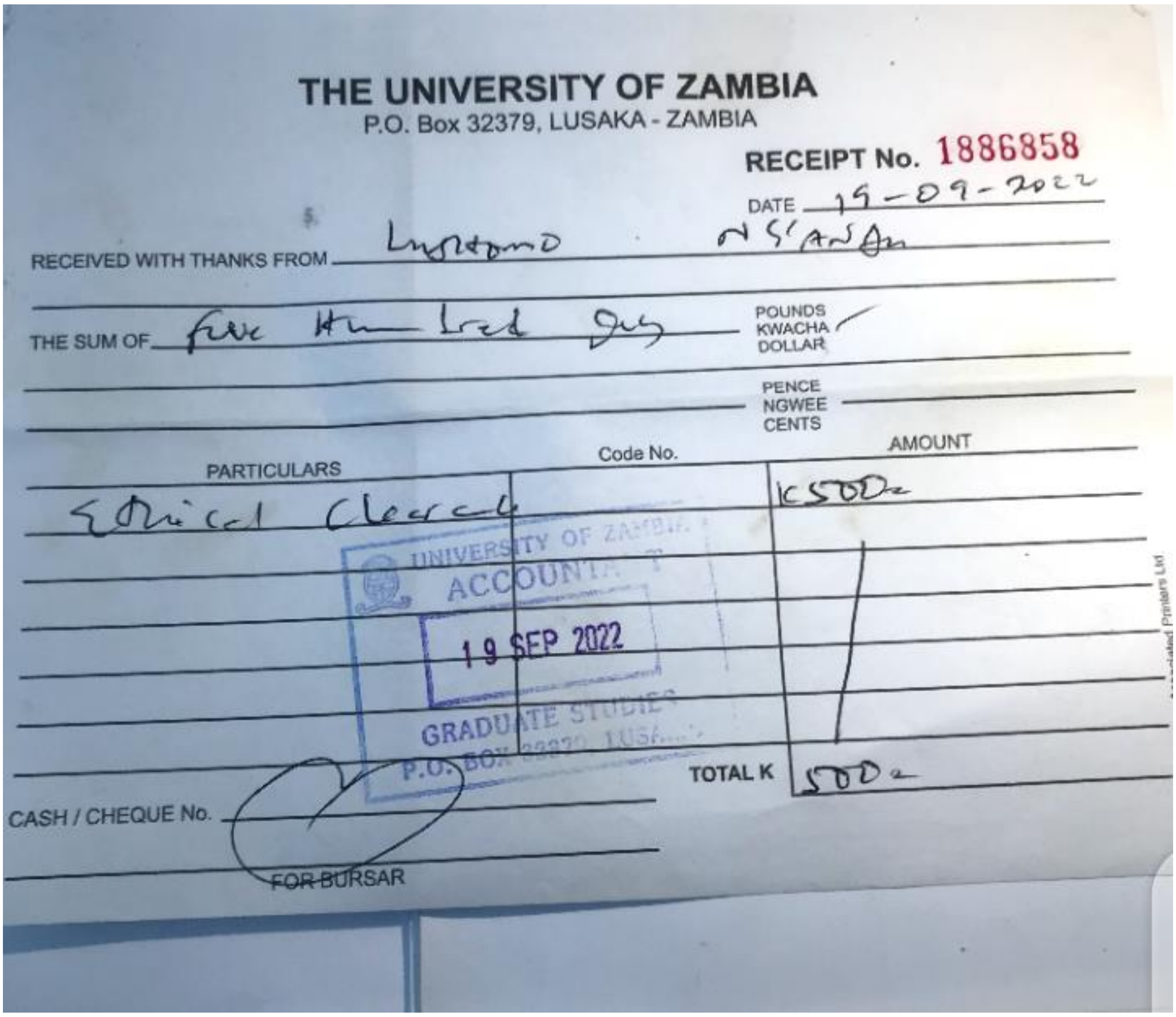
Kindly assist the student in any way possible and be assured that the information obtained will be used exclusively for academic purposes only.

Your assistance will be greatly appreciated.

UNIVERSITY OF ZAMBIA
HEAD DEPARTMENT OF GEOGRAPHY
AND ENVIRONMENTAL STUDIES
21 SEP 2022
P.O. BOX 32379,
LUSAKA.

Yours faithfully,

E.N.S. Imasiku (PhD)
HEAD, DEPARTMENT OF GEOGRAPHY & ENVIRONMENTAL STUDIES



THE UNIVERSITY OF ZAMBIA
P.O. Box 32379, LUSAKA - ZAMBIA

RECEIPT No. 1886858

DATE 19-09-2022

RECEIVED WITH THANKS FROM Lushomo N'Sanda

THE SUM OF Five Hundred Only POUNDS / KWACHA ✓ / DOLLAR

PENCE / NGWEE / CENTS

PARTICULARS	Code No.	AMOUNT
Ethical Clearance		K500=
	TOTAL K	500=

UNIVERSITY OF ZAMBIA ACCOUNTANT 19 SEP 2022 GRADUATE STUDIES P.O. BOX 32379, LUSAKA

CASH / CHEQUE No.

FOR BURSAR