EZULWINI MUNICIPALITY

COMPREHENSIVE MOBILITY PLAN

FINAL REPORT

2023

Ezulwini MUNICIPALITY
Discover Happiness

EZULWINI MUNICIPALITY
COMPREHENSIVE MOBILITY PLAN

PUBLICATION DATE:

2023

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1. INTRODUCTION

1.1. Background

Characterised by its low-lying valleys and scenic natural landscape, Ezulwini has been described as the tourism hub of the Kingdom of Eswatini. Located in the Hhohho region and lying in close proximity to the western border of Eswatini, the town is strategically positioned between the Kingdom's cities of Mbabane and Manzini, making it a preferred residential location for the high-income individuals of the working population within the two cities. This preference was due to the town being known as a drive-through town, as the Old Mbabane Road (now MR103) acted as the only access between Mbabane, Manzini, and the industrial town of Matsapha.

Ezulwini has experienced a transformation in its land use profile over the years, having thrived on tourism in the past, the town has transitioned into more of a commercial town. This transition can be inferred from the increase in the number of corporate tourists. Through the transition, population estimates of Ezulwini have been expected to grow at a steady rate over the next few decades. The growing population combined with the increasing economic activities, that have resulted from the transition in the land use profile of Ezulwini have shifted the demands of the town towards those of; quality roads, quality water, reliable power, and access to fast and affordable internet services. This transition has also led to increased traffic flow within urban Ezulwini, taking in the spill-over traffic from urban nodes such as Mbabane, and subsequently bringing about issues of increased traffic congestion during peak hours, frequent motor-vehicle-related crashes, and deteriorating road infrastructure.

These aforementioned issues then question the capability of Ezulwini's current and future road infrastructure, public transportation, and road safety, questioning whether the town will be able to cope with its changing landscape and increasing population which will potentially introduce an influx of freight and private vehicles frequenting the town. This raises the need for efficient transport planning in Ezulwini - which can be addressed by developing a Comprehensive Mobility Plan (CMP). This transport plan will form part of a long-term strategy to provide sustainable improvement in the movement of people and goods around Ezuwlini.

1.2. Comprehensive Mobility Plan (CMP)

A CMP is a strategically envisioned plan that encompasses all the elements of sustainable transport under an integrated planning process. A CMP should include a long-term vision for desirable accessibility and mobility patterns for people and goods in the city to provide safe, secure, efficient, reliable, and seamless connectivity that supports and enhances socio-economic and environmental sustainability.

The main objectives of the CMP include, but are not limited to:

- Focusing on the mobility of people and goods, not vehicles;
- Developing an efficient and reliable infrastructure for public and non-motorised transportation, inclusive of pedestrians while recognising them as an important mode of transport;
- Integrating land use and transport planning,
- Developing a low-carbon mobility growth scenario for the municipality; and
- Providing equity to all sections of the society including the urban poor and differently abled.

The ease of mobility for people and goods is an important aspect of the Global Sustainability Development Goals SDGs), specifically *Goal 3: Good Health and Well-being*. Mobility has a significant impact on the quality of life for people, determining the access and ease with which individuals can go about their lives.

Thus, the essential part of planning for a comprehensive sustainable city is planning with the intent to encourage mobility that is not dependent on having to use motorised vehicles.

In 2019, an Integrated Development Plan (IDP) was developed by the Ezulwini Municipality, in an effort to address the aforementioned needs and to align Ezulwini with the global SDGs. Under these SDGs, a comprehensive sustainable transport plan plays a major role in providing mobility for all, including environmentally friendly, Non-Motorised Transport (NMT) modes such as walking and cycling, while also improving public transport, its infrastructure and improving overall road safety.

One of the objectives of the IDP is to provide an efficient transport system for the town of Ezulwini, which can be brought about by:

- Developing a Comprehensive Mobility Plan, that considers mobility for all;
- Planning and provision of Non-Motorised Transport (Cycling and walking) infrastructure;
- Improving road safety through speed limit regulation and road safety measures and
- Improving public transport systems and their associated infrastructure.

The CMP aligns itself with the strategies discussed within the IDP in coherence with the aforementioned SDGs, further extending to address the challenges and targets set out in the National Development Plan (2019/20 – 2021/22), the National Development Strategy (2014) and the National Disability Plan of Action (2015-2020) of Eswatini. The CMP additionally provides local and national government with direction in terms of funding and prioritisation of projects, exhibiting the most urgent and detrimental challenges in terms of transportation, road infrastructure and mobility. The Ezuwlini Municipality will thus have a clearer overview of the current transportation challenges and how to potentially overcome them through this CMP.

This CMP will comprise of the following chapters:

- **Chapter 1:** Introduction
- **Chapter 2:** Socio-economics, Land Use & Relevant Legislation
- **Chapter 3**: Transportation Situation/Urban Mobility Challenges
- **Chapter 4**: Urban Mobility Plan
- **Chapter 5**: Phasing
- **Chapter 6:** Pricing
- **Chapter 7:** Mobility Management Measures
- **Chapter 8:** Conclusion

1.3. Study Area

As shown in Figure 1-1 below, Ezulwini is located in the Hhohho region of Eswatini and it is situated in Lobamba between Mbabane and Manzini.

The study area encompasses the entire Ezulwini Municipality, focusing within the urban boundary and its surrounding residential areas. The study area is inclusive of these surrounding areas to provide a thorough analysis of the transport system within and affecting Ezulwini, taking into consideration the links between MR103 and MR3. Figure 1-2 illustrates the extent of the study area.

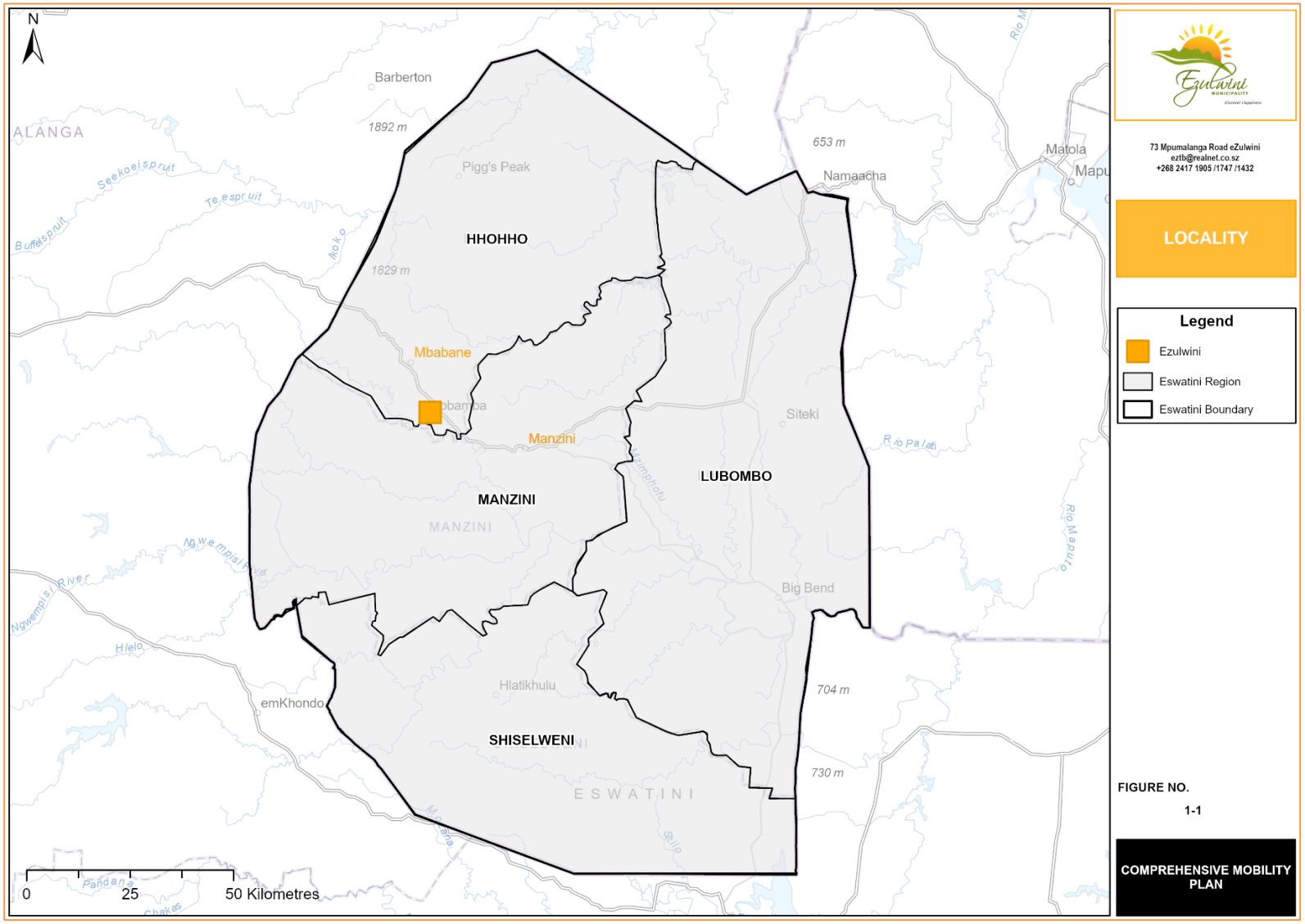


Figure 1-1: Locality of Ezulwini in Eswatini

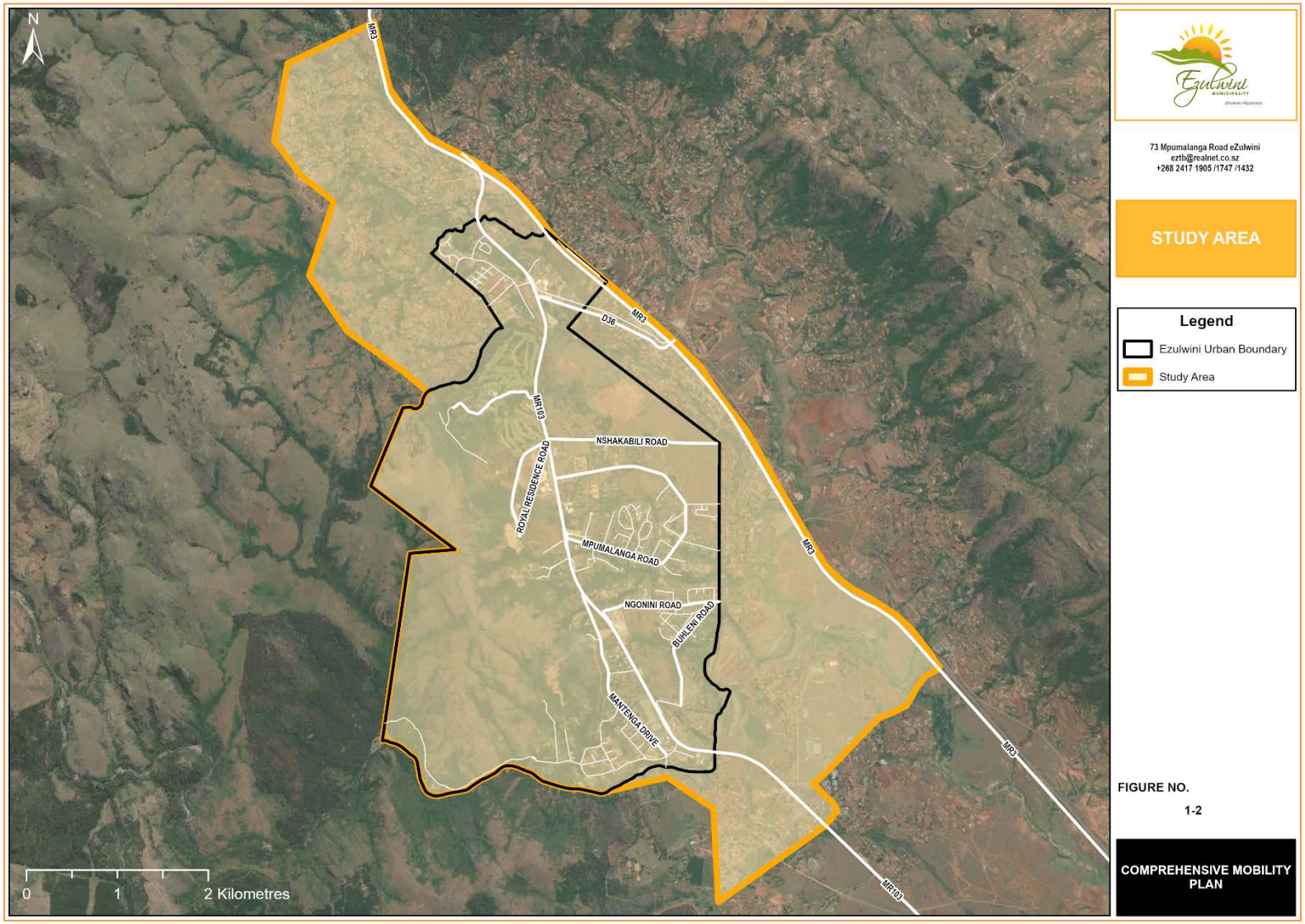


Figure 1-2: Study area encompassing urban Ezulwini

2. SOCIO-ECONOMICS, LAND USE & RELEVANT LEGISLATION

One of the most important variables for determining the current and future conditions of the transport system in Ezulwini is the population. Forming a part of the overall demographic and socio-economic situation within Ezulwini, the population distribution provides a comparative analysis over the years that can be used to estimate how the demands and capabilities of the transport system have and are to change.

2.1. Demographics & Socio-economics

According to the Ezulwini Municipality Town Planning Scheme (2017), the urban population in Eswatini is expected to grow from 22.1% in 2007 to 26.5% by 2030. According to the UN World Urbanization Prospects, Lobamba has grown by 13.1% annually over the past decade. This poses a significant problem, specifically for Ezulwini as more than half the population in Eswatini is said to be concentrated in Mbabane and Manzini. The positioning of the municipality between these two major cities thus results in activities occurring at either Mbabane or Manzini, having an impact on the patterns and trends experienced in Urban Ezulwini. Similarly, Malkerns and Matsapha have the same effect, contributing to the influx of individuals entering Ezulwini. Therefore, considerations have to be made while incorporating the population dynamics and urbanization trends of the cities when planning for Ezuwlini, as the high collective population figures of the Manzini and Hhohho Regions, have an impact on Ezulwini.

Using 2007 as a base year, a 35% (over 5 years) growth rate was calculated using the 2007 Population and Housing Census, as well as the divisional growth trends. This growth rate was then estimated to be approximately 7% annually which indicates that the Ezulwini population is growing comparatively faster than other towns, meaning that a higher number of individuals are potentially attractive to employers within Ezulwini. In 2017, the Central Statistics Office approximated that Ezulwini's population would be expected to grow at a steady rate over the next few decades, with the 2016-night population of 2661 residents being expected to double in 2020 and to further exceed 6000 individuals by the year 2030. These future projections insinuate the need for the Ezulwini transport system to be capable enough to cater to and sustain the growing population.

2.2. Land Use

2.2.1. Current/Existing Land Use

Ezulwini covers approximately 1720 hectares of which only 1120 hectares can be developed. Areas including the Mantenga Nature Reserve, steep mountainous areas and Riverine areas are incapable of being developed. New establishments within Ezulwini are predominately led by the private sector with the introduction of places such as The Gables Shopping Complex, The Galleria, Corner Plaza Shopping Centre and the Mahlal'ekhukhwini House.

The Gables Shopping Complex is located along the southern part of the MR103 entering the municipality. This shopping area/complex has grown to be one of the largest business centres in Ezulwini, owing to its location and proximity to the MR103, as the road traverses through the Municipality and connects Ezulwini with other major centres of the country. The shopping complex is frequented by guests and diplomats from the neighbouring casino and U.S. Embassy respectively, as well as individuals from the low-density residential areas and informal settlements near it. Comparable to The Gables Shopping Complex is the Corner Plaza Shopping Centre which is another commercial hub surrounded by high economic activity. This shopping centre, located along the D36 road, is frequented by individuals coming in from the northern parts of Ezulwini as well as the surrounding townships located towards the east of the Lobamba. Both the MR103 and D36 experience high volumes of traffic frequenting these shopping centres, where congestion and delays can be expected.

Ezulwini is still primarily residential in nature as there are an estimated 848 residential properties and 441 developed residential plots within urban Ezulwini, giving an estimated amount of 491 housing units. As illustrated on the existing land use map (Figure 2-1) below, the dominant land use category is residential, followed by the hospitality/ tourism industry and then the vacant spaces which provide opportunities for new developments.

Table 2-1: Make-up of the existing land use in Ezulwini:

Residential purposes	45%
Conservation area	18%
Hospitality Industry	16%
Undeveloped	15%.
Social & commercial facilities	less than 10%

2.2.2. Future Land Use

The Ezulwini Town Planning Scheme (TPS) provides the overall physical planning framework for the development of the existing urban area up to the year 2026, and also provides Sustainable Settlement Planning through future allocation and utilization of land within the declared urban area of Ezulwini. This TPS is still in effect over the urban Ezulwini as defined by the Urban Government Act of 1969. The future economic development of Ezulwini is linked to that of the Mbabane, Matsapha and Manzini corridor as there is a need to develop and attract more strategic economic activities in the commercial and tourism sectors.

A key component of the local economy in Ezulwini is the commercial sector which will be focused on through the implementation of business districts, around areas such as The Gables/Happy Valley (Primary Business District along the MR103 (Secondary Business District). Given the attributes, tendencies and characteristics of the municipality, future land utilisations have been identified in relation to the residential areas, ranging from more affordable higher-density to larger low-density site options which identify a need in mobility to transfer these residents throughout the municipality.

These future land use characteristics, such as; zoning patterns, zoning regulations, land availability, public utilities, and telecommunication infrastructures, will affect the activity patterns. Changes in activity patterns will then bring about changes in trip patterns (for both passengers and freight) while trip patterns may change in a number of ways (i.e., in terms of the number of trips, the timing of trips, their origin or destination, their mode of travel etc.)

By connecting the future land use and understanding the change in zonal characteristics, an integrative and holistic approach can be taken when planning for mobility. This integration between the future land use and the road network will significantly increase the accessibility of individuals within the municipality. For the proposed land use to be more responsive to the needs of people and to maintain both Ezulwini's quality of life and its economic competitiveness; a comprehensive, sustainable, and affordable connectivity between various (future) land use through a well-planned transport network and infrastructure is imperative.

2.3. Existing Policies and Strategies

This section provides an overview of the legislative documents that were relevant in compiling this CMP.

National Development Plan (2019/20 – 2021/22)

The National Development Plan (NDP) is a document aimed at addressing the challenges related to economic growth, unemployment, and high levels of poverty. The NDP provides a long-term perspective on the socio-economic development of an area by defining the desired goals and, identifying the roles that the different sectors of society need to play, in order to reach the identified goals.

National Development Strategy

The National Development Strategy was initiated to formulate a vision of what to achieve over 25 years with the necessary strategies required to achieve this set vision. These are inclusive of strategies pertaining to all aspects of the country, ranging from socio-economic to agricultural development and industrialization.

National Disability Plan of Action

The Kingdom of Eswatini developed the "National Policy on Disability" together with "The Persons with Disabilities (PWD) Bill, 2014" after approving the United Nations Conventions on the Rights of Persons with Disabilities (CRPD) in 2012. The policy primarily focuses on measures required to address the issues experienced/related to people with disabilities across all development programmes of government, while implementing the Constitution of Eswatini, which recognizes the rights of people with disabilities.

Transportation Act 5/2007

The Transportation Act was formed in 2007 and it commenced in February 2008. This act includes policies and regulations that road users (i.e., drivers, passengers, and pedestrians) and authorities should adhere to.

Road Traffic Act 2007

The Road Traffic Act 6 of 2007, is an Act to provide for the registration and licensing of motor vehicles and drivers to regulate, control traffic and transport on public roads and other matters incidental thereto.

Ezulwini Integrated Development Plan

The Integrated Development Plan (IDP) for Ezulwini is a super plan that provides an overall framework for development in Ezulwini over a 30-year period from 2019 to 2049. The plan aims to coordinate the work of local and other spheres of government in a coherent and integrated plan to improve the quality of life for all the people living in Ezulwini.

Ezulwini Town Planning Scheme (2019)

The Town Planning Scheme for Ezulwini is a document that aims to regulate development to ensure harmonious development of the built environment by addressing land use and zoning issues, current and future demographics to guide planning decisions, and providing guidelines on home occupations, design, and aesthetics to regulate design and form of buildings, settlements, and services.

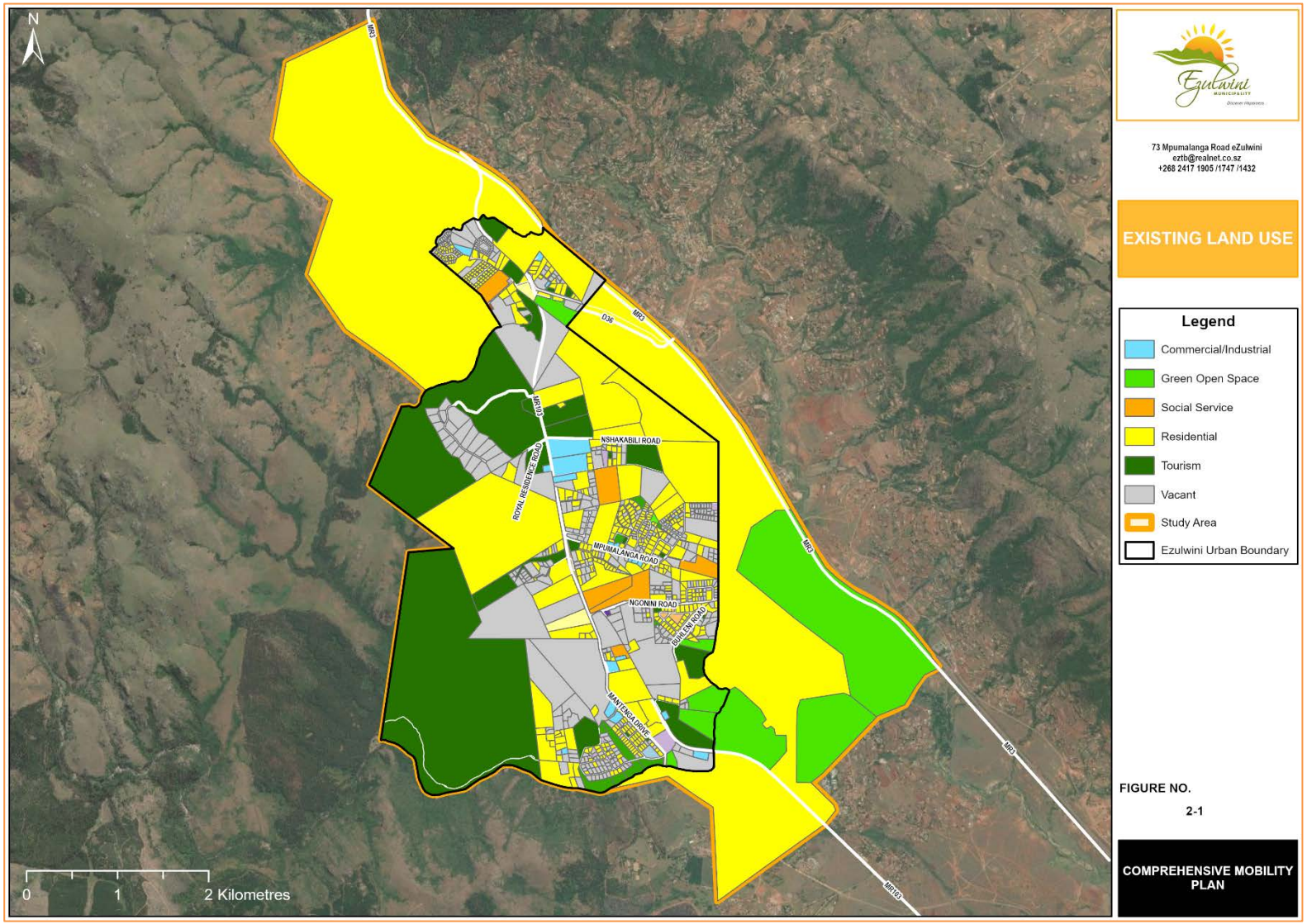


Figure 2-1: Existing land use of the Ezulwini municipality and extended study area

3. TRANSPORTATION SITUATION & URBAN MOBILITY CHALLENGES

This chapter summarises the main mobility challenges experienced within Ezulwini, that hinder the efficiency and safety of the current transport system. The information presented within this section was obtained from surveys inclusive of traffic and link counts, roadside and household surveys and high-level signage and road safety audits conducted in the study area preliminary to this CMP is a status quo report that was prepared, detailing the methodology behind the study, the aforementioned surveys, and the in-depth analysis of the findings.

3.1. Roads

Roads form a fundamental part of social and economic prosperity as they support the movement of both goods and people. In Ezulwini, roads are vital in the economic and sustainable development of the municipality as they promote connectivity within and throughout the municipality, supporting its tourist and commercial activities by allowing people and freight to reach their respective destinations. Through this connectivity, the municipality can successfully align itself with the SDGs and achieve its envisioned targets (i.e., reduced unemployment).

Ezulwini encompasses a network of roads and is traversed by the MR103, an arterial road, which serves the municipality as its main thoroughfare. This arterial provides the entire municipality with intra-connectivity between areas of urban Ezuwlini and further connectivity to the national highway – the MR3. Similarly, D36, which is a collector road, provides alternative access to Ezulwini from the MR3 while providing connectivity to the eastern regions of Lobamba.

These roads are imperative within Ezulwini as they form the main points of access within the Municipality and supplement access towards the commercial nodes (i.e., The Gables Shopping Complex and Corner Plaza Shopping Centre). The other connecting roads (i.e., Nshakabili Road, Mpumalanga Crescent etc.) form the major roads within the study area as they provide access throughout the municipality. The challenges observed on these roads are discussed as follows.

3.1.1. Traffic Volumes

Traffic volumes are essential as they provide an indication of the current capacity of roads and can further be used to predict the future capacity and capabilities of roads. These are essential in designing for the future land use profile of the municipality. To quantitively observe how these roads are utilised within the municipality, traffic counts were conducted along the major intersections to obtain the traffic volumes within Ezulwini. These volumes were then analysed, and it was deduced that,

During the AM Period:

- The AM Peak hour was between 07:00 – 08:00 with the highest inbound volumes found at the MR3/MR103 intersection as tabulated below and shown in **Figure 3-1**.
- These volumes were predominately comprised of light vehicles (i.e., private vehicles) as shown in the modal split map **Figure 3-1**.

Peak (Passenger Car Unit) PCU at the MR3 and MR103 intersection		
Northern Approach / South Bound - MR 103	Eastern Approach / West Bound - MR 3 Slip Road	Southern Approach / North Bound - MR 103
522	89	432

These high volumes during the AM Peak Period could be attributed to the individuals entering Ezulwini for work purposes.

During the Midday period:

- The midday peak hour was between 12:30 – 13:30 with the highest inbound volumes observed at the MR103/The Gables intersection as tabulated below and shown in **Figure 3-2**.
- These volumes were predominately comprised of light vehicles (i.e., private vehicles) as shown in the modal split map **Figure 3-2**.

Peak (Passenger Car Unit) PCU at the MR103 and Gables Shopping Centre intersection			
Northern Approach / South Bound - Unnamed Road	Northern Approach / South Bound - Unnamed Road	Northern Approach / South Bound - Unnamed Road	Northern Approach / South Bound - Unnamed Road
19	19	19	19

During the PM period:

- The PM peak hour was between 16:30 – 17:30 with the highest volumes inbound observed at the MR103/The Gables intersection as tabulated below and shown in **Figure 3-3**.
- These volumes were predominately comprised of light vehicles (i.e., private vehicles) as shown in the modal split map **Figure 3-3**.

Peak (Passenger Car Unit) PCU at the MR103 and Gables Shopping Centre intersection			
Northern Approach / South Bound - Unnamed Road	Eastern Approach / West Bound - MR103	Southern Approach / North Bound - Unnamed Road	Western Approach / East Bound - MR103
50	527	516	426

These midday and pm peak hour volumes could be attributed to the presence of the shopping complex as more individuals frequent the area during the day and in the evening. This shopping complex is one of the commercial nodes of high economic activity within Ezulwini. Additionally, within these time periods, light vehicles were still dominant, indicating that there is high presence of light/private vehicles within Ezulwini as depicted by the figures 3-2 and 3-3. The high presence of light/private vehicles within the study area indicates opportunities of congestion, particularly to and from the commercial nodes in the municipality, causing delays and inconveniences. Therefore, opportunities of diversion from private to public transport are imperative as well as diversion of traffic from the main MR103 to alternative routes connecting Ezulwini with the MR3. This presents the need for an access management and alternate route plan to address these issues of congestion and provide alternative routes of travel.

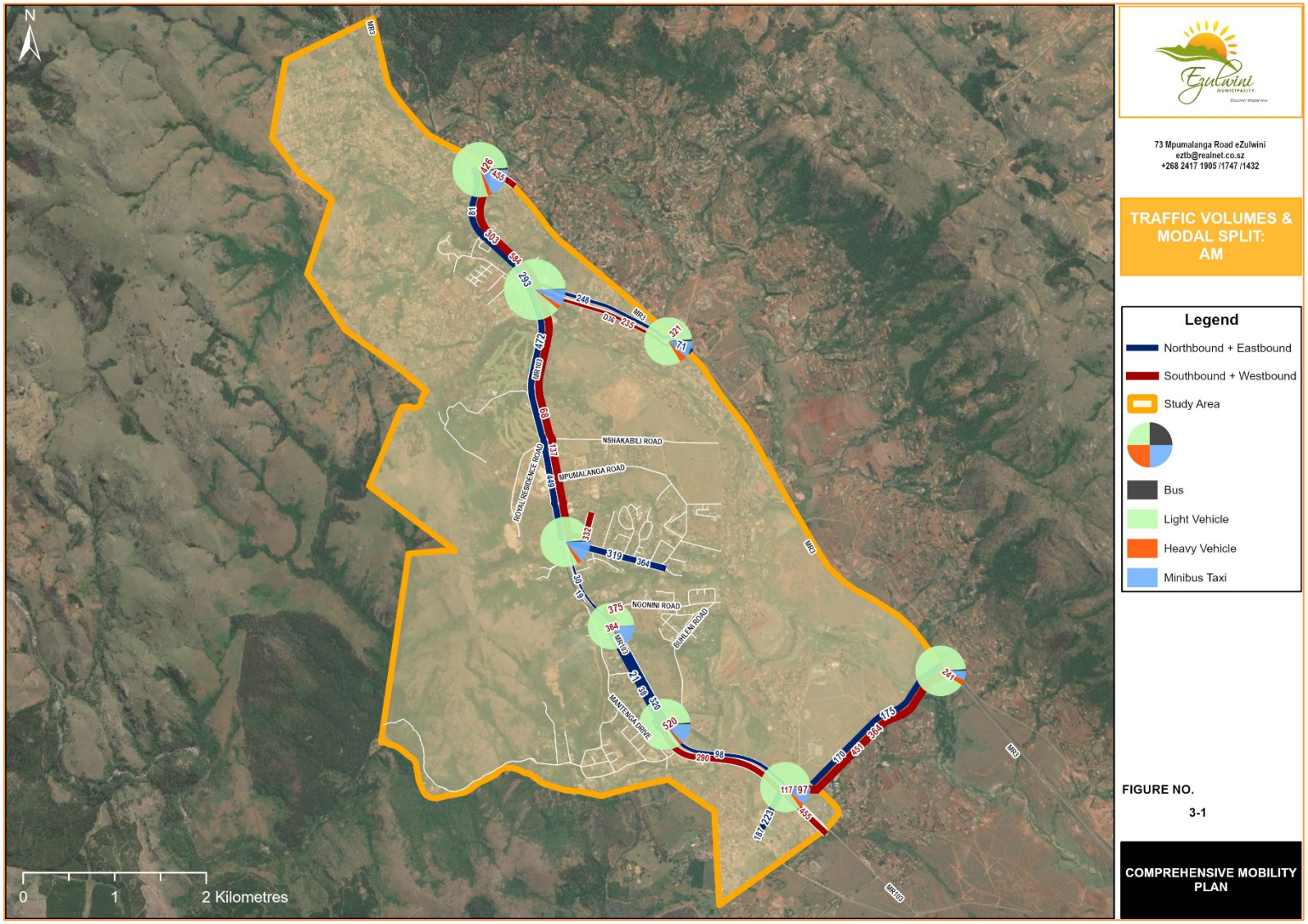


Figure 3-1: Traffic volumes and modal split during the AM period

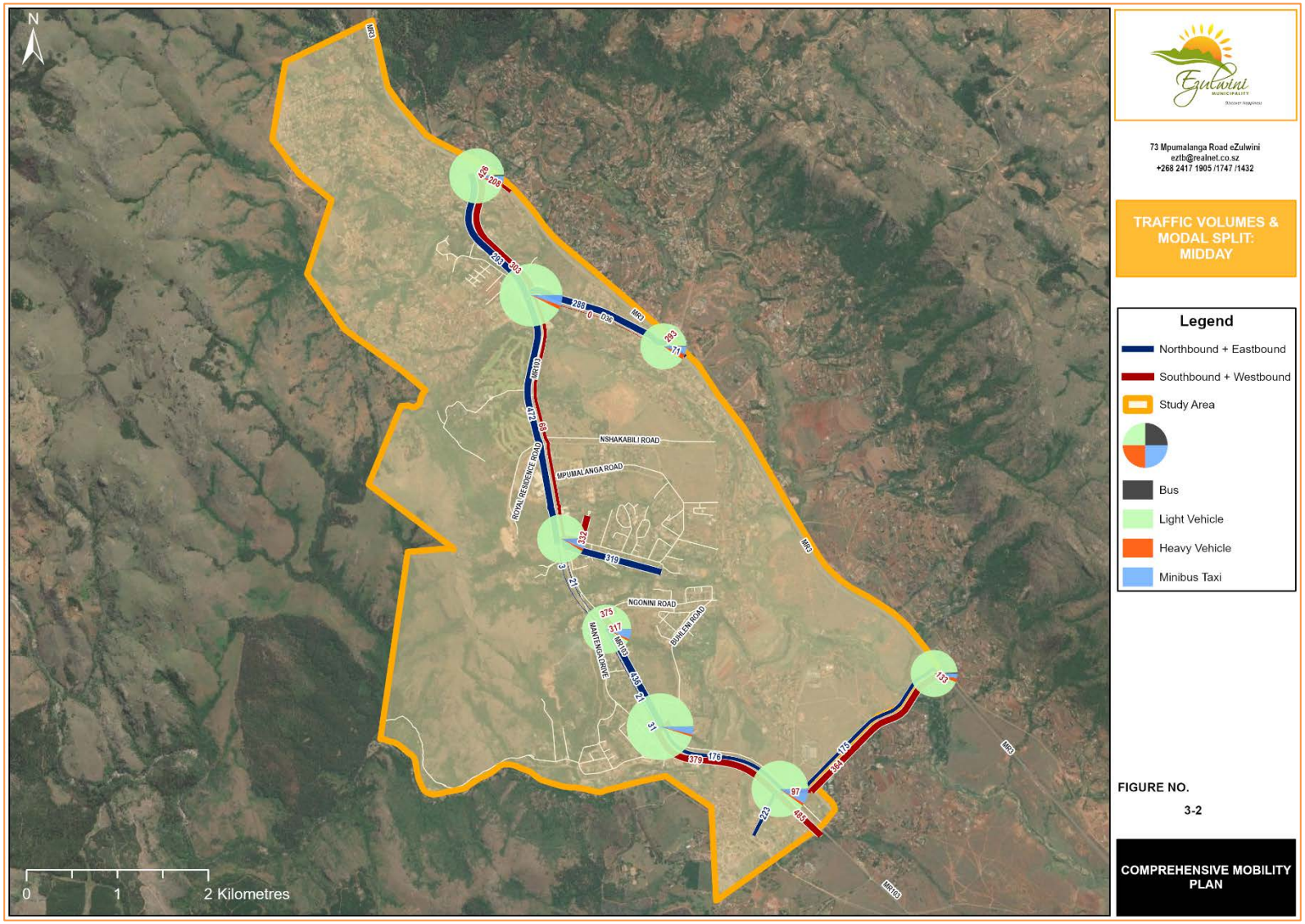


Figure 3-2: Traffic volumes and modal split during the Midday period

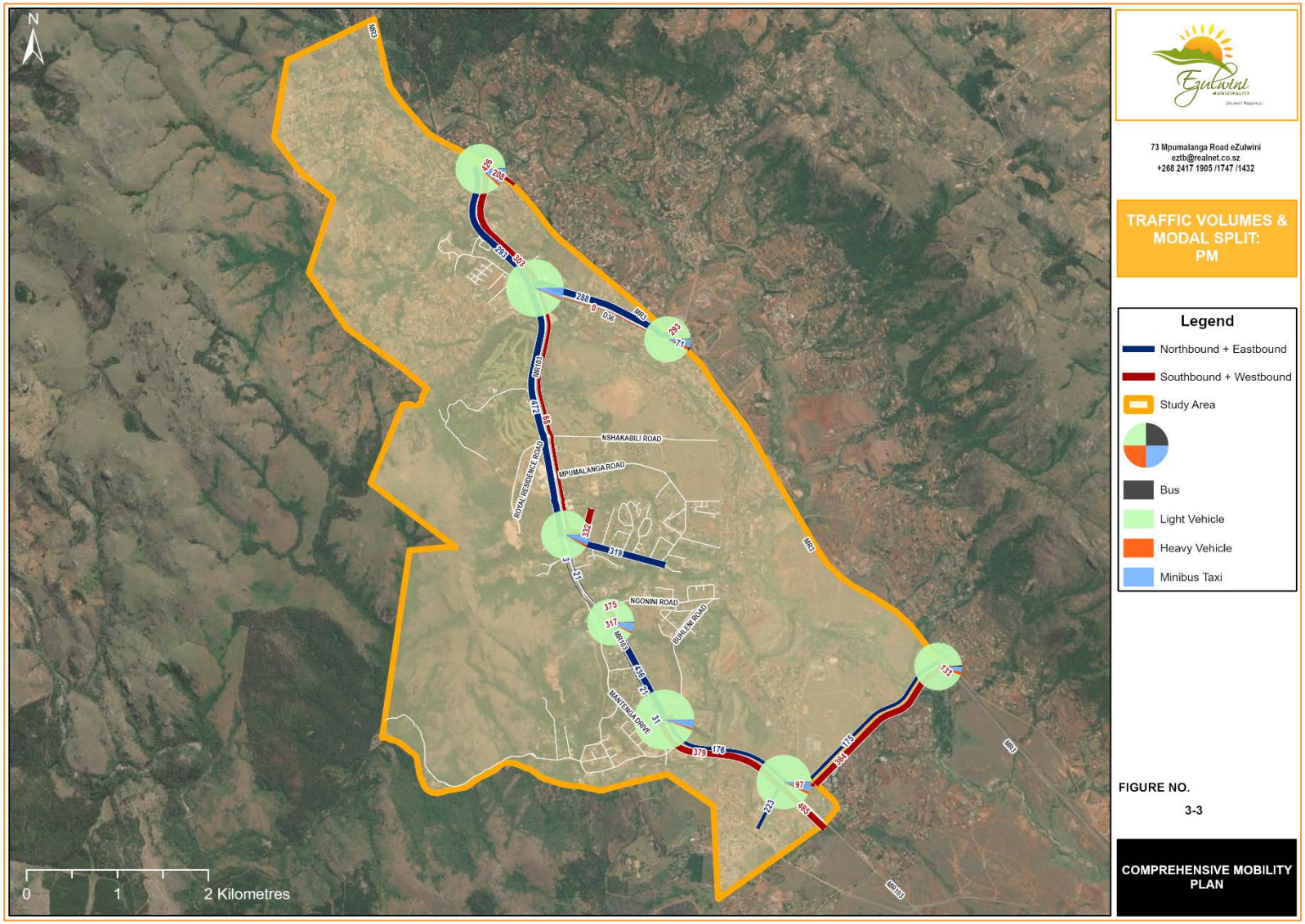


Figure 3-3: Traffic volumes and modal split during the PM period

3.1.2. Road Network

The road network influences the traffic and mobility within Ezulwini and is essential for land use planning. A good road network will support the strategies set out in Ezulwini in accordance with its IDP (i.e., Bulk service distribution by the municipality; water and electricity).

From the Town Planning Scheme (TPS), the road classification of the Ezulwini road network is inconsistent as shown in **Figure 3-4** below:

- the MR103 is classified as both a National Arterial and a Main Arterial Road.
- The surface type is also used as a classification and does not explicitly express what hierarchy the roads fall on, this classification does not provide context as to the functional class of the road (i.e., arterial, collector or local etc.).
- A large number of roads do not have a classification (are unknown) which makes it difficult to know the character of traffic service these roads are intended to provide for.

The lack of distinguishable roads within the municipality can cause authoritative and ownership confusion, which results in maintenance backlogs. Additionally, vehicles potentially travel on roads that are not suitable for them, further deteriorating the road surface. Most of the development in Ezulwini has developed in an ad hoc manner over the years and in combination with the lack of proper traffic control measures, road classifications do not align with those set in COTO TRH26 - Road Classification and Access Manual. Therefore, clear, and defined classifications of the road network are required. This presents the need for a functional road classification plan which will address these issues of inconsistency and uncertainty.

3.1.3. Road Condition and Inventory

One of the strategies set within the IDP over the 5 years is to have 100% of its roads with an asphalt finish, this is a necessary target within Ezulwini as some of the roads are extremely degraded (see Annexure I). Through high-level visual assessments done within the municipality;

- Potholes were observed on Mantenga Drive towards the informal settlements (southern parts of the study area).
- Several roads were found in a deteriorating state due to the lack of stormwater drainage.

There is a need for a thorough audit of the road conditions within Ezulwini to determine the quality and suitability of these roads for use as well as a road infrastructure and capacity upgrades plan to improve the road conditions within the municipality.

3.1.4. Road Safety

Road markings and signs form an integral part of a traffic safety and management plan. These provide visual guidance for road users and ensure that a standardised approach is followed within the transport system and ensure safe, uniform, and efficient operations. From the high-level visual assessments done in the study area, it was found that:

- Road markings, road signs, and warning and guidance signs were inadequate.
- Road markings were inconsistent, having different colours with some being obscured and faded.

The signage within the study area was also particularly a problem (see Annexure I) with:

- **Absent Road Signs** – There were several speed humps observed without warning, this is exceptionally problematic as drivers may encounter a speed hump without being prepared, causing a collision, or damaging their car. This was also the case for rumble strip signs. Public transport signs were also substantially absent throughout the study area.
- **Inconsistent Road Signs** – There were road signs observed that presented a warning or a feature that was not on the road. An example of this was from warning signs indicative of a rumble strip, however, there were no rumble strips physically present on the roadway.
- **Misplaced Road Signs** - There were signs observed along the roads of Ezulwini as out of place, and some important signs were not visible. This is due to several signs being placed in the same place.
- **Road Signs Out of Place** – There are outdated and temporary signs present along the major roads, which need to be removed or replaced accordingly.

The lack of these road safety measures creates confusion on the road, leading to highly avoidable incidents as road users may misunderstand and misinterpret road markings and traffic signs, and thus even violate local traffic laws. Therefore, all the irrelevant signage should be removed and Mandatory signs such as regulatory, warning and traffic calming signs etc. need to stand out to be distinguished from the informative ones, such as directions and advertisements etc. This presents the need for a road safety improvement plan that will address these issues of road markings and signage.

3.2. Freight

Freight transportation aids in executing the municipality's vision of providing efficient services and goods to improve the quality of life of Ezulwini residents. Within the municipality, freight traffic and the movement of goods affect overall mobility.

From the traffic counts illustrated in the previous modal split figures **Figure 3-1**, **Figure 3-2** and **Figure 3-3.**

- Hourly volumes for all major modes of transport at the intersections were obtained.
- From the modal split percentage analysis of the hourly volumes, it was found that the freight (heavy) vehicles constituted 4-5% of total traffic volume along all the major intersections along the corridors of MR103 and D36.
- MR3 Slip Road intersection has the highest modal share of 4% during the AM Peak hour, 4% during the midday peak and 5% during the PM peak hour of total volumes.

This MR3/D36 Slip Road is the entry to MR103 through D36 from MR3. It is possible that these vehicles could be captured as through-traffic, however it is possible that their destination is actually within Ezulwini, posing a number of potential issues:

- freight vehicles share the same road space as the other vehicles, which could potentially cause issues of road safety due to the poor visibility, speed, and size of these vehicles.

- Within The Gables Shopping Complex, freight vehicles use the same entrance and exit points as private vehicles, which although may not be a detrimental issue at the moment but may prove problematic over the next few years as traffic volumes increase.

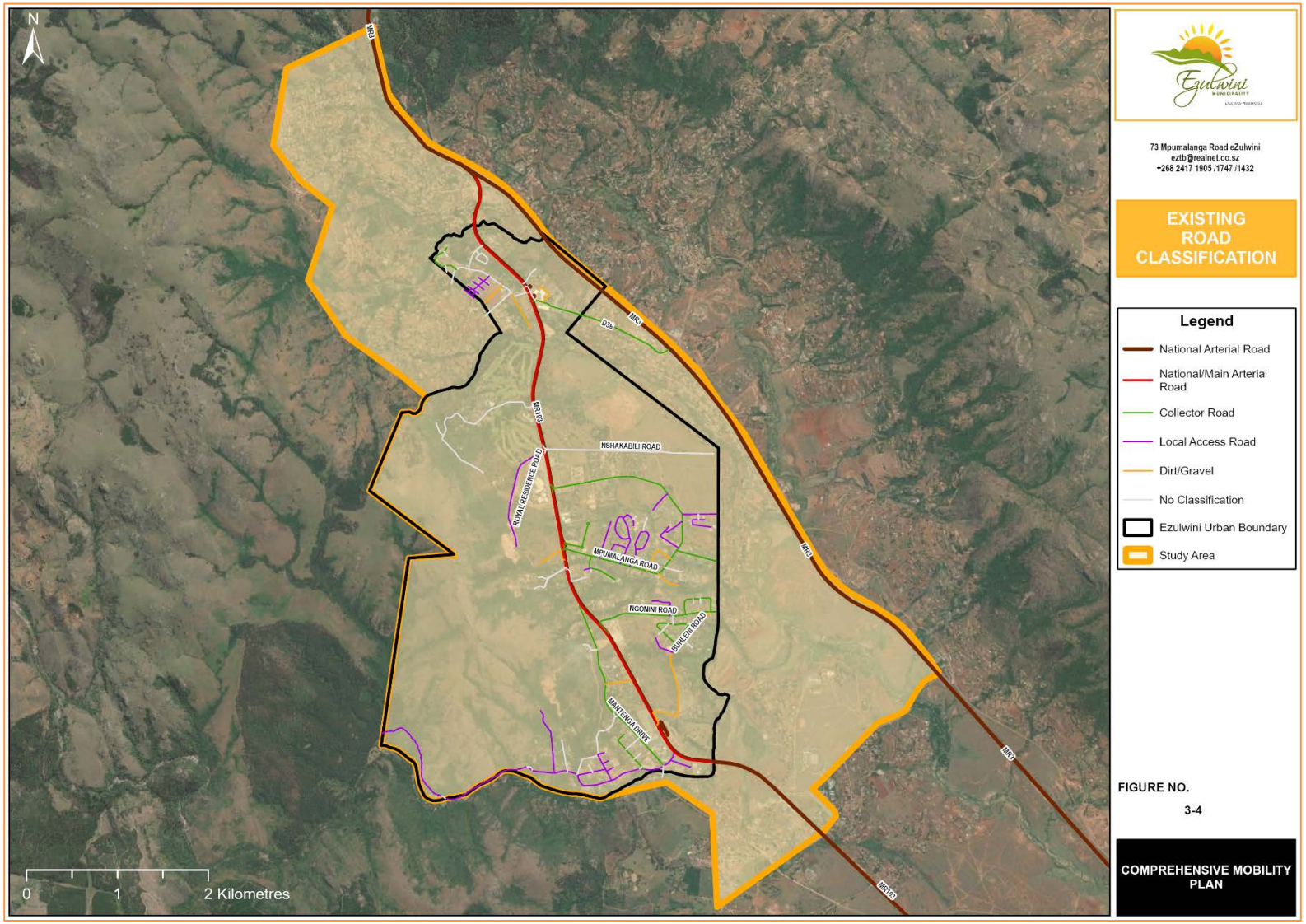


Figure 3-4: Existing road classification as per the Town Planning Scheme

Therefore, with the change in land use and the prospect of higher economic activity, freight transportation should also be considered and integrated within the mobility plan, to support the municipality's targets for social and economic development and improved quality of life. This presents the need for a freight improvement plan that will address the current and future issues of congestion and road safety caused by freight vehicles.

3.3. Public Transportation

Public transportation plays a substantial role in providing mobility and access to opportunities such as employment, healthcare, and education. It especially caters to individuals without access to private vehicles, children, people with disabilities as well as the elderly. As the Ezulwini municipality strives to align itself with the Sustainable Development Goals (SDG), the provision and utilisation of public transport is crucial in achieving these sustainability goals and poverty reduction strategies. In Ezulwini, public transport services (i.e., minibus taxis (i.e., kombis and buses)) are predominantly on the MR103 and D36 routes.

To understand the improvement and promotion measures for public transport, a review of existing transport infrastructure and facilities was analysed from the data from its share in the traffic volume counts, origin-destination patterns from roadside interviews, issues of public transport services etc. Results are discussed in detail in the status quo report. Below they are briefly discussed.

- There is a low utilisation of public transport in comparison with private vehicles. Nine percentage (AM Peak) and six percentage (PM Peak) of respondents indicated public transport as their mode choice, however, 40% (AM Peak) and 43% (PM Peak) preferred private transport as their mode choice.
- Results generated from the analysis of the volume count data for the intersections along the MR103 corridor show that public transport (Bus) has a modal share of 1% of the total volume of traffic at these intersections.
- There are minimal services along collector roads, as services are predominantly on the aforementioned roads.
- Access to public transport services proves difficult for individuals within the southern parts of Ezulwini (i.e., residential areas and informal settlements) as they have to travel to the MR103.
- There are no designated bus or minibus taxi ranks within Ezulwini
- There is no regulated public transport system (i.e., no scheduled times for buses or minibus kombis and no information regarding routes and costs)
- There is no regulated costing for services (i.e., prices vary at the drivers' discretion)
- Public transport stops are inconsistent (i.e., presence of signage, shelter and laybys varies between stops)
- Facilities are not able to accommodate a large number of people.

These findings have been the main reasons behind public transport not being the preferred mode of travel based on individuals travelling with private vehicles. The lack of a formal or designated rank also places individuals from the southern parts of Ezuwlini at a disadvantage as they have to walk to the MR103 to acquire public transport. Although there are facilities along the major routes, most were concentrated at the commercial nodes (i.e., The Gables and Corner Plaza). These facilities were also too small to accommodate groups (3-4) of people. The lack of safety and efficiency of the

current public transport within Ezuwlini discourages most commuters from using it.

Therefore, the public transport system must be improved through the provision of public transport facilities and sign provision, regulated systems, and safe vehicles to assist the municipality in achieving its vision for sustainable development. This presents the need for a public transport improvement plan which will address issues of safety, reliability, and public transport infrastructure.

3.4. Non-Motorised Transport (NMT)

NMT is a vital element of successfully encouraging clean urban transport as it brings about health, socio-economic and environmental benefits. NMT promotes physical activity and helps reduce air and noise pollution, which are fundamental in achieving the defined SDGs in the IDP of sustainable cities and communities, and good health and well-being. The challenges of NMT are discussed as follows:

3.4.1. Pedestrian and cyclist volumes

Pedestrian and cyclist volumes are imperative in understanding the movements and patterns of these individuals and observing whether their mobility needs are being met. To quantitatively analyse these patterns, pedestrian counts and roadside surveys were conducted where it was found that:

- There was no consistent/uniform pattern of movement of pedestrians.
- There were hourly variations in pedestrian volumes observed at all the survey locations.
- There is not a substantial presence of cyclists within the municipality however, the present volumes indicate that there should be some provisions made for cyclists.

During the AM Period:

- The AM peak hour for pedestrians was between 07:00 and 08:00 with the. highest pedestrian volumes observed at the survey location near the MR103/D36 intersection with 184 pedestrians counted.
- The AM peak hour for cyclists was between 06:00 and 07:00 with the highest proportion of cyclists observed at the crossing between MR103/D36 with 5 cyclists counted.

As shown in **Figure 3-5**, these high volumes could be attributed to work and educational trips from individuals moving in from the eastern parts of Lobamba towards Corner Plaza. Additionally, these high volumes could be attributed to individuals walking towards the MR103 to acquire public transportation, or to walk along the MR103 to their respective destination.

During the Midday period:

- The Midday peak hour for pedestrians was between 13:00 and 14:00 with the. The highest pedestrian volumes were observed at the survey location near the MR103/The Gables intersection with 338 pedestrians counted.
- The Midday peak hour for cyclists was between 13:00 and 14:00 with the highest proportion of cyclists observed at the crossing between MR103/D36 with 6 cyclists counted.

During the PM period:

- The PM peak hour for pedestrians was between 17:00 and 18:00 with the. highest pedestrian volumes observed at the survey location near the MR103/D36 intersection with 462 pedestrians counted.
- The PM peak hour for cyclists was between 18:00 and 19:00 with the highest proportion of cyclists observed at the crossing between MR103/D36 with 7 cyclists counted.

As shown in **Figure 3-6** and **Figure 3-7**, these high volumes can be attributed to the presence of The Gables shopping complex, the surrounding hotels, apartments, residential areas, and other recreational activities. Most individuals choose to walk during these Midday and PM Peak periods to enjoy the recreational activities surrounding the area. Therefore, ease of mobility and access should be provided for these individuals through means of appropriate infrastructure to support their movement throughout the municipality.

3.4.2. Sidewalks and streetlights

In Ezuwlini, there is provision of NMT infrastructure (i.e., sidewalks) along the MR103 and D36, as well as on some collector roads (i.e., Mpumalanga Crescent and Mantenga Drive) however NMT infrastructure is mostly inadequate. It was found from the high-level visual assessments conducted that NMT infrastructure are:

- Discontinuous;
- Too narrow;
- Streetlights are absent or discontinuous.
- Kerbs do not follow standards set in the South African National Standards (SANS) 10400 & 784, making them inaccessible or difficult for all categories of sidewalk users.
- Universally accessible sidewalks should have kerb cuts with a slip-resistant finish and gradient not exceeding a 1:12 ratio and should be provided immediately adjacent to the bus stops, parking areas and entry and exit to the walkway.
- There is no tactile paving, that hinders the independent movement of people with sight impairments through an intersection.

Pedestrian movements were also restricted and unsafe, with the pedestrian bridge located in Lobamba (see Annexure I) in a degrading and deteriorating state.

Illustrated in **Figure 3-8**, the lack of uniform and continuous sidewalks creates a limited and discontinuous pathway for pedestrians, cyclists, and people with disabilities (see Annexure I). As pedestrians are restricted from walking side-by-side or are forced to walk on the roadway due to limited space, heightening the risk of potential incidents and/or crashes. There is also limited visibility for pedestrians due to the absence of streetlights, which makes them feel unsafe and vulnerable especially during the early hours of the morning or at night. Therefore, the provision of continuous and uniform sidewalks, that are compliant with universal access requirements is essential in addressing the mobility needs of pedestrian and cyclist, further achieving the set-out targets of the municipality. This presents the need for a non-motorised transportation improvement plan that will address issues of inaccessibility, lack of infrastructure and safety.

3.5. Standards & Guidelines

Standards and guidelines are essential in framing and facilitating that the appropriate planning and construction is conducted for the users' well-being. Throughout the study, it has been apparent that one of the issues pertaining to the governance of the transport system within Ezulwini is sourcing the relevant information required. Multiple documents contain road information which should be found from one source (i.e., Road Classification is obtained from the TPS instead of an Integrated Transport Plan or Framework). This is also pertinent in the design of the road, the infrastructure and signage, where different guidelines and standards are adopted to design and implement a transport plan. This causes conflicting designs and a lack of uniformity throughout the municipality. This presents a need for an inventory of relevant documents (i.e., legislation, regulations, and standards) that should be established by the municipality**.**

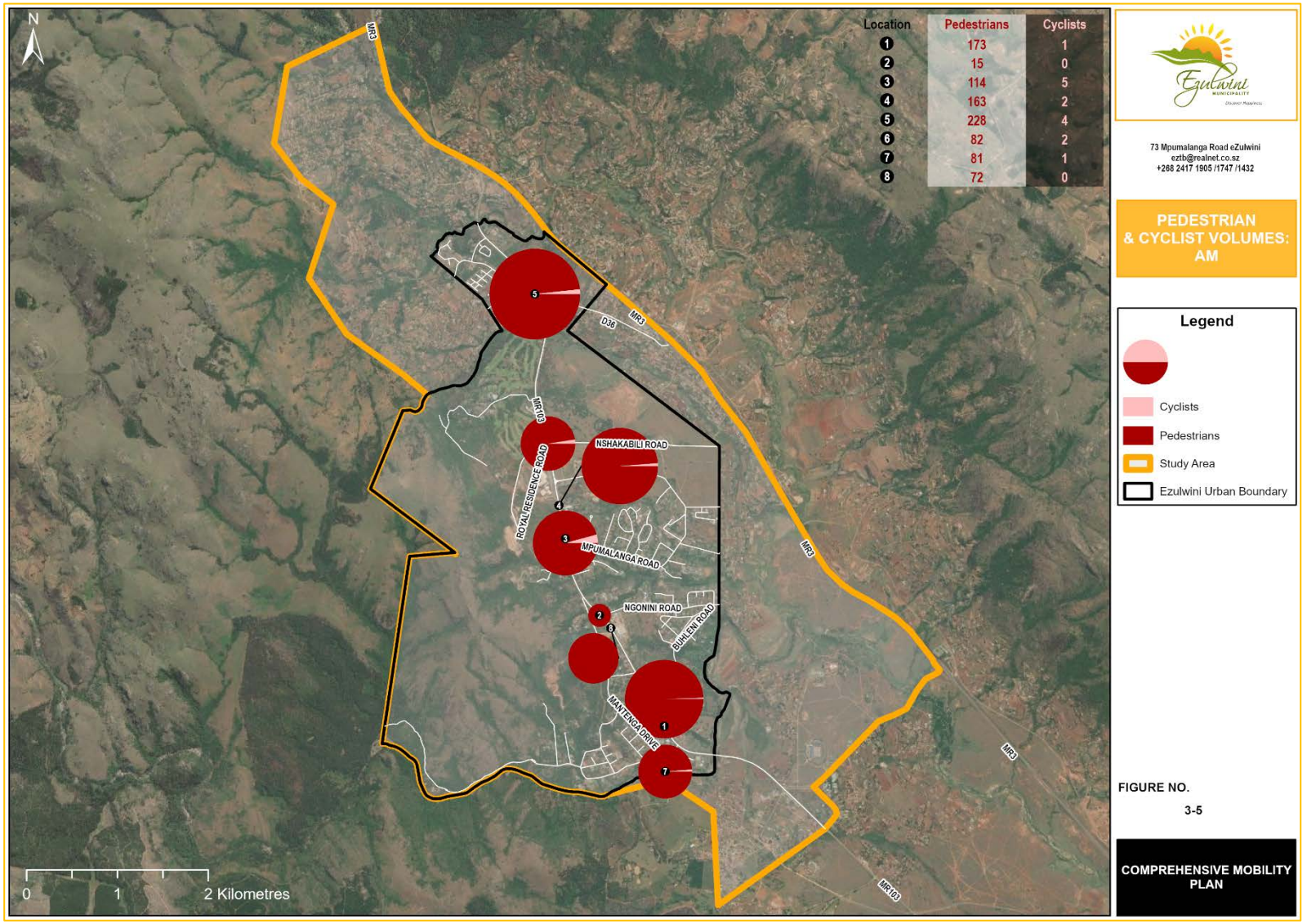


Figure 3-5 Pedestrian and cyclist volumes during the AM period

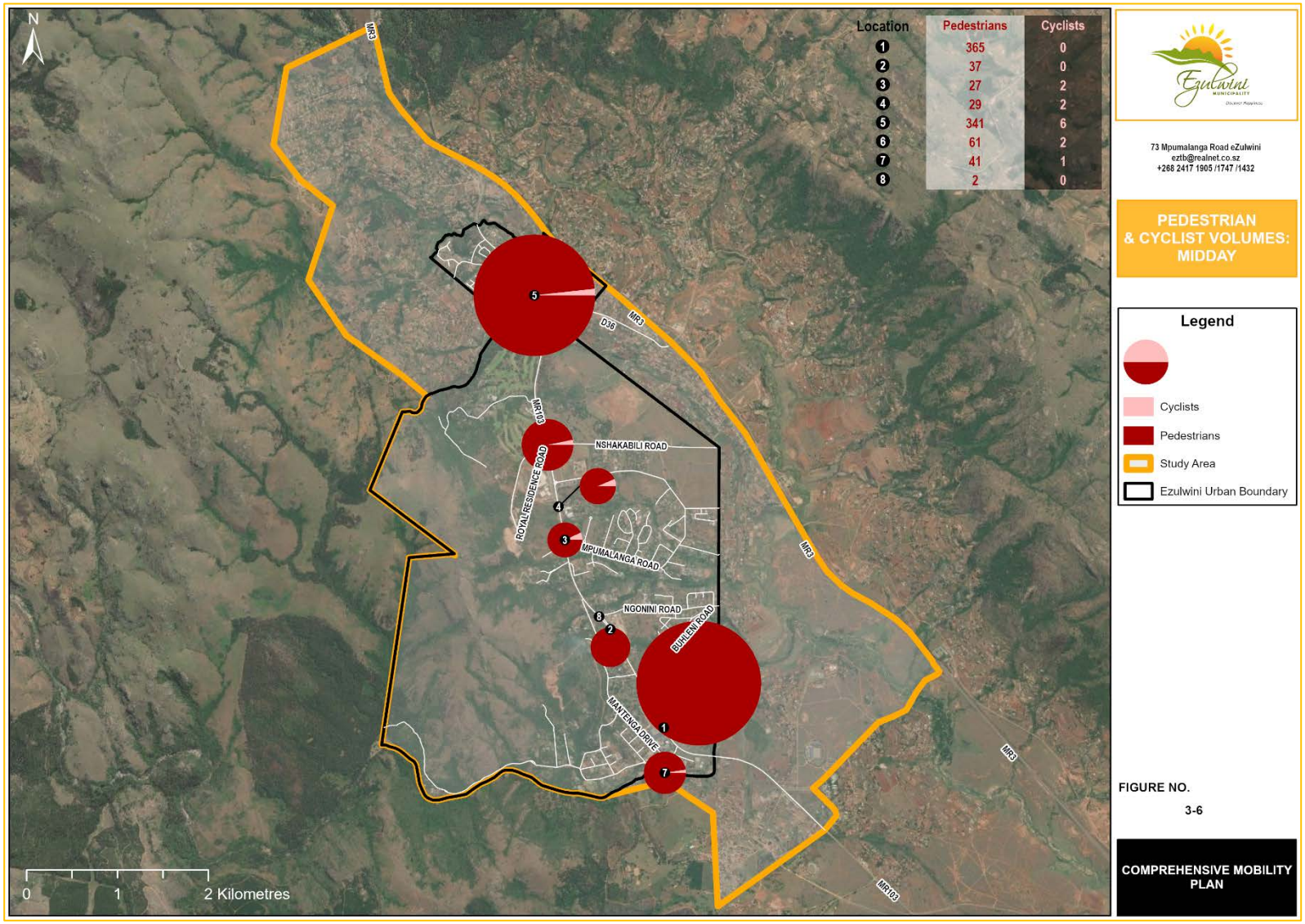


Figure 3-6 Pedestrian and cyclist volumes during the Midday period

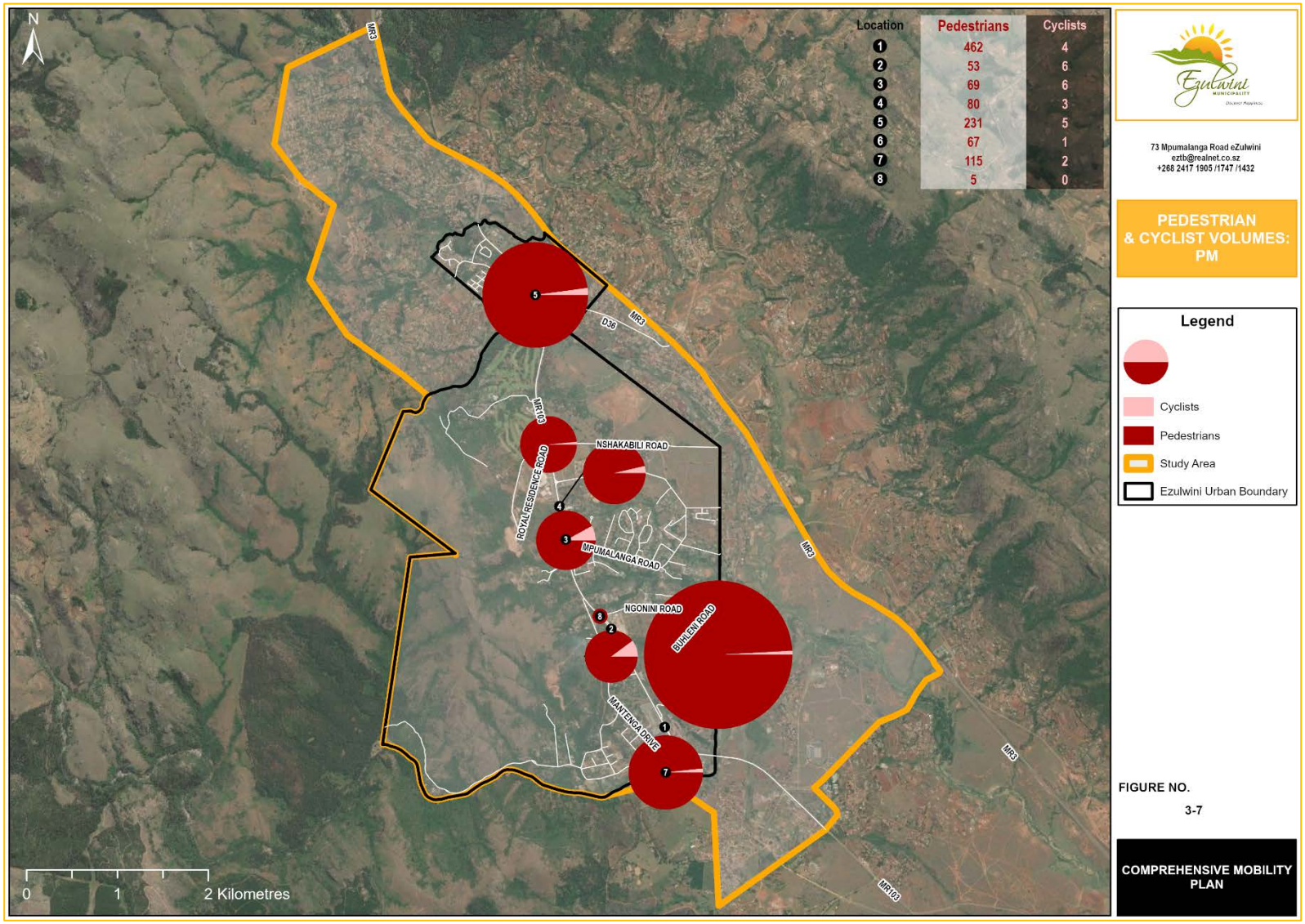


Figure 3-7: Pedestrian and cyclist volumes during the PM period

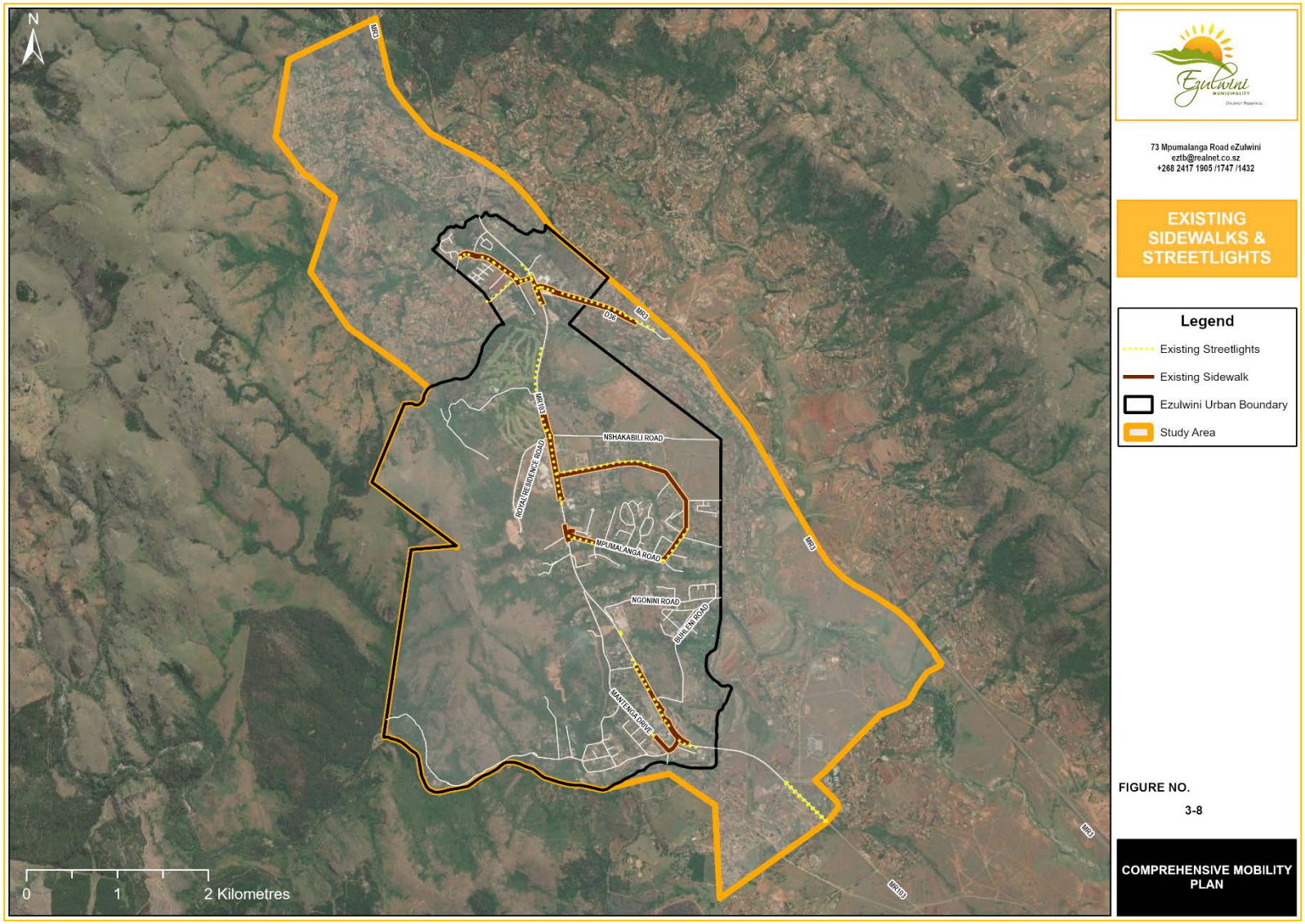


Figure 3-8: Existing sidewalks and streetlights

4. URBAN MOBILITY PLAN

An urban mobility plan is a well-developed strategic plan that is designed to address and meet the transportation and mobility needs of people, goods, and services within a particular area. This plan aims to attain a safe, reliable, and sustainable transportation system by improving the accessibility and mobility of the current system. The purpose of this plan is to provide a better quality of life through improved connectivity for individuals within Ezulwini. The plan improves and builds on existing practices, identifying inclusive solutions, and integrating relevant plans, policies, and stakeholders to form an integrated transport plan.

As described, the main objective of an urban mobility plan is to focus on the mobility of people and goods, and not necessarily vehicles. This vision can be achieved through improving and promoting sustainable modes of transport (i.e., public transport, non-motorised vehicles, and pedestrians as important modes of transport). This plan also provides an effective platform for the integration of land use and transport planning, which will optimally connect economic activities with all means of movement. Such a plan is required in Ezulwini to support the socio-economic and environmental spheres of the municipality, to provide an effective, efficient, and sustainable transport system.

This chapter will discuss the Urban Mobility Plan prepared for Ezulwini with proposed measures to address the mobility challenges discussed in the previous chapter. These measures are proposed in line with Ezulwini's strategies and envisioned targets.

4.1. Roads

Roads are an important component of an urban mobility plan because they play a crucial role in connecting people, goods, and services. Roads support alternative modes of transportation and contribute to the socio-economic well-being of cities therefore, effective urban mobility planning should consider the role of roads and prioritize investments in roads to ensure safe, efficient, and sustainable transport systems.

The following road improvement plans are proposed as a part of the urban mobility plan, to ensure that the roads in Ezulwini support connectivity, and provide access to essential services and economic activity.

4.1.1. Road Extensions

An alternate route plan outlines alternative routes or paths that can be used in the event of a closure or disruption of a primary transportation route. In Ezuwlini, an alternate route plan is required to divert traffic from the MR103 as it serves as the main entry and exit into the municipality. This alternate route plan will improve transportation resilience and reduce the impact of disruptions on the MR103 especially in cases of emergency.

Shown in **Figure 4-**1, in addition to the D36, which serves as an alternate route in and out of Ezulwini, the following are proposed as alternative routes of access and mobility through the municipality, in accordance with the minimum spacing requirements prescribed in the COTO TRH26:

- Nshakabili Road extended to the proposed service road parallel to the MR3.
- Ngonini Road extended with a bridge over the Lushwana River to the MR3.

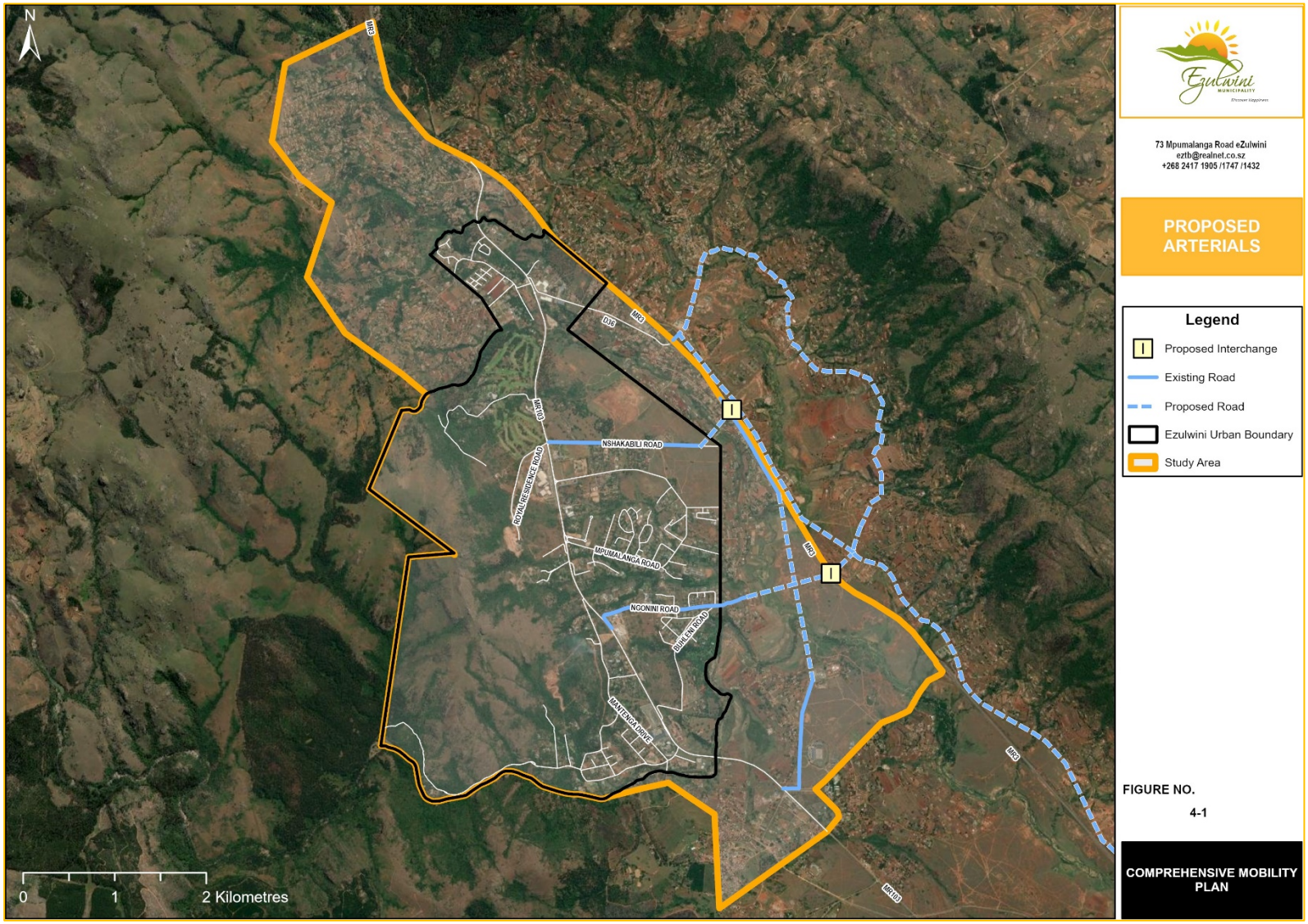


Figure 4-1: Proposed Road Extensions

The proposed road extensions provide the following advantages:

- Improves accessibility from the MR3 to Ezulwini, reducing congestion at existing intersections
- Increases the developable land and density on the eastern side of Ezulwini.
- Several evacuation routes in the event of a disaster within Ezulwini.
- In the event of an accident on the MR3 (adjacent to Ezuliwini), the diverted traffic from the MR3 does not have to travel the entire length of MR103, through Ezulwini. The diverted traffic can use the closest on and offramps. So traffic congestion due to the diverted traffic can be localised to a portion of MR103, without affecting all the intersections in Ezulwini.

4.1.2. Functional Road Classification Plan

A functional road classification is a method in which roads are grouped into classes or systems according to the functional characteristics that the road provides. These classifications inform the planning, development, and management of roads. In Ezulwini, a functional road classification plan is required to provide uniform classification to eliminate inconsistencies between different road classes and further ensure that the roads in the municipality are accounted for, under their respective authorities, ensuring that resources are used effectively.

The road network in Ezulwini is then to be updated from its current classification (which has no referred guideline/standard) to the COTO:TRH 26 South African Road Classification and Access Management Manual classification (in the absence of a specified guideline for road classification). **Figure 4-2** illustrates the that Class 1 serves a mobility function, while Class 5 serves an accessibility function. Class 1 roads such as the MR3 are designed for a higher speed limit, with interchanges spaced 2.4kms apart, while Class 5 roads are residential streets, where individual houses have direct access and the speed limits are generally 40 kmph.

Therefore, the proposed classifications, based on the Average Daily Traffic (ADT) and the functionality are as follows:

- MR103 should be classified as an Urban Class 2, as the ADT of 25 650 vehicles (calculated from link counts conducted), falls within the Urban Class 2 Range of 20 000 – 60 000 vehicles (TRH26), with anticipated growth in vehicle volumes along this route in the future, this classification serves as the best class of road for the route. Additionally, the main function of this route is mobility, allowing through-movement of traffic which aligns this road with the proposed classification.

- D36 should be classified as an Urban Class 3, as the ADT of 13 010 vehicles (calculated from Traffic Counts taken), falls within the Urban Class 3 Range of 10 000 – 40 000 vehicles (TRH26), however, the number of illegal accesses observed on this route may pose a potential problem for this classification, therefore, this route may be subject to change in the near future.

The following roads are to be classified based on their functionality as vehicle volumes were not available to calculate their ADT.

- Mpumalanga Crescent to Class 3, as Mpumalanga is defined as a collector road within the road hierarchy, and ties into the MR103
- Ngonini Road to Class 3
- Buhleni Road to Class 4

- Road leading to D36 to Class 4
- Road parallel to Mpumalanga Crescent to Class 4
- Road parallel to Nshakabili Road to Class 4

These are illustrated in **Figure 4-2** below.

4.1.3. Access Management Plan

An access management plan refers to a strategic and proactive plan to manage vehicle access points along a roadway, in an attempt to improve the efficiency and safety of the roadway. This term encompasses techniques of spacing, designing, provision of turns, medians, and intersections, as means of controlling the entry and exit of vehicles on the urban network. The main objective of access management is to design a plan that improves safety, reduces congestion, and increases the traffic flow on a roadway. In Ezulwini, an access management plan is needed in coherence with the functional road classification plan to improve the operational performance of the transport system.

As a means of improving the efficiency of the MR103, the following locations are prescribed for a thorough access management study:

- Somnjalose Primary School
- Ezulwini Private Hospital
- Sibane Sami Hospital

The D36 is also in need of an in-depth access management study, to manage the illegal accesses that hinder the smooth flow of traffic along the route.

The Tables below are extracts from the COTO: TRH26 manual depicting the different classes of road and their minimum access spacings .

Table 4-1: Rural and Urban Road Classification

Rural Classes		**Urban Classes**	
R1	Rural principal arterial	U1	Urban principal arterial
R2	Rural major arterial	U2	Urban major arterial
R3	Rural minor arterial	U3	Urban minor arterial
R4	Rural collector arterial	U4	Urban collector arterial
R5	Rural local arterial	U5	Urban local arterial
R6	Rural walkway	U6	Urban walkway

Table 4-2: Minimum intersection spacing requirements on mobility routes

Class	**Rural**	**Urban Signals**	**Urban roundabouts and priority**
Class 1	8.0km	n/a	n/a
Class 2	5.0km	800m ± 15%	800m ± 15%
Class 3	1.6km	600m ± 20%	600m ± 20%

The TRH serves as a recommended guideline for Ezulwini to consider for the functional classification of it's routes. This document in combination with an access managemt plan may provide the municipality with the necessary process to identify the existing and future access management challenges as well asses possible solutions to these challenges. **Annexure H** contains the conceptual layouts developed from an access management study, detailing the proposed remediations to allow for a seamless and freeflowing road network.

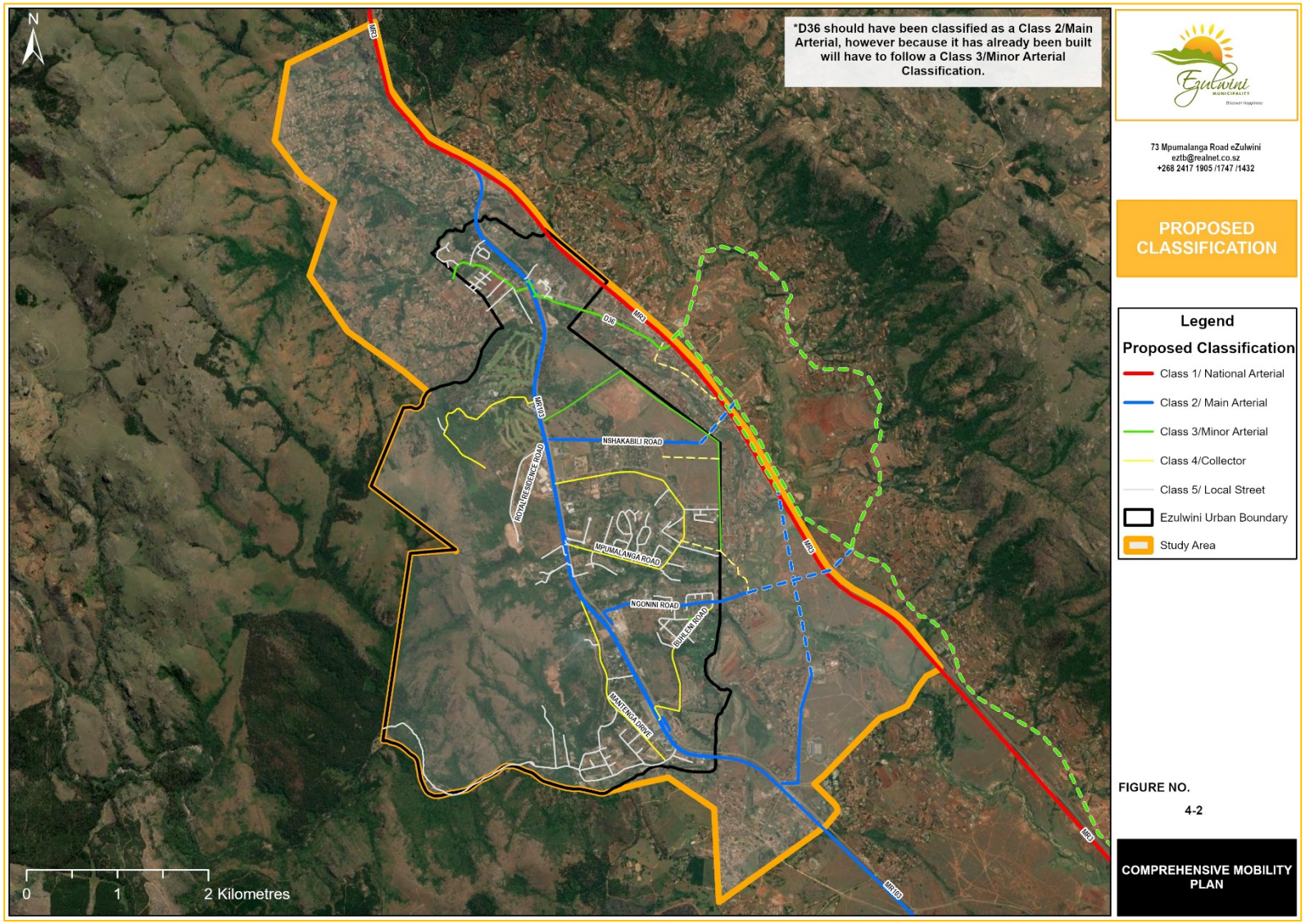


Figure 4-2: Proposed road classification (in accordance with the COTO: TRH26)

4.1.4. Road Infrastructure/Capacity Upgrades Plan

A comprehensive road infrastructure plan outlines the development and maintenance of a road network with the goal of ensuring that the road network functions effectively and efficiently without any impedance. In Ezulwini, an infrastructure and capacity upgrade plan is required to facilitate the necessary funding allocations to improve the existing road network through construction and maintenance. This plan is also required to ensure that the roads are safe, sustainable, and meet the needs of users.

The road infrastructure and capacity upgrades are illustrated in **Figure 4-3** as follows:

1. MR103 Section 1 (S1), from the MR3/MR103 intersection to Cuddle Puddle (*26°24'8.83"S 31°10'31.42"E*), and Section 2 (S2) from Nshakabili Road to King Sobuza II Memorial Park are to be upgraded to a 2-Lanes per direction configuration to increase the capacity of the road to accommodate the existing demand of vehicles as well as the future demand of vehicles. This is to increase the current capacity. This configuration is to further allow free movement of motorised transport, additionally providing smooth and continuous movement of traffic.

2. Roads that need to be upgraded to paved, as they are currently gravel/unpaved roads are:
    - Buhleni Road
    - Road A
    - Road B
    - Road C
    - Road D
    - Road E
    - Ngonini Road
    - Twiggs Garden Street

**Additionally, these roads should provide sidewalks of 1.5m (minimum) on each side of the road or 2m (minimum) on one side along with streetlights.*

Similarly, the following bridges along the MR103 have been identified in need of upgrade/formalisation:

- Bridge on southern Mantenga Drive (*26°26'40.12"S 31°11'19.98"E*) – This bridge needs to be widened to accommodate both vehicles and pedestrians entering and exiting. The bridge needs to be upgraded into a 1-lane per direction configuration at the very least, with provision of a 2m sidewalk for pedestrians. The bridge also needs to be maintained as it is currently corroded and may not sustain future weather conditions.
- Bridge on MR103, near EWSC (*26°26'35.98"S 31°11'38.96"E*) – This bridge should follow the 2-lanes per direction configuration proposed for the MR103, while adding clip on bridges on the western side to allow provision for pedestrians crossing the bridge. The bridge also requires guard rails to ensure safety for both vehicles and pedestrians.
- The pedestrian bridge located on the north-eastern parts of the study area (*26°24'10.06"S 31°10'44.28"E*) was observed to be in a deteriorating state, requiring immediate remediation to reconstruct and reinforce with coarse materials that ensure that it is not slippery and heighetened columns to protect it from flooding and erosive damage.

The cross sections for these proposed upgrades can be found in **Figure 4-7** and in **Annexure E**.

4.1.5. Road Safety Improvement Plan

A road safety improvement plan is a comprehensive strategy aimed at reducing accidents and improving road safety by minimising the risks associated with road use. In Ezulwini, a road safety improvement plan is required to identify measures and strategies that can be implemented to improve and manage the road safety in the municipality while addressing the multimodal safety concerns experienced by road users.

In Ezulwini, the United Nations' Road Safety Strategies are adopted as measures to improve on the road safety management in the municipality, these pillars are listed as follows:

- **Pillar 1: Road Safety Management**
- **Pillar 2: Safer Road and Mobility**
- Pillar 3: Safer Vehicles
- **Pillar 4: Safer Road Users**
- Pillar 5: Post-crash response

With pillars 1, 2 and 4 being the most pertinent in Ezulwini, therefore, to address the challenges of road safety in accordance with these pillars, the following measures are proposed to manage the road safety in the municipality as illustrated in **Figure 4-4**:

- Provision of speed hump signs along the MR103 and warning plates.
- Provision of Rumble Strip Signs to reduce speed throughout the MR103.
- Removal of temporary and outdated signs throughout Ezulwini.
- Removal of irrelevant signs (i.e., advertisement signs before mandatory signs) throughout Ezulwini.
- Maintenance and uniformity of signs throughout Ezulwini – ensuring signs have standardised and uniform sizing, colours and meaning.
- Maintenance and provision of road markings throughout Ezulwini.
- Provision of guardrails along elevated sections of the MR103.

4.2. Freight Improvement Plan

A freight improvement plan outlines strategies and initiatives to address challenges of increased congestion, capacity constraints and potential environmental impacts. In Ezuwlini seeing that this is not an industrial town and has very low commercial activity, there is no need for a freight improvement plan as there are a few number of trucks. However, as shown in Figure 4-1, proposed extensions leading in and out of MR3 are proposed for the town which will need to be designed for heavy vehicles. Therefore, plans to to mitigate and plan for future developments that will be established on these proposed routes. This would entail freight data collection and analysis, route optimization and technology upgrades that are further discussed in the Mobility Measures chapter. This freight improvement plan will ensure that an efficient transportation network is operational in Ezulwini.

4.3. Public Transport Improvement Plan

A public transport improvement plan outlines strategies and initiatives to address the challenges associated with public transport systems such as limited coverage of services, inadequate service quality and aging infrastructure. In Ezulwini, a public transport improvement plan is required to address these challenges as well as provide a public transport system that is successfully integrative of other modes of transport, which can improve the quality of life of Ezulwini residents and contribute to a more sustainable municipality.

The following measures are proposed as illustrated in **Figure 4-5** to improve the public transport system in Ezulwini:

- Provision of a well-routed and regulated bus system with the following routes as formalised bus routes:
    - MR103
    - D36
    - Mpumalanga Crescent
    - Mantenga Drive
- Provision of designated and well-located bus stops with appropriate signage should be made throughout the municipality.
- Conversion of minibus taxi (i.e., kombis) trips to scheduled bus trips and allow minibus taxis (i.e., kombis) to service collector roads).
- Reduce the distance traveled for public transport by providing services within residential Ezulwini.
- Design public transport facilities with adequate space for groups of people.
- Maintain existing infrastructure of facilities, laybys, and signs.
- Provision of a minibus taxi (i.e., kombi) / bus rank in Ezulwini.

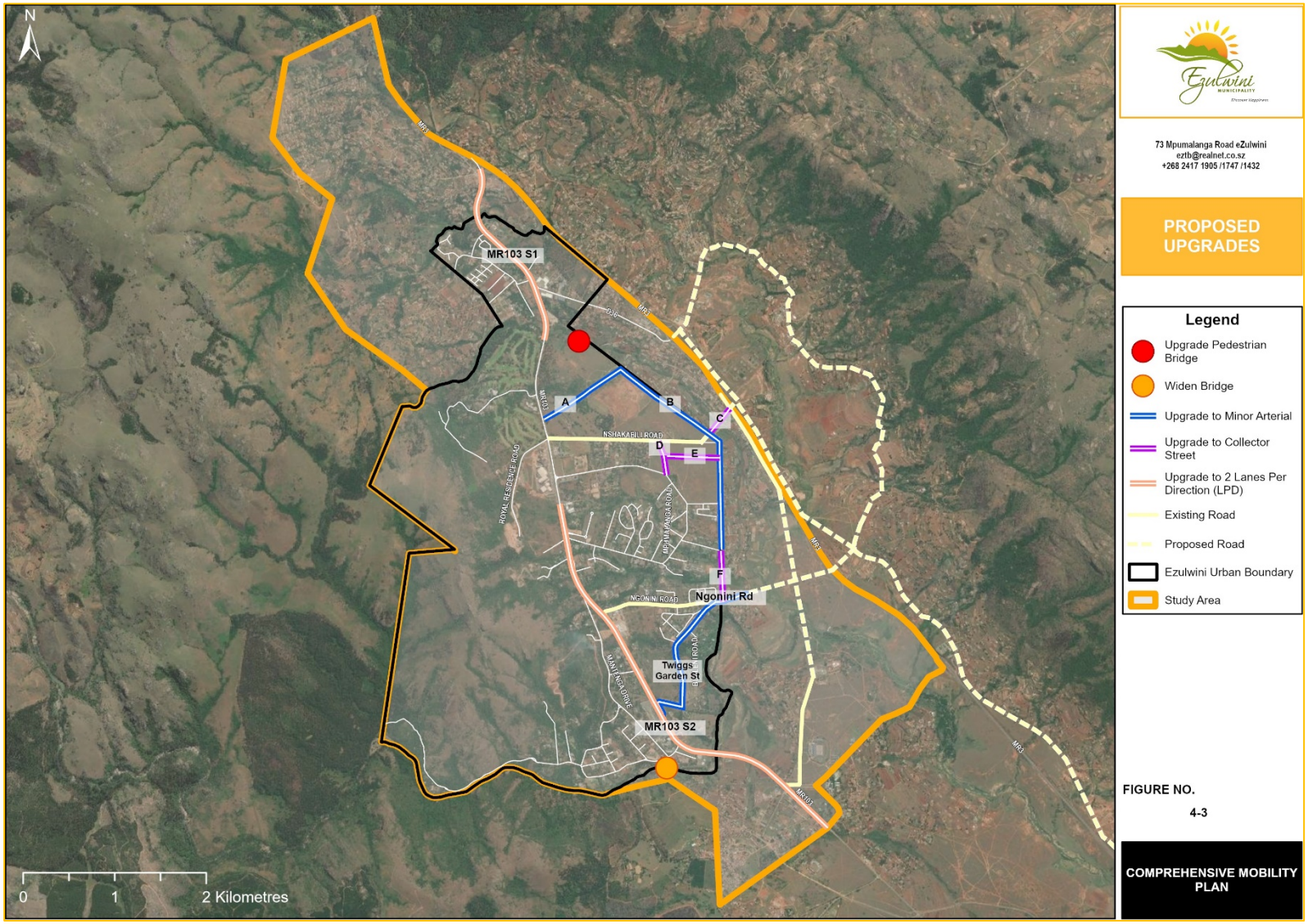


Figure 4-3: Proposed road and capacity upgrades

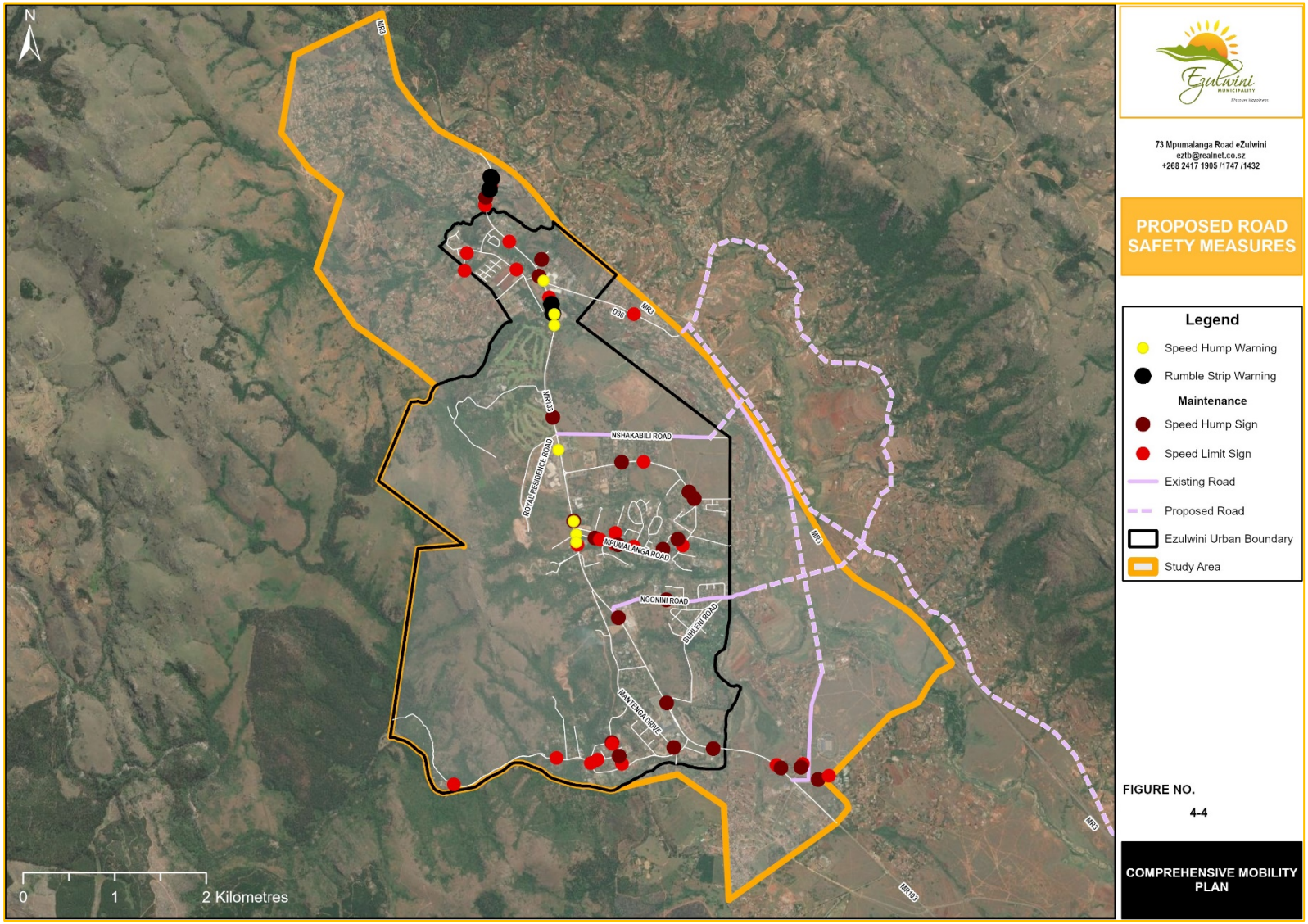


Figure 4-4: Proposed road safety measures

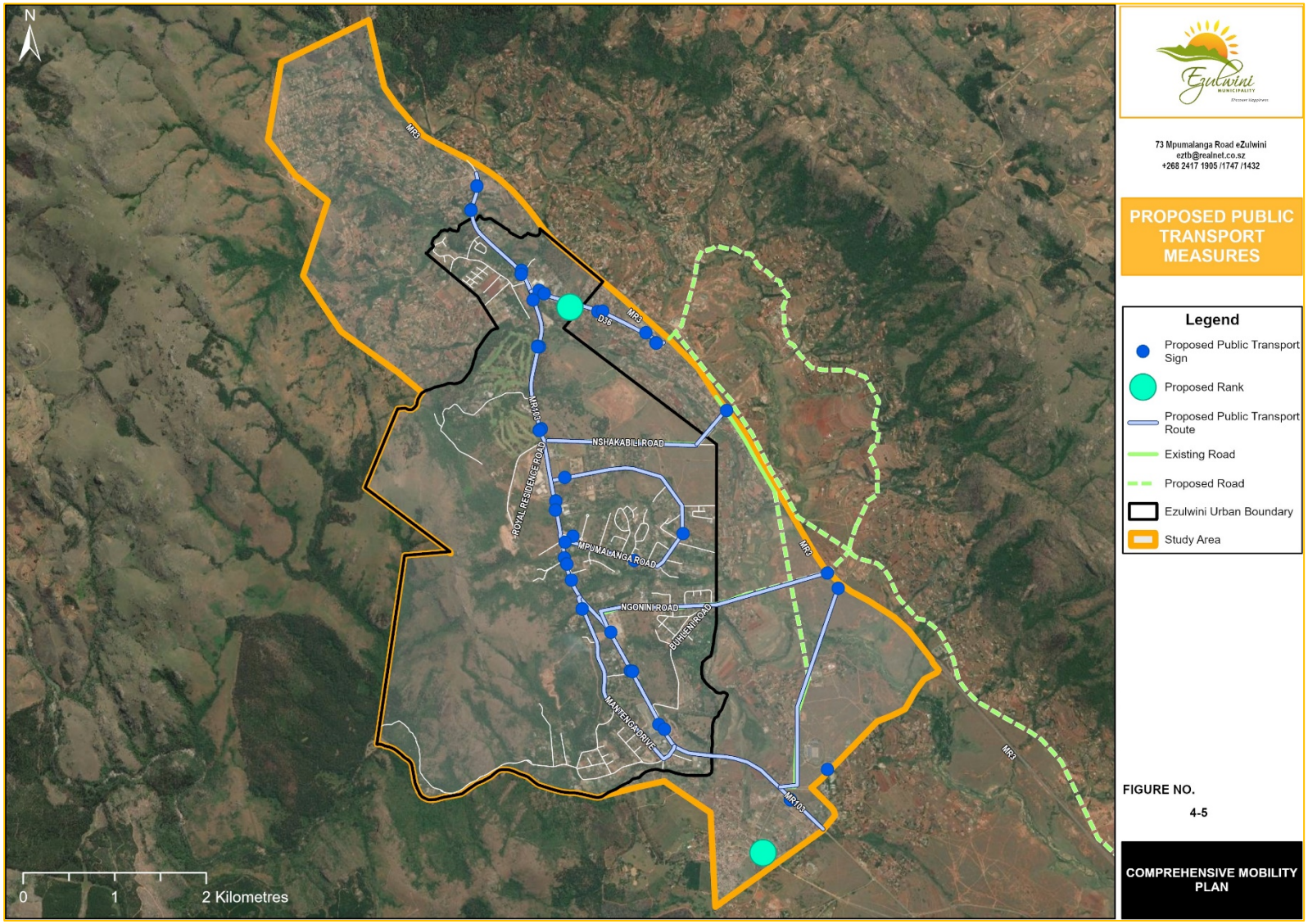


Figure 4-5: Proposed public transport measures

4.4. NMT Improvement Plan

A NMT improvement plan outlines strategies and initiatives to address challenges of inaccessibility, safety, lack of infrastructure and connectivity. In Ezuwlini, an NMT improvement plan is required to address these challenges and improve the overall performance of the NMT system that will support active transportation and contribute to a more sustainable and livable environment. By implementing a comprehensive NMT plan, the use of public transportation is also encouraged.

The following measures are proposed to improve the NMT system in Ezulwini as illustrated in **Figure 4-6** and the proposed cross sections in **Figure 4-7**:

Along the MR103:

- A complete, continuous, and safe walkway that consists of a 2m wide spacing on both sides of the roadway.
- Where a sidewalk already exists and presents itself as too narrow (i.e., not more than one individual can walk along it at the same time without encountering some danger), it should be widened to 2m.
- Provision of continuous street lights along the route MR103, to ensure safety of pedestrians.
- A dedicated cycle lane should be considered for future plans, when active transport becomes more frequent in Ezulwini.
- Bridge near the Eswatini Water Services Corporation (EWSC) requires an extension to allow for a 2m sidewalk with guard rails.

Along the D36:

- Continuous, and safe sidewalks should be provided on both sides, with a minimum spacing of 1.5m. Where the sidewalks prove to be narrow, widening is required to extend the sidewalks to 2m.
- There is lighting predominantly on one side of the route, therefore, lighting should be provided on both sides to increase safety and ensure visibility at night for both vehicles and pedestrians.

Throughout Ezulwini

- Minimum of 1.5m sidewalks and streetlighting (on one side at the very least) Is proposed for the rest of the road network. In instances where the sidewalk proves too narrow, widening to 2m is suggested.
- Maintenance is proposed throughout the entire municipality.
- Pedestrian Bridge near Lobamba needs to be upgraded with new materials, and the pathway towards the bridge similarly needs to be upgraded and formalised with appropriate sidewalks and streetlights. This pathway will be extremely essential for the current and future residents of Lobamba, especially with the anticipated change in land use.

All proposed sidewalks and crossings should be cognitive of universal access, ensuring that:

- Sidewalks are smooth, continuous, and easily allow mobility, with no impedances such as raised kerbs.
- Sidewalks and crossings must have appropriate detectable surfacing (i.e., tactile tiles or tactile paving).
- Sidewalks and raised crossings are continuous, having no hazardous breaks/spaces in-between.
- NMT infrastructure can be used by all individuals, without requiring any assistance.

4.5. Standards and Guidelines

Standards and guidelines are necessary as they assist in ensuring the safety, accessibility, interoperability, sustainability, and quality of transportation systems. In Ezulwini, standards and guidelines should be adopted and implemented to ensure that transportation systems are designed and operated through safe, efficient, and effective means, which will be beneficial for all users, passengers, and communities. Additionally, these standards and guidelines should be easily accessible by means of an inventory or database that is regularly updated with relevant information.

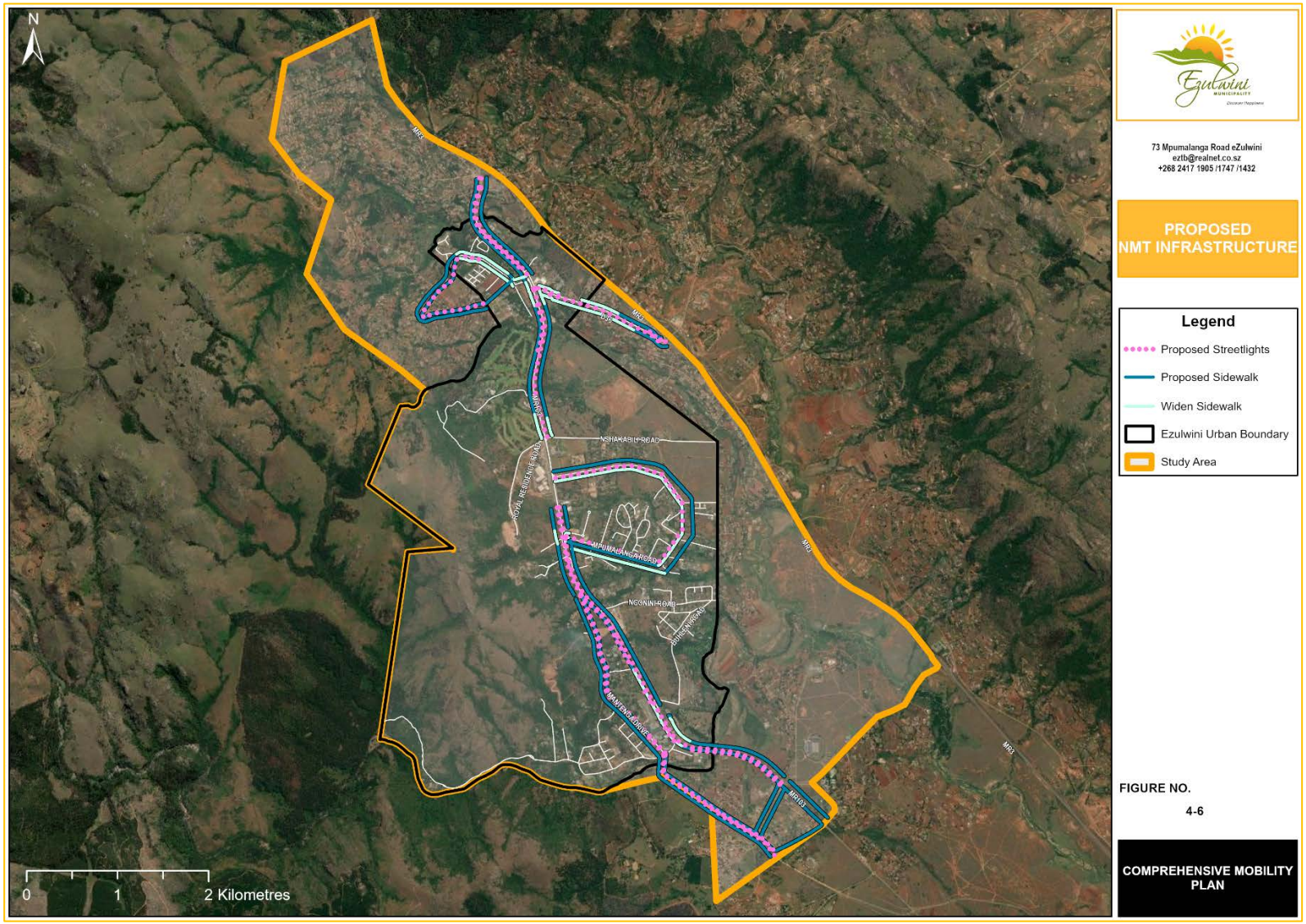


Figure 4-6: Proposed NMT infrastructure

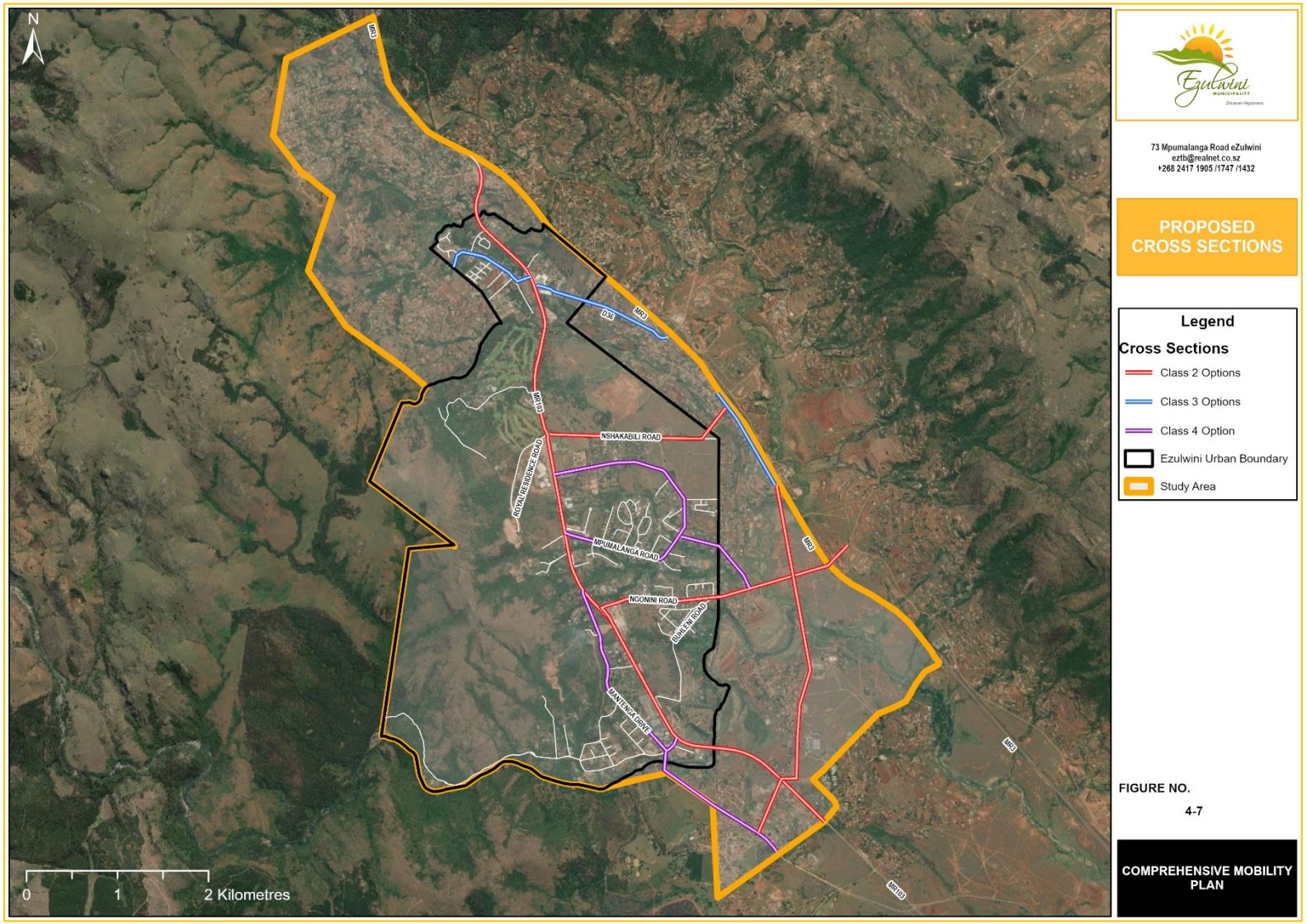


Figure 4-7: Proposed road cross sections

5. PHASING

This chapter describes the phasing of the proposed infrastructure, indicating when these interventions should be implemented. These proposals have been categorised into either short, medium, or long-term projects as discussed below.

5.1.1. Short-term

The short-term plans are described as the most urgent projects that should be preferably implemented and prioritised within a 5-year period. These interventions were determined as the most urgent and effective within the 5 - year period for Ezulwini, in alignment with the municipality's vision in the IDP.

- Provision of bus/minibus taxi rank in southern Lobamba
- Provision of bus/minibus taxi rank near D36 within close proximity of the Corner Plaza Shopping Mall
- Upgrade of pedestrian bridge within Lobamba
- Upgrade of bridge near southern Mantenga Drive
- Maintenance of public transport facilities
- Maintenance of signage
- Maintenance of existing sidewalks and streetlights
- Upgrade of Road A to Class 3 standards
- Upgrade of Road B to Class 3 standards
- Upgrade of Road F to Class 4 standards
- Upgrade of Ngonini Road to Class 3 standards
- Upgrade of Twiggs Garden Street to Class 3 standards
- Widening of sidewalks along MR103 and D36
- Provision of sidewalks along MR103 and D36
- Provision of public transport signage
- Repair and maintenance of roads in poor condition along the southern parts of Mantenga Drive
- Upgrade pedestrian bridge within Lobamba

5.1.2. Medium-term

The medium-term plans are described as projects that should preferably be implemented after a 5–10-year period.

- Implement Nshakabili Road extension
- Upgrade of Road C to Class 4 standards
- Upgrade of Road D to Class 4 standards
- Upgrade of Road E to Class 4 standards
- Provision of sidewalks and streetlights on other roads throughout Ezulwini

5.1.3. Long-term

The long-term plans are described as projects that can be implemented at a later stage (after a 10-year period).

- Implement Ngonini Road extension with bridge
- Provision of an additional lanes with sidewalks and streetlights on section 1 (S1) of MR103
- Provision of an additional lanes with sidewalks and streetlights on section 2 (S2) of MR103

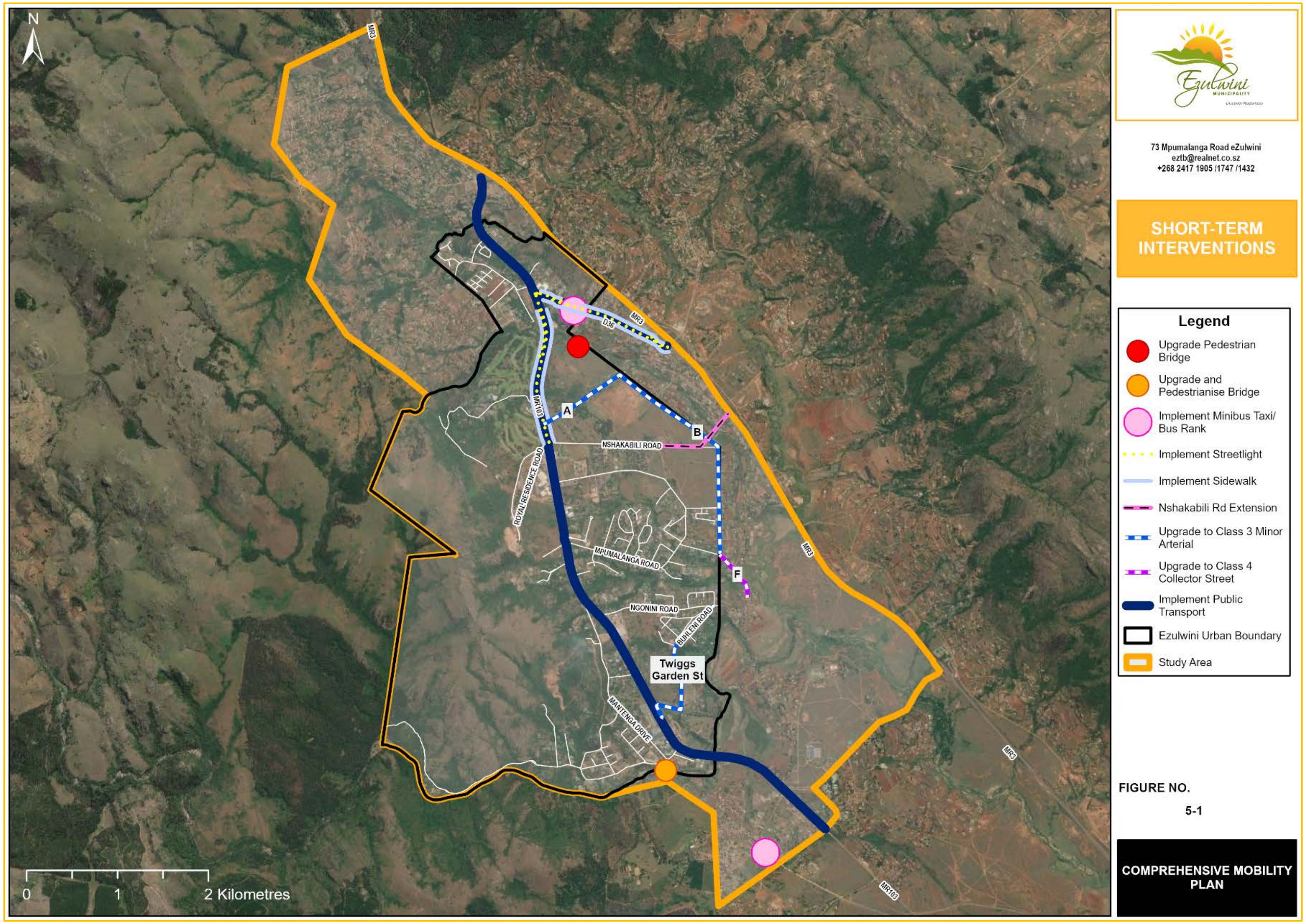


Figure 5-1: Short-term proposed interventions

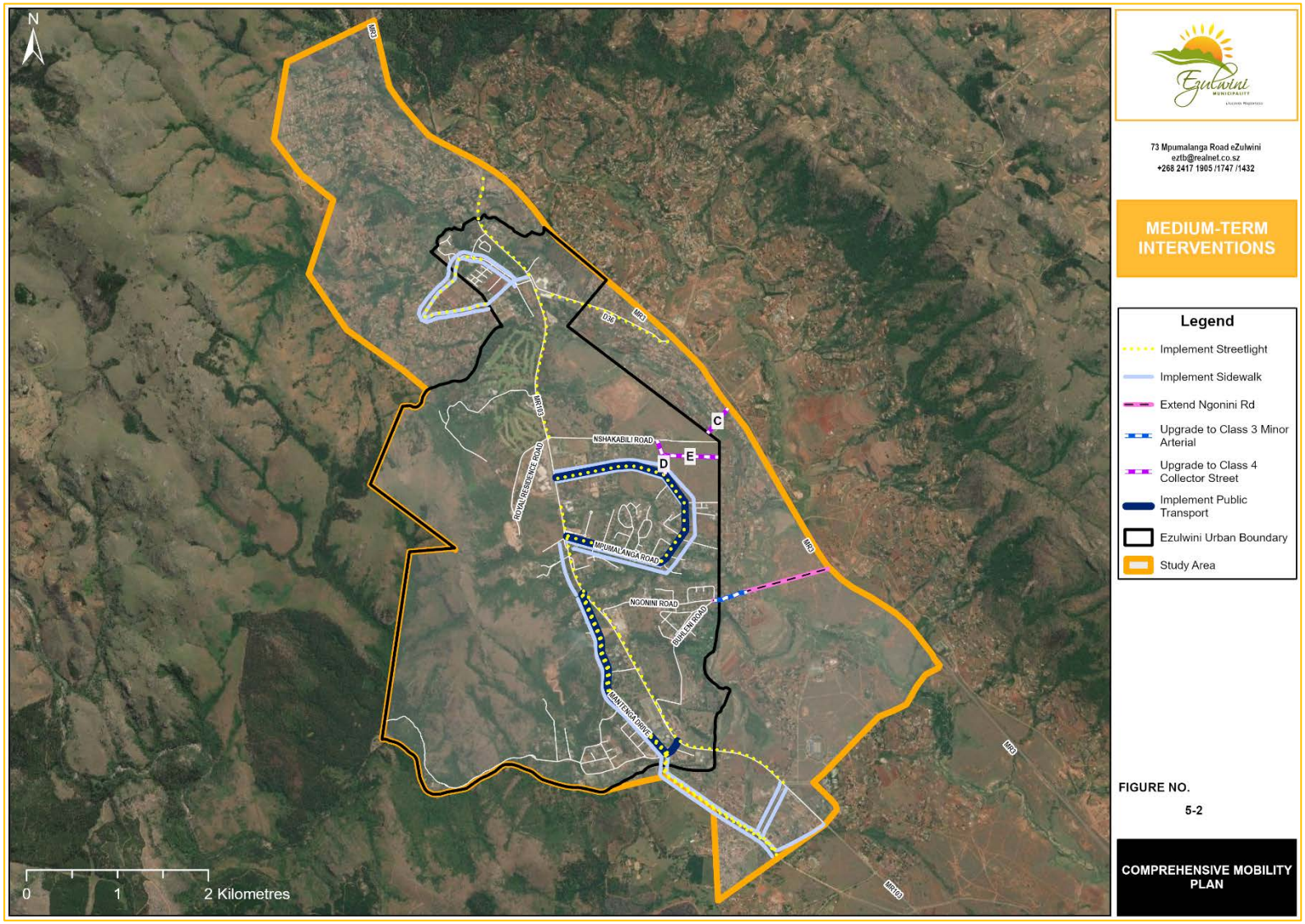


Figure 5-2: Medium-term proposed interventions

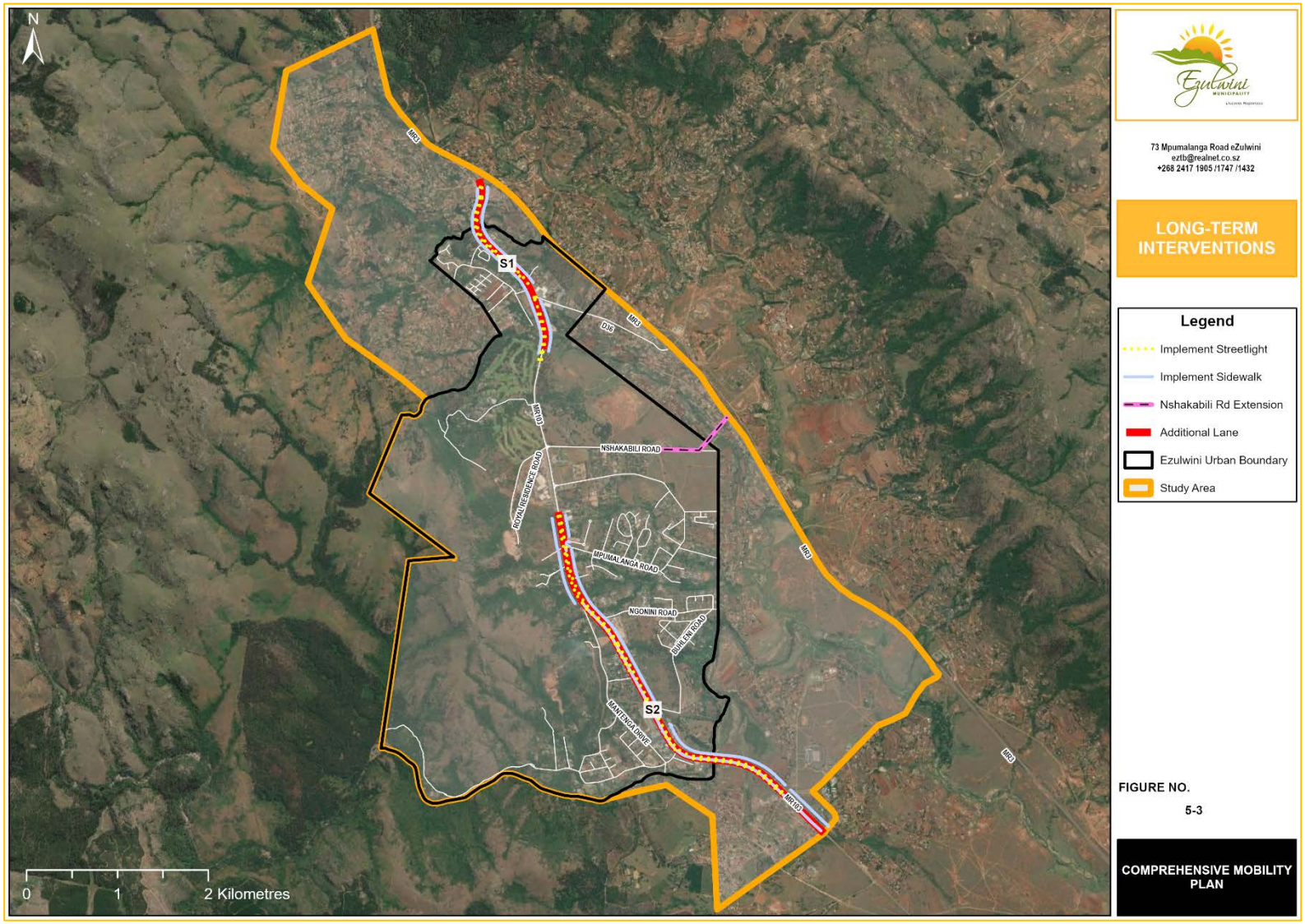


Figure 5-3: Long-term proposed interventions

6. PRICING

Table 6.1 provides an outline of the estimated costs and funding required to implement the projects proposed within the mobility plan. These projects are classified according to the short, medium, and long term. In the short-term approximately SZL 289 million is required to implement the proposed interventions. In the medium-term approximately SZL 156 million is required and in the long-term approximately SZL 260 million is required to implement the proposed interventions.

The largest contributor to the total cost are the road upgrades which comprise 30% of the total cost.

Table 6-1: Cost estimates of proposed interventions

Rank	Project Description	Length (km)	Rate	Total
	Short-term			
1	Implement public transport (along MR103 and D36 with minibus taxi/bus rank)	10,44	1155600	SZL 12064464,00
2	Pedestrianise MR103 and D36	9,65	4494000	SZL 43367100,00
3	Upgrade pedestrian bridge within Lobamba			
4	Upgrade of bridge southern Mantenga Drive			
5	Upgrade of Road A to Class 3	1,01	39 020 760	SZL 39 410 967,60
6	Upgrade of Road B to Class 3	1,22	39 020 760	SZL 47 605 327,20
7	Upgrade of Road F to Class 4	0,61	39 020 760	SZL 23 802 663,60
8	Upgrade of Ngonini Road to Class 3	0,38	39 020 760	SZL 14 827 888,80
9	Upgrade of Twiggs Garden Street to Class 3	1,76	39 020 760	SZL 68 676 537,60
10	Implement Nshakabili Road extension and service road	1,02	39 020 760	SZL 39 801 175,20
Total		**26,09**		**SZL 289 556 124,00**
	Medium-term			
1	Implement public transport along Mpumalanga Crescent and Mantenga Diver	5,71	1 155 600	SZL 6 598 476,00
2	Pedestrianise other roads throughout Ezulwini (Swaki Street, Mpumalanga Crescent and Mantenga Drive)	21,6	4 494 000	SZL 97 070 400,00
3	Upgrade of Road C to Class 4	0,36	39 020 760	SZL 14 047 473,60
4	Upgrade of Road D to Class 4	0,38	39 020 760	SZL 14 827 888,80
5	Upgrade of Road E to Class 4	0,62	39 020 760	SZL 24 192 871,20
Total		**28,67**		**SZL 156 737 109,60**
	Long-term			
1	Additional lane on section (S1) and section 2 (S2) of MR103	14,1	6 420 000	SZL 90 522 000,00
2	Pedestrianise S1 and S2 of MR103	17,35	4 494 000	SZL 77 970 900,00
3	Implement Ngonini Road extension with bridge	2,33	39 020 760	SZL 90 918 370,80
Total		**64,09**		**SZL 259 411 270,80**
Total Costs				**SZL 705 704 504,40**

7. MOBILITY MANAGEMENT MEASURES

Mobility management measures, also known as Transport Demand Management (TDM) measures are strategies set to address challenges associated with transportation such as congestion, parking, infrastructure, and the environment. These measures aim to appropriately manage and reduce these challenges, resulting in an effective and efficient transport system. Specifically focusing on transferring road users from private vehicles to other efficient modes of transportation, these measures promote the use of Public and Non-Motorised Transport to find ways of improving the transport system without having to incur additional costs of building new roads.

This chapter will address some of the crucial transportation challenges faced in Ezulwini and, provide the relevant mobility management measures that can be adopted for each of them.

7.1. Public Transport Improvements

The low provision and subsequent utilisation of public transport in Ezulwini demonstrates the necessity in developing and implementing an effective plan that will provide a safe, reliable, and efficient public transport system within the municipality. As Minibus Taxis (Kombis) and busses have the potential to play an integral role as an alternative mode of travel for commuters in Ezulwini, improvements can provide essential support for TDM efforts to encourage the use of Public Transport and further promote the transition of road users from private vehicles.

These improvements include:

- Increasing the number of minibus taxis(kombis) and busses operating within Ezulwini

- Universal Design of minibus taxi vehicles/kombis and busses (i.e., being able to accommodate people in wheelchairs and those with large packages).

- Universal Design of vehicles, stations, and pedestrian facilities to accommodate people with disabilities and other special needs.

- Increasing the quality of minibus taxi vehicles (kombis)and busses (i.e., comfort, safety) through better seats, cleaner vehicles etc.

- Improve the service of minibus taxis (kombis) and busses (i.e., reduced crowding through regulated services and dispatch).

- Affordable fares with discounts, and more convenient fare payments (i.e., electronic “smart cards”).

- Improved Security (increased freedom from assault, theft, and vandalism) for transit users and pedestrians.

- Improved Stops and Stations (Ensuring that existing facilities are appropriate to use and well maintained).

- Integrating NMT and the Public Transport System with Universal Access and Complete Streets Design.

- Development designed around a transit oriented and smart growth approach.

- Marketing and awareness of public transport systems operating in Ezulwini through advertisements and provision of information.

- Provision of standardised and regulated Public Transport signage.

Table 2: Benefits of Public Transport Service Provision and Improvements

Benefits	
Mobility	- Users have increased mobility resulting in increased productivity through improved access to education and job opportunities. - Relatively improved mobility to people who are socio-economically or physically disadvantaged, who now have access to more opportunities.
Efficiency	- Reduced motor vehicle traffic congestion. - Reduced traffic delay to pedestrians. - Changes in transit users' travel time costs.
Economic Development	- Jobs and business activity created by transit expenditures. - More efficient transport system due to economies of scale in transit service, more accessible land use patterns, and reduced automobile dependency.

Weisbrod, et al. (2017)

Performance indicators should be used within Ezulwini to regularly audit and determine the efficiency and quality of these public transport systems, these indicators will thus form the basis of managing the system, identifying any hindrances or shortfalls of the system. These performance indicators include:

- Availability of taxis in Ezulwini (i.e., Number of taxis operating vs the demand for them),
- Availability of taxis that accommodate people with special needs (i.e., wheelchair users),
- Reliability (i.e., Average dispatch time and maximum delays),
- Vehicle comfort and cleanliness,
- Number of user complaints,

Regular audits of signage; ensuring that design principles and guidelines are continuously maintained for Public Transport signage throughout Ezulwini.

7.2. Non-motorised Transport (NMT) Improvements

NMT is a valuable mode of the transportation system in Ezulwini as this mode benefits the environment, yields increased liveability, improved health, and subsequent economic opportunity, and increases the overall quality of life for most people. Therefore, the need for effective strategies to implement an operational NMT system with the appropriate infrastructure is essential. Through appropriate NMT planning, the following measures to develop a coherent NMT system in Ezulwini would include:

- Improving existing NMT Infrastructure (i.e., Sidewalks, crosswalks, paths, and bike lanes.)

- Improving Facility Management and Maintenance of NMT, including conflict resolution between NMT users while also maintaining cleanliness of facilities and infrastructure.
- Ensuring Universal Design (i.e., transportation systems that accommodate people with disabilities and other special needs) guidelines and principles are followed for the NMT system.
- Awareness through safety education, law enforcement and encouragement program
- Planning and designing roadways to increase walking and cycling safety.
- Providing adequate access through implementing infrastructure that is designed to be Sufficiently wide, sufficiently lit and have visible pedestrian crossing, with sufficient storage space on sidewalks.
- Integrating the NMT system with the Public Transport System (Bike/Transit Integration and Transit Oriented Development).
- Implementing Traffic Calming, Streetscape Improvements, Traffic Speed Reductions, Vehicle Restrictions and Road Space Allocation.
- Addressing security concerns of pedestrians and cyclists in Ezulwini.

Table 3: Benefits of NMT Provision and Improvements

Benefits	
Mobility	- NMT Improvements aid in creating balanced transport systems that reduce private vehicle dependency.
	- NMT Improvements are extremely essential and beneficial for people with physical disabilities.
Land Use Impacts	- NMT supports Smart Growth Land Use objectives including Clustered and Mixed-Use development that increases accessibility and reduces impervious surfaces.
Health, Safety and Recreation	- Increased walking and cycling provide significant fitness and aerobic health benefits, providing some recreational benefit. - The transition from private vehicles to NMT results in overall increases in road safety.
Socio-economic Development	- Social inequalities and poverty can be addressed through effective NMT systems by providing access to economic opportunity. - Tourism and local business may be enhanced through the presence of NMT. - Increased commercial activity and property value through easier access from NMT - Increase in regional Economic Development by improving accessibility and reducing consumer expenditures on fuel and other imported resources.

Environmental	- Mode shift from private motorised transport to NMT, also means reduction in vehicular emissions, leading to reduced air pollution and greenhouse gas emissions.

A well designed NMT network, when integrated with other modes of transport, specifically public transport, can help in shifting the first and last km of commuters' mobility to that of entirely NMT. However, the management of the system forms the most crucial element, determining its success or failure, as well as how sustainable the system might be. To effectively manage the established or planned system, the following measures should be set out for all NMT facilities and infrastructure:

1. Education and Awareness – Providing information and making it locally available about NMT and how it can be used as an alternative mode to ensure that the system is well utilised.
2. Consideration – Different NMT modes have different facility requirements and conflicts between different requirements should be resolved to ensure a continuous and well-flowing system. One approach could be through implementing User Behaviour Guidelines at each facility, ensuring that issues such as universal access are taken into consideration.
3. Maintenance Programs – Regular audits of the conditions of facilities and infrastructure as well as the appropriate maintenance should be conducted.
4. Ensure that infrastructure is suitable for walking and cycling unless these modes are specifically prohibited, then ensure that suitable alternatives are available.
5. Use traffic calming and other traffic control measures to make street environments safer and more pleasant for NMT.
6. Conduct commuter surveys to identify problems and barriers to non-motorised travel.

Focusing on NMT's role in mobility development will lead to reduced focus of roadway investments which only cater for motorised vehicles and will help in achieving sustainability goals for transportation in Ezulwini.

7.3. Traffic Control Measures

Traffic control measures are a combination of physical measures that are aimed at distributing and controlling road traffic to reduce the negative effects of motor vehicle use and alter driver behaviour. These measures include techniques such as traffic calming and speed regulation which assist in the reduction of potential incidents and their associated impacts. In Ezulwini, the traffic is mainly composed of private vehicles therefore, traffic control measures are essential to reduce potential conflict with other road users and further reduce road incidents.

7.3.1. Traffic Calming

Traffic calming (also known as Traffic Management) refers to various design features and strategies put in place to reduce traffic speed and volumes along a particular road. These design features are inclusive of roundabouts, bike lanes, median islands, raised crosswalks, speed humps, and rumble strips. These features all work to reduce traffic speeds, as well as traffic volumes in some instances. Another traffic-calming approach would be converting one-way streets into two-way streets which is required on the MR103 in Ezuwlini, as to reduce motor vehicle speeds as well and the vehicle miles travelled.

7.4. Traffic Safety Plan

Traffic safety plan is a planned traffic management plan that involves a systematic approach to road traffic safety that will help to reduce the risk of traffic related accidents and injury in Ezulwini. Few of the approaches are discussed below:

7.4.1. Complete Streets

Complete Streets are road design and operating practices that serve to safely accommodate different users including pedestrians, motorists, cyclists, public transport users as well as people with disabilities. Complete Streets planning considers that roads serve different functions including travel, recreational walking, socializing, and vending. This must be considered and balanced in roadway design and management.

To implement the complete streets approach, changes to planning practices need to be implemented. Specific design manuals which define the required roadway details should be used. There may be a need to divert road infrastructure funding from expanding roads to multi-modal road projects.

A complete and detailed complete streets program that is inclusive of bus lanes, sidewalks, bicycle lanes, and traffic calming can drastically reduce vehicle ownership and use. This will in turn lower the traffic congestion within the town and increase road safety for all users. Complete street programs will also increase the mobility of non – drivers that reside in poorer locations by providing more affordable travel modes. Complete street policies work hand in hand with traffic calming, universal design, and parking management approaches.

In Ezulwini, to achieve Complete Streets, all strategies for Public Transport, NMT and Road Network Improvement should be implemented, which encourage mobility and further reduce the demand and use of private vehicles in the municipality.

7.5. Para-Transit Plan

A Paratransit Plan considers individuals whose disability prevents them from using the common transportation modes e.g., commuters using wheelchairs or those that are blind.

7.5.1. Universal Design

This refers to the design of transport facilities and services design that accommodates a wide range of users including those with disabilities. This design approach results in efficient mobility options for all and considers all possible options that may exist at any point along the transportation system i.e. from origin to destination.

Within Ezulwini, universal design planning should include standards for pedestrian facilities, vehicles, and other transportation facilities within the study area. Programs to educate planners and designers should be put in place to ensure that this design approach is incorporated into all planning and designs.

The main goal of universal design involves improving transportation facilities to cater mainly to people with disabilities. It increases the use of pedestrian facilities and public transport services and reduces the need for vehicle chauffeuring and paratransit services. Universal design also allows users with disabilities to participate fully in society and improves education and employment opportunities that will increase economic productivity.

Universal design can be implemented hand in hand with other transport demand management strategies such as pedestrian improvements. It is also supported by traffic calming and parking management.

7.6. Parking Management Plan

A Parking Management Plan refers to a variety of strategies that encourage the more efficient use of existing parking facilities and improve the quality of service provided to the users of parking facilities. These strategies can assist in tackling other transportation problems (i.e., Road Safety) and achieving other land use, socio-economic and development objectives. Discussed below are some strategies that may be beneficial to the parking challenges faced in Ezulwini.

7.6.1. Parking Solutions

Parking that is convenient and affordable is considered as a welcoming sign in any area, where parking is inadequate or difficult to find, it frustrates users and contributes to spill over. In Ezulwini, parking challenges are experienced by businesses which can detrimentally affect how these perform. These are solutions that can be adopted to pacify these parking challenges:

- Increasing the Parking Supply
    - Minimum Parking Requirement
    - Increasing on-street parking
    - Subsidizing off-street parking
- Address Varying Demand
    - Develop a service that helps businesses share, lease, or sell parking
- Reduce Parking Demand
    - Pricing parking

7.6.2. Share Parking

Sharing parking spaces typically allows 20-40% more users compared with assigning each space to an individual motorist, since some potential users are usually away at any particular time. For example, 100 employees can typically share 60-80 parking spaces, since at any particular time some employees are on leave, away on business, or using an alternative commute mode. Even greater reductions are possible with mixed land uses since different activities have different peak demand times. For example, a restaurant can share parking with an office complex, since restaurant parking demand peaks in the evening while office parking demand peaks during the middle of the day. Public parking facilities, including on-street parking spaces, can usually be shared efficiently among many destinations.

7.6.3. Regulate Parking Use

By managing and regulating parking facilities, a more efficient and effective use of parking resources is achieved. Often, this involves making the most convenient parking spaces available to certain higher-values uses, such as:

- Regulating parking services based on the type of vehicle users (For example, during peak periods dedicate the most convenient spaces for service vehicles, customers, rideshare vehicles, and vehicles used by People With Disabilities.)

- Implementing more flexible Pricing Methods which allow motorists to pay for only the amount of time they park, which makes shorter parking periods relatively attractive.

7.6.4. Improve Walkability

The usable parking supply serving a destination can often be increased by improving Walkability (the quality of the walking environment), taking into account the sidewalk, path and roadway conditions, land use patterns, social acceptance, security, and comfort for walking. Improved walking conditions expands the range of Shared Parking, and encourages *park once* trips, which means that visitors park their vehicles and walk to several destinations, rather than driving to, and parking at, each destination.

Increase the Capacity of Existing Parking Facilities

- Using currently wasted areas (corners, edges, undeveloped land, etc.).
- Changing from parallel to angled parking.
- Sizing a portion of spaces for motorcycles and compact cars.

7.6.5. Address Spill over Problems

Spill over problems can be addressed directly with management, pricing, and enforcement strategies. This could be achieved through generous and free parking between businesses.

7.7. Intelligent Transport System (ITS) and User Information

These refer to the use of information technologies such as computers, GPS, and the internet to improve the transport system efficiency. The list below represents a few types of ITS that can be incorporated within the study area:

- Traffic Management: for controlling and monitoring traffic conditions.
- Traffic control: includes advanced signal flow to improve traffic flow.
- Emergency warning systems: these alert drivers to excessive speeds, roadway hazards as well as traffic and weather conditions.
- Rideshare matching: this provides information to people who are going to the same destination and might want to share a ride.

8. CONCLUSION

In order to achieve its 30-year vision described in the IDP, the Ezulwini Municipality needs to ensure that the appropriate measures are set in place for an effective and efficient transport network. This would mean a transport system that services the municipality in providing accessibility and mobility throughout Ezulwini, provides a safe and reliable network that will stimulate socio-economic growth and that will aid in creating a fully functional and successful municipality.

The CMP then proves beneficial to the municipality through its identification of existing and potential challenges with the transport system, that hinder its full functionality and ability to service Ezulwini. The CMP then identified potential measures and interventions that, if designed and implemented correctly, could improve the transport system for all its users, benefiting both the social and economic spheres of the municipality.

Annexure A: Study Area

Annexure B: Traffic Volumes & Modal Split

Annexure C: Pedestrian & Cyclist Volumes

Annexure D: Proposed Interventions

Annexure E: Cross Sections

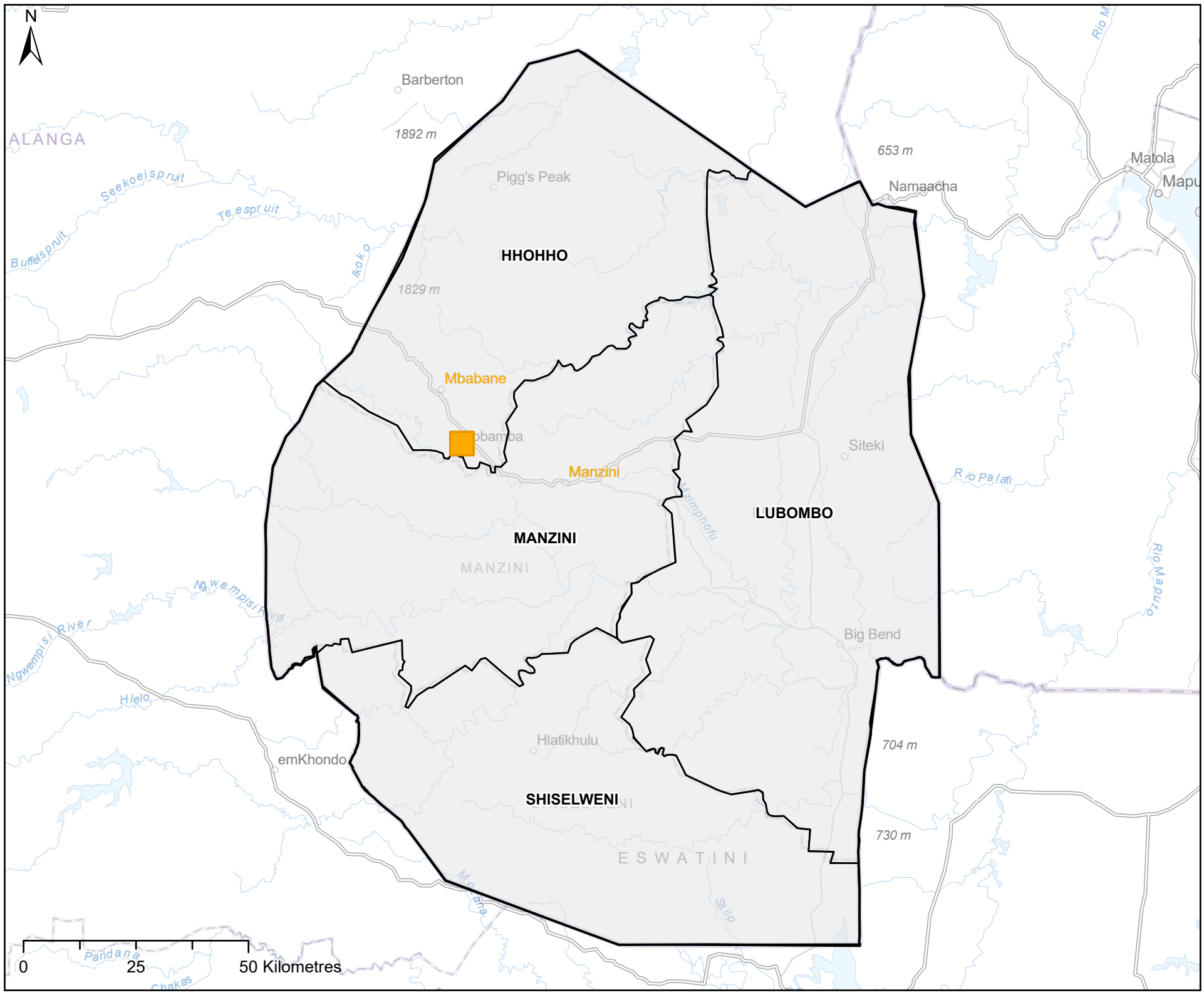
Annexure F: Phasing

Annexure G: Pricing

Annexure H: Access Management Conceptual Layouts

Annexure I: Reference Images

ANNEXURE A: STUDY AREA



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LOCALITY

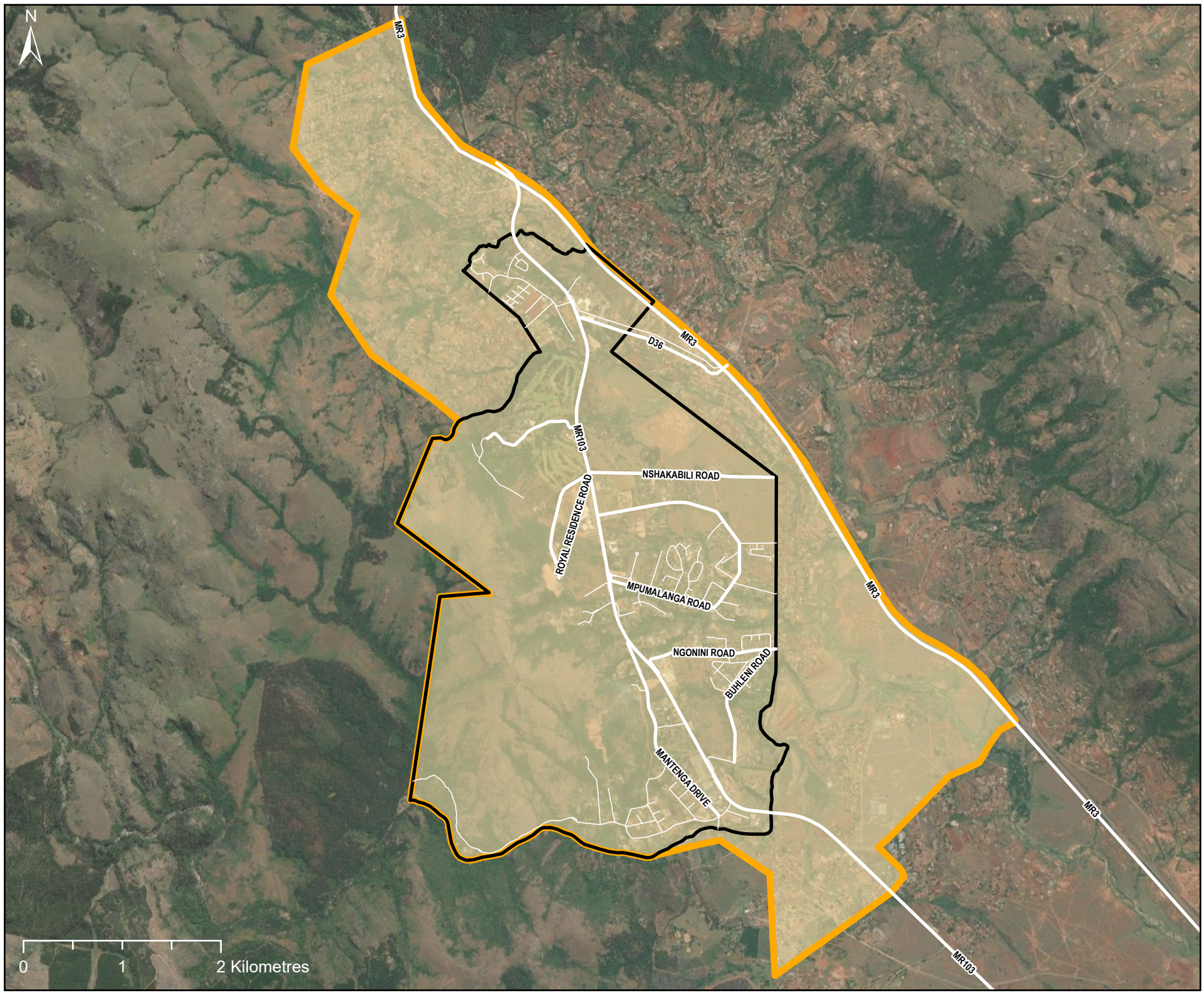
Legend

- Ezulwini
- Eswatini Region
- Eswatini Boundary

FIGURE NO.

A1

COMPREHENSIVE MOBILITY PLAN



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STUDY AREA

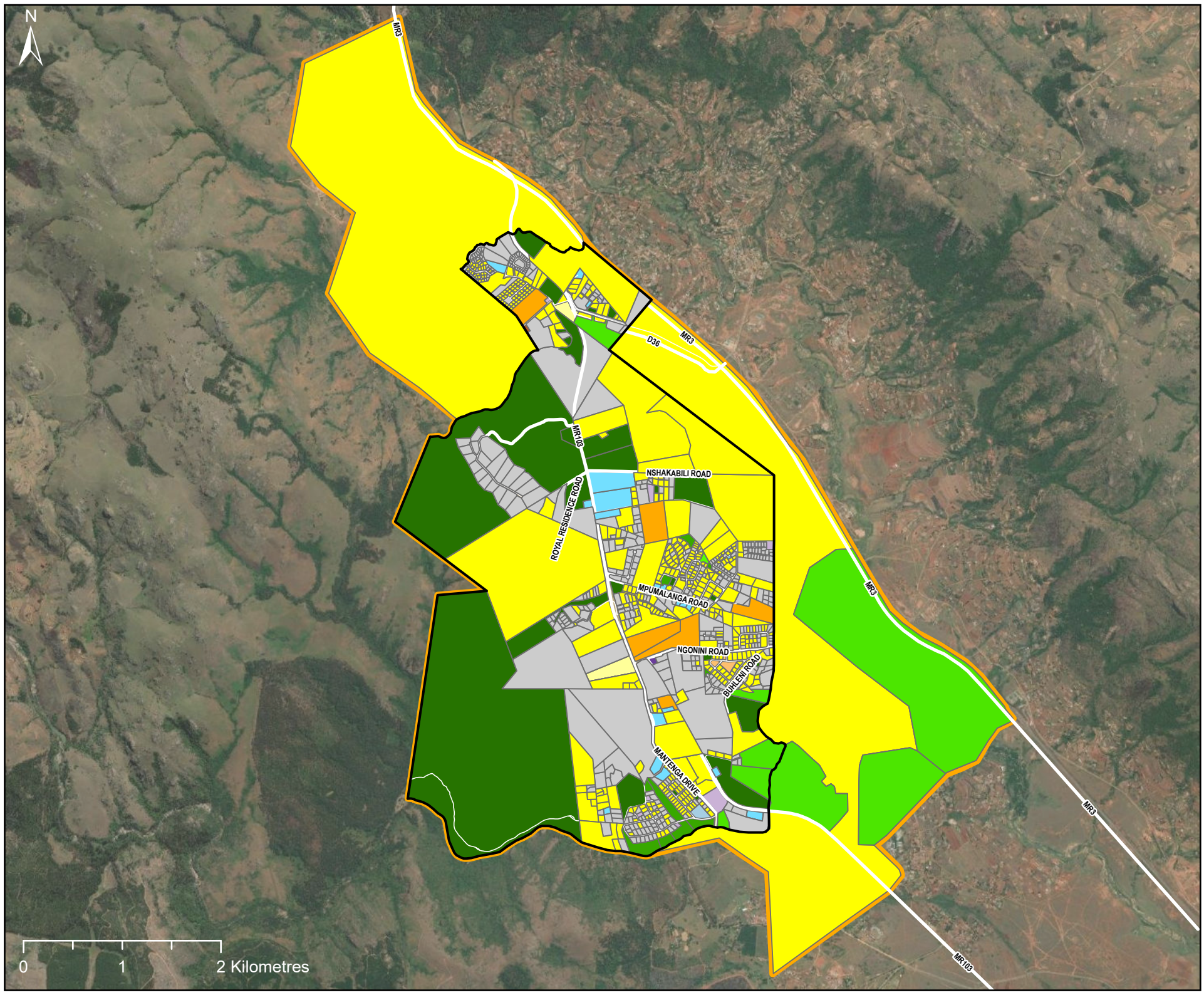
Legend

- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

A2

COMPREHENSIVE MOBILITY PLAN



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EXISTING LAND USE

Legend

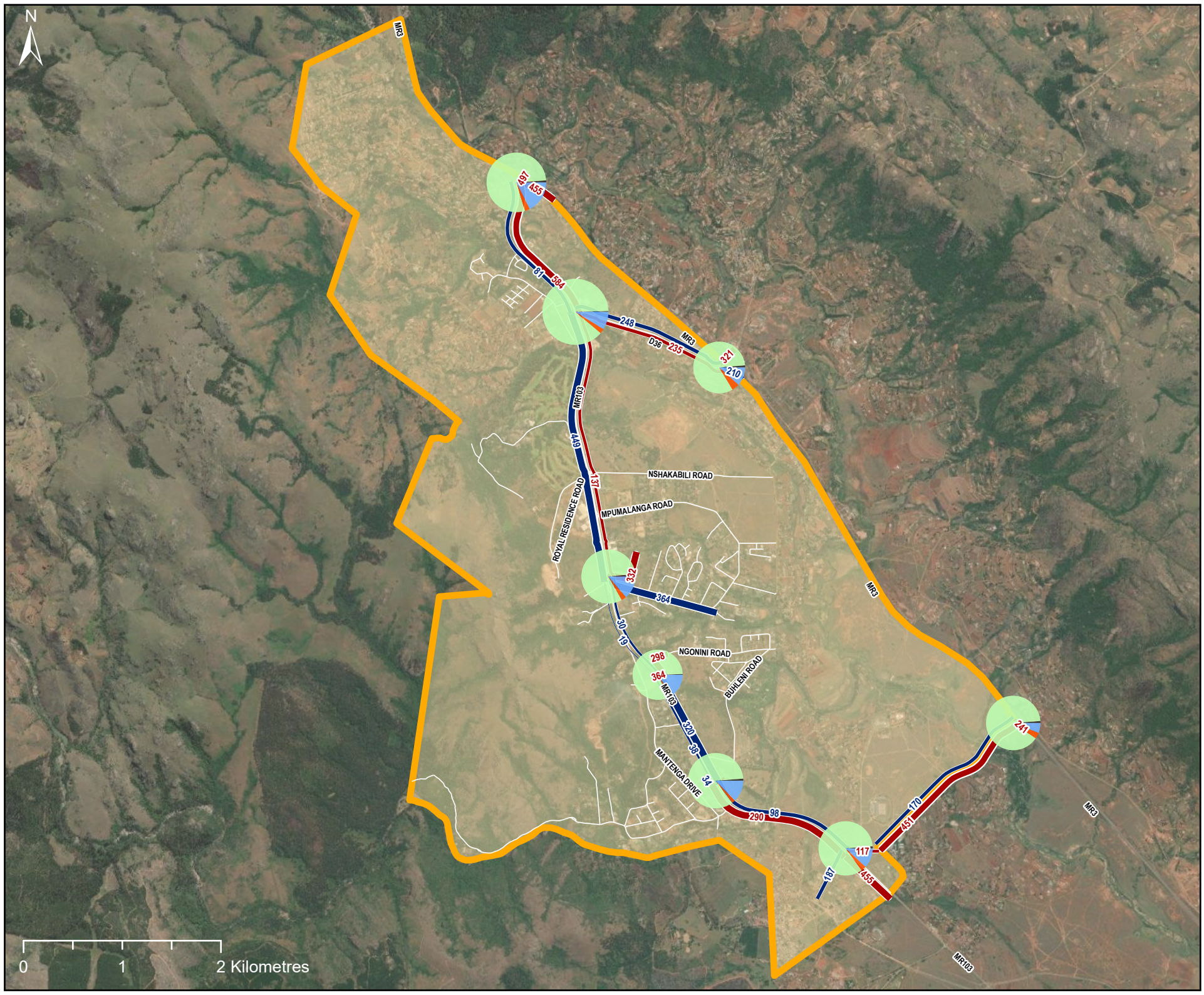
- Commercial/Industrial
- Green Open Space
- Social Service
- Residential
- Tourism
- Vacant
- Study Area
- Ezulwini Urban Boundary

FIGURE NO.

A3

COMPREHENSIVE MOBILITY PLAN

ANNEXURE B: TRAFFIC VOLUMES & MODAL SPLIT



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TRAFFIC VOLUMES & MODAL SPLIT: AM

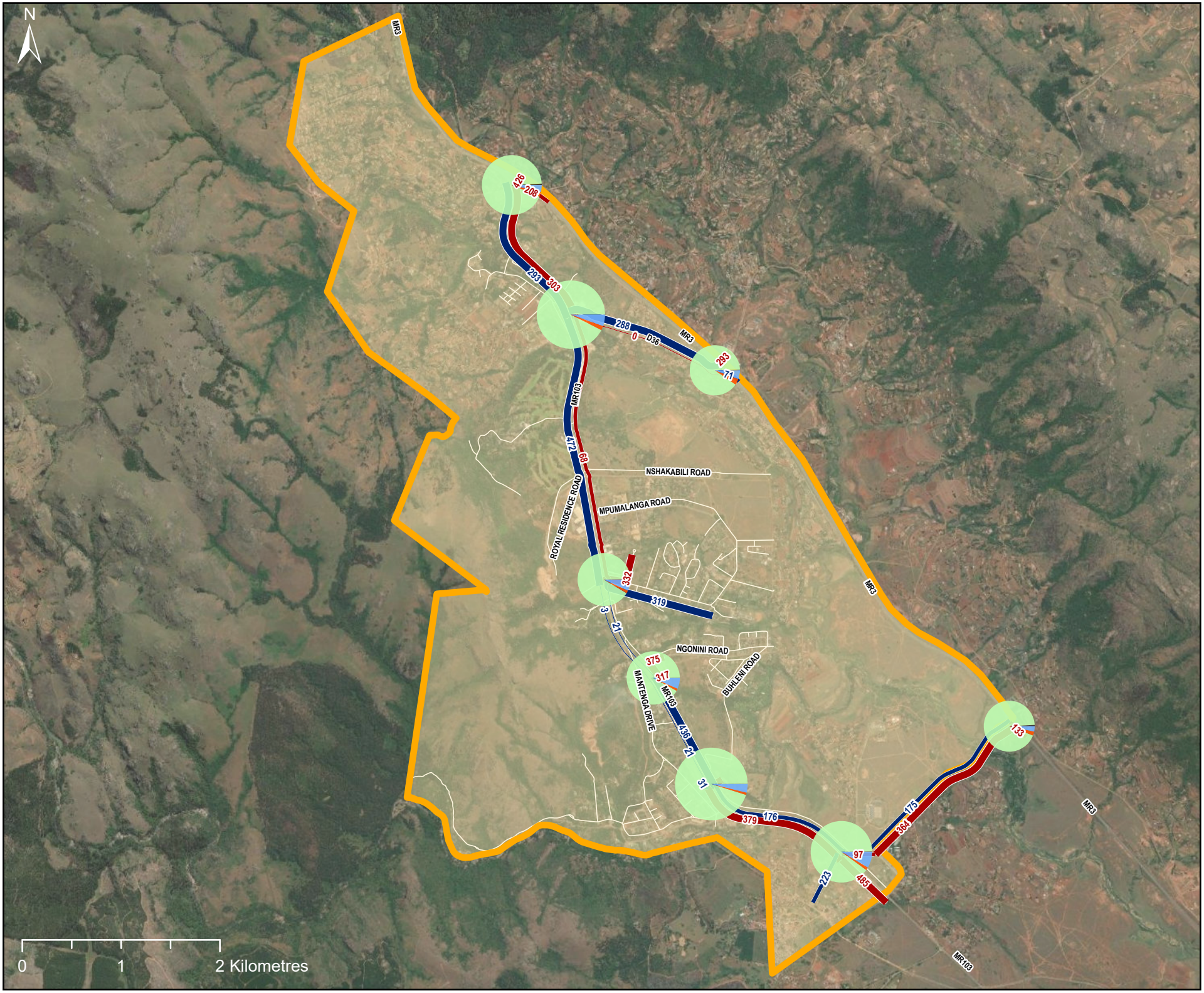
Legend

- Northbound + Eastbound
- Southbound + Westbound
- Study Area
- Bus
- Light Vehicle
- Heavy Vehicle
- Minibus Taxi

FIGURE NO.

B1

COMPREHENSIVE MOBILITY PLAN



Legend

- Northbound + Eastbound
- Southbound + Westbound
- Study Area
- Bus
- Light Vehicle
- Heavy Vehicle
- Minibus Taxi

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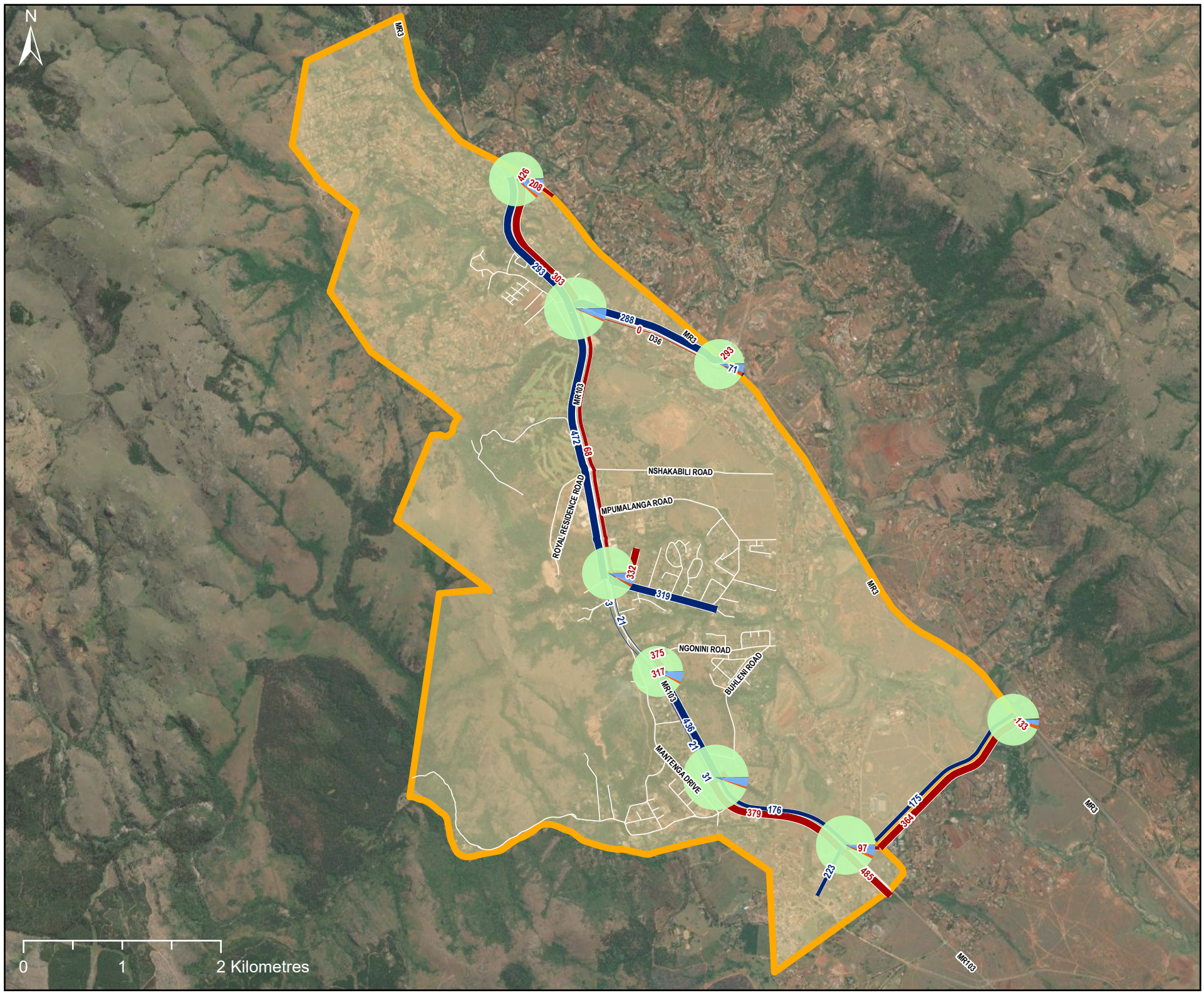
TRAFFIC VOLUMES & MODAL SPLIT: MIDDAY

FIGURE NO.

B2

COMPREHENSIVE MOBILITY PLAN



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TRAFFIC VOLUMES & MODAL SPLIT: PM

Legend

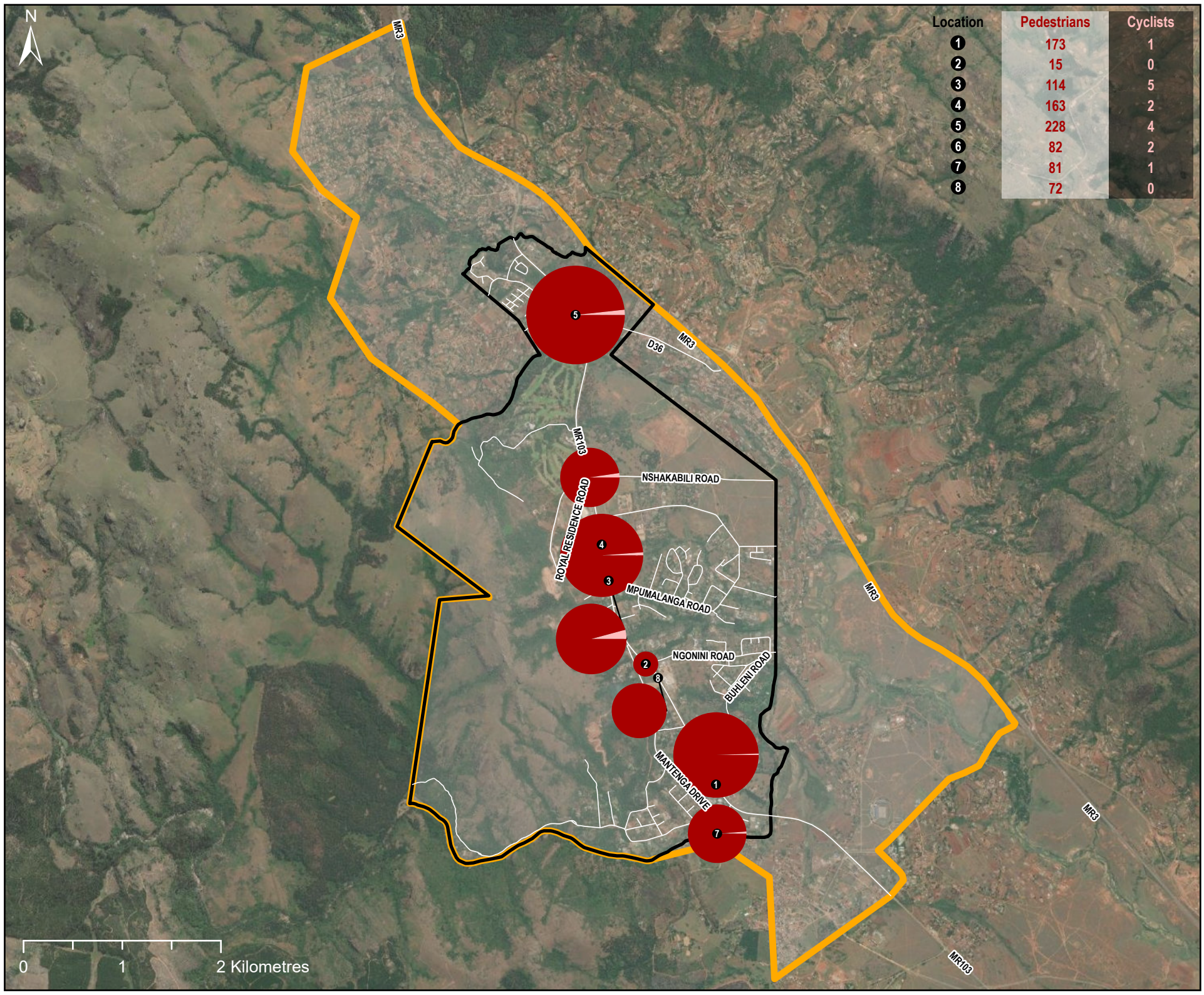
- Northbound + Eastbound
- Southbound + Westbound
- Study Area
- Bus
- Light Vehicle
- Heavy Vehicle
- Minibus Taxi

FIGURE NO.

B3

COMPREHENSIVE MOBILITY PLAN

ANNEXURE C: PEDESTRIAN AND CYCLIST VOLUMES



Location	Pedestrians	Cyclists
1	173	1
2	15	0
3	114	5
4	163	2
5	228	4
6	82	2
7	81	1
8	72	0

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PEDESTRIAN & CYCLIST VOLUMES: AM

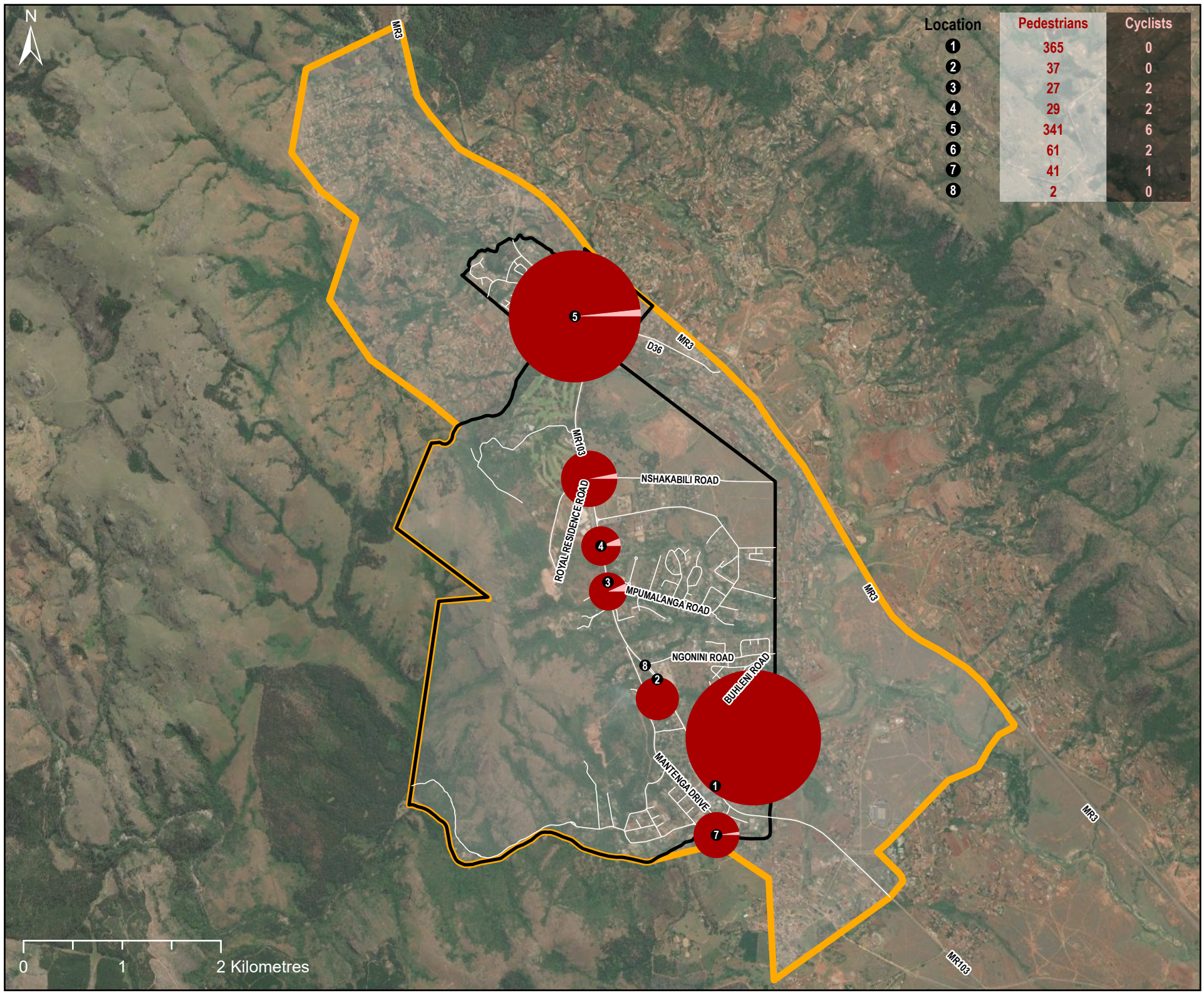
Legend

- Cyclists
- Pedestrians
- Study Area
- Ezulwini Urban Boundary

FIGURE NO.

C1

COMPREHENSIVE MOBILITY PLAN



Location	Pedestrians	Cyclists
1	365	0
2	37	0
3	27	2
4	29	2
5	341	6
6	61	2
7	41	1
8	2	0

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PEDESTRIAN & CYCLIST VOLUMES: MIDDAY

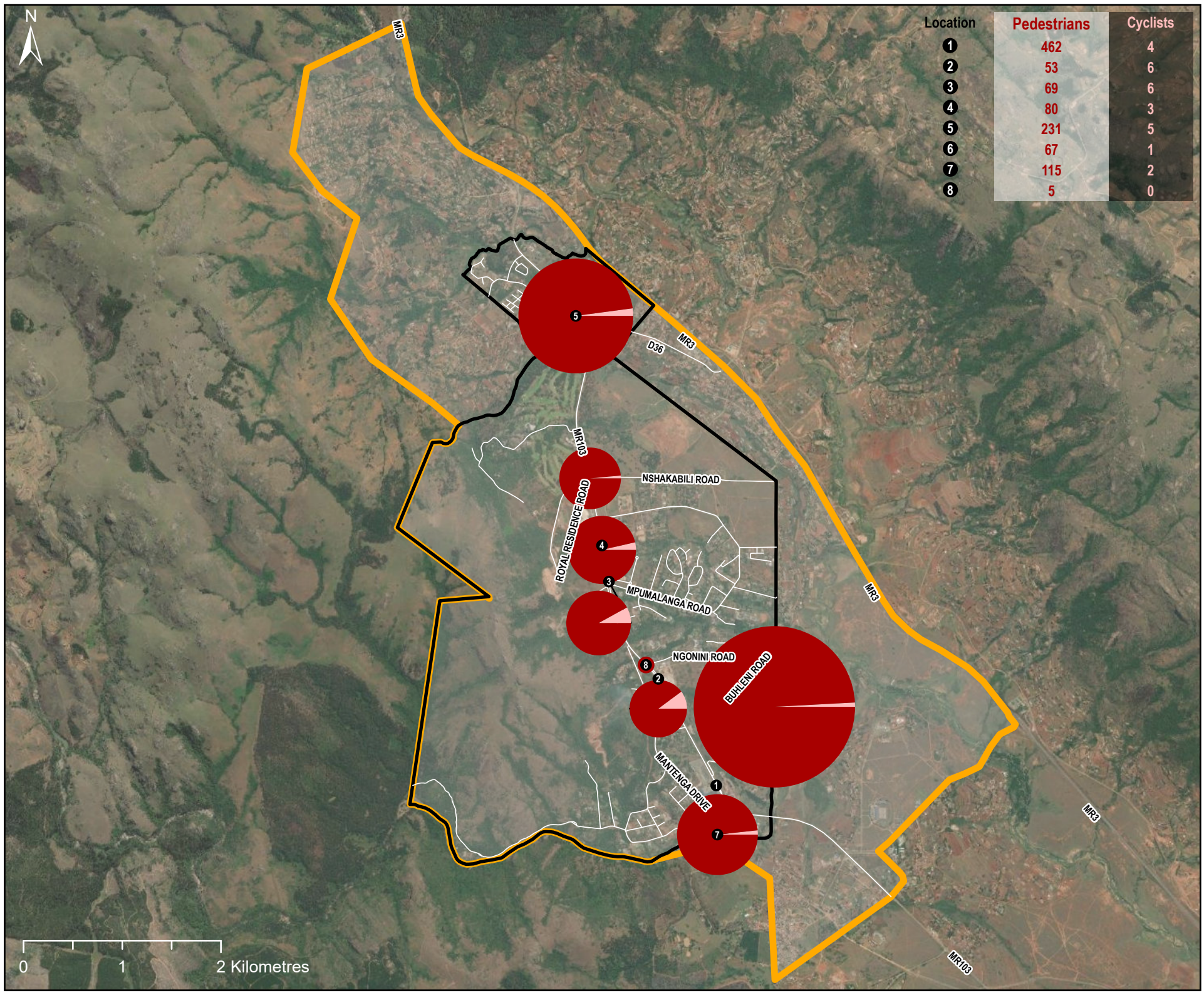
Legend

- Cyclists
- Pedestrians
- Study Area
- Ezulwini Urban Boundary

FIGURE NO.

C2

COMPREHENSIVE MOBILITY PLAN



Location	Pedestrians	Cyclists
1	462	4
2	53	6
3	69	6
4	80	3
5	231	5
6	67	1
7	115	2
8	5	0

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PEDESTRIAN & CYCLIST VOLUMES: PM

Legend

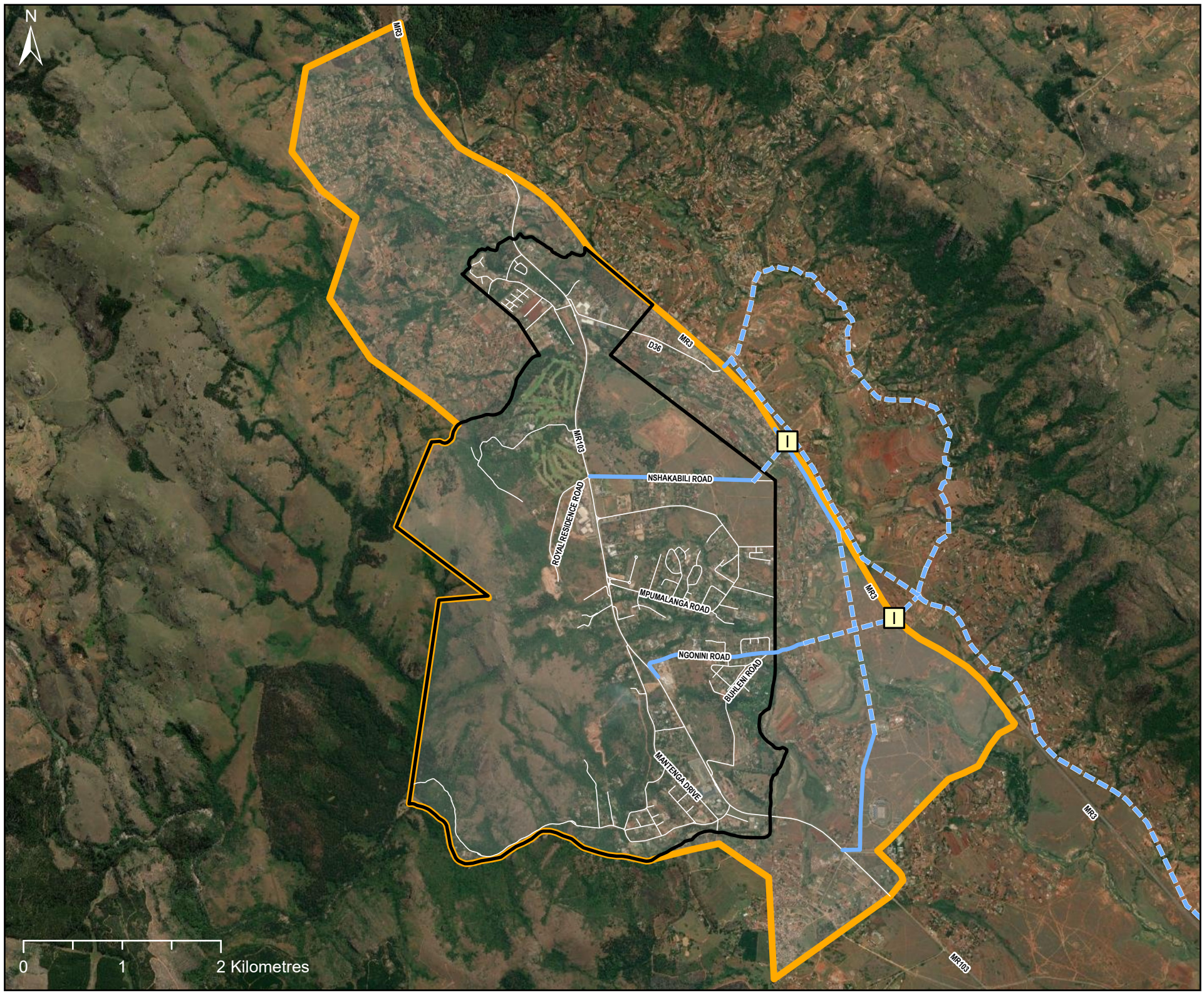
- Cyclists
- Pedestrians
- Study Area
- Ezulwini Urban Boundary

FIGURE NO.

C3

COMPREHENSIVE MOBILITY PLAN

ANNEXURE D: PROPOSED INTERVENTIONS



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PROPOSED ARTERIALS

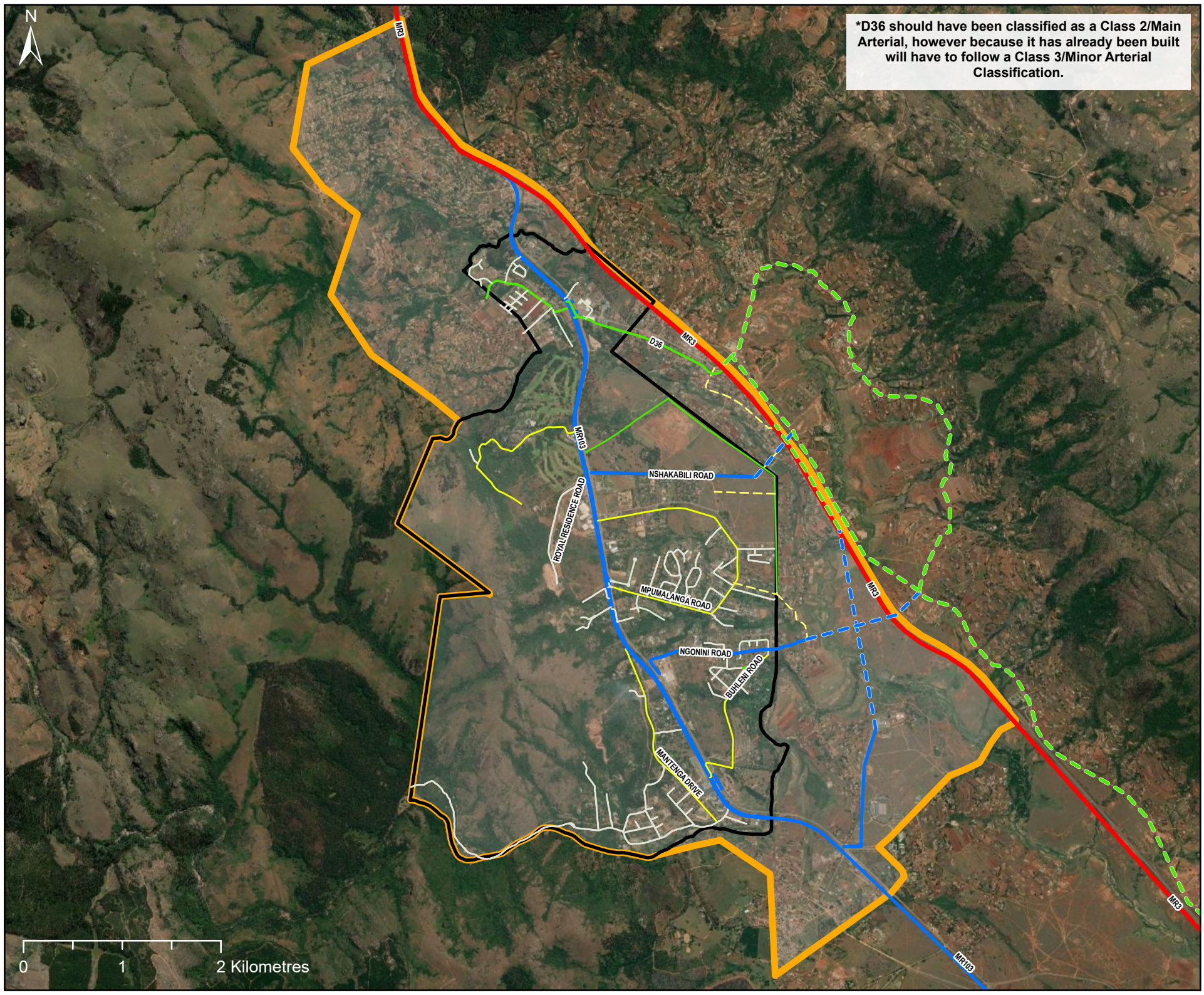
Legend

- Proposed Interchange
- Existing Road
- Proposed Road
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D1

COMPREHENSIVE MOBILITY PLAN



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PROPOSED CLASSIFICATION

Legend

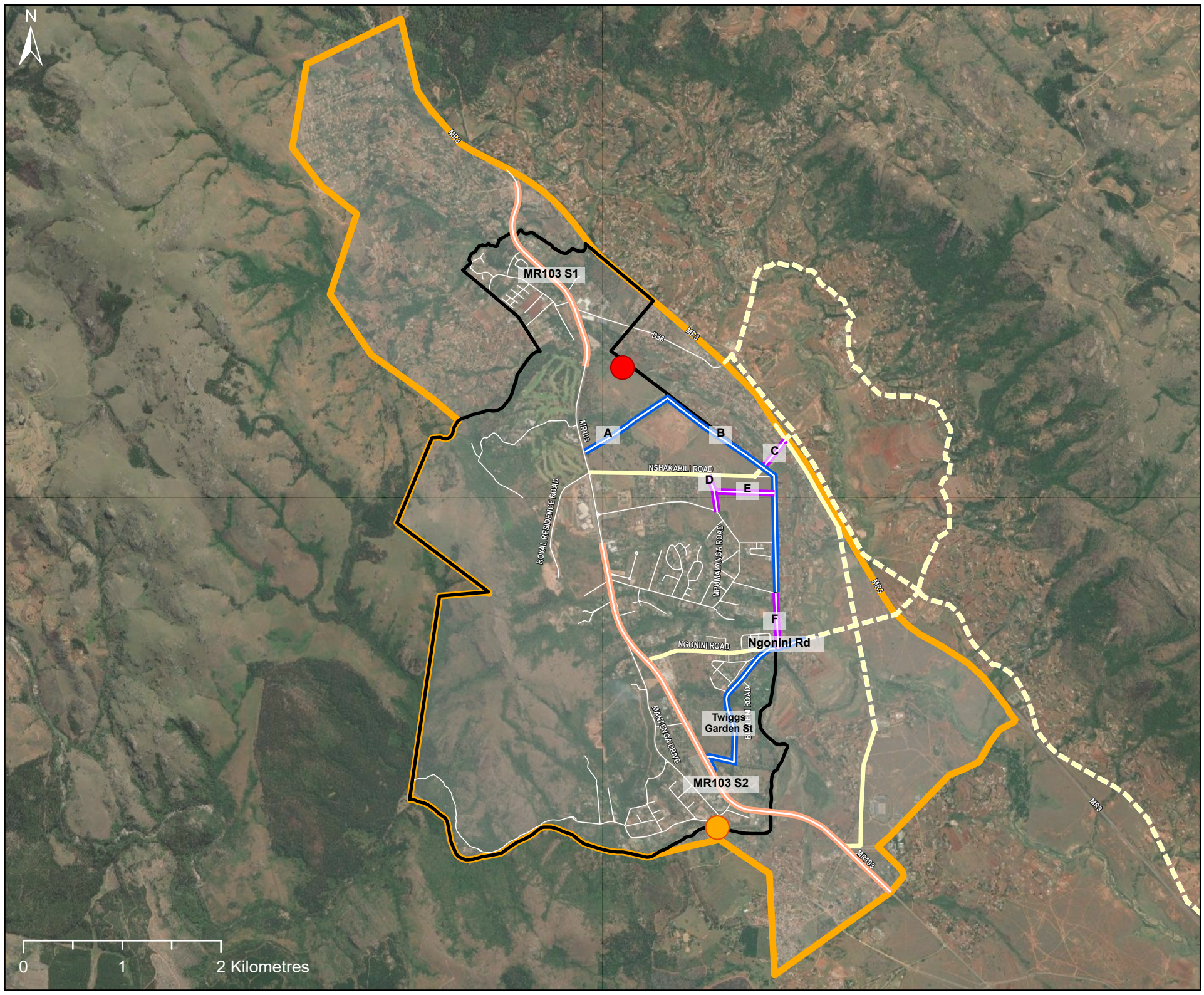
Proposed Classification

- Class 1/ National Arterial
- Class 2/ Main Arterial
- Class 3/Minor Arterial
- Class 4/Collector
- Class 5/ Local Street
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D2

COMPREHENSIVE MOBILITY PLAN



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PROPOSED UPGRADES

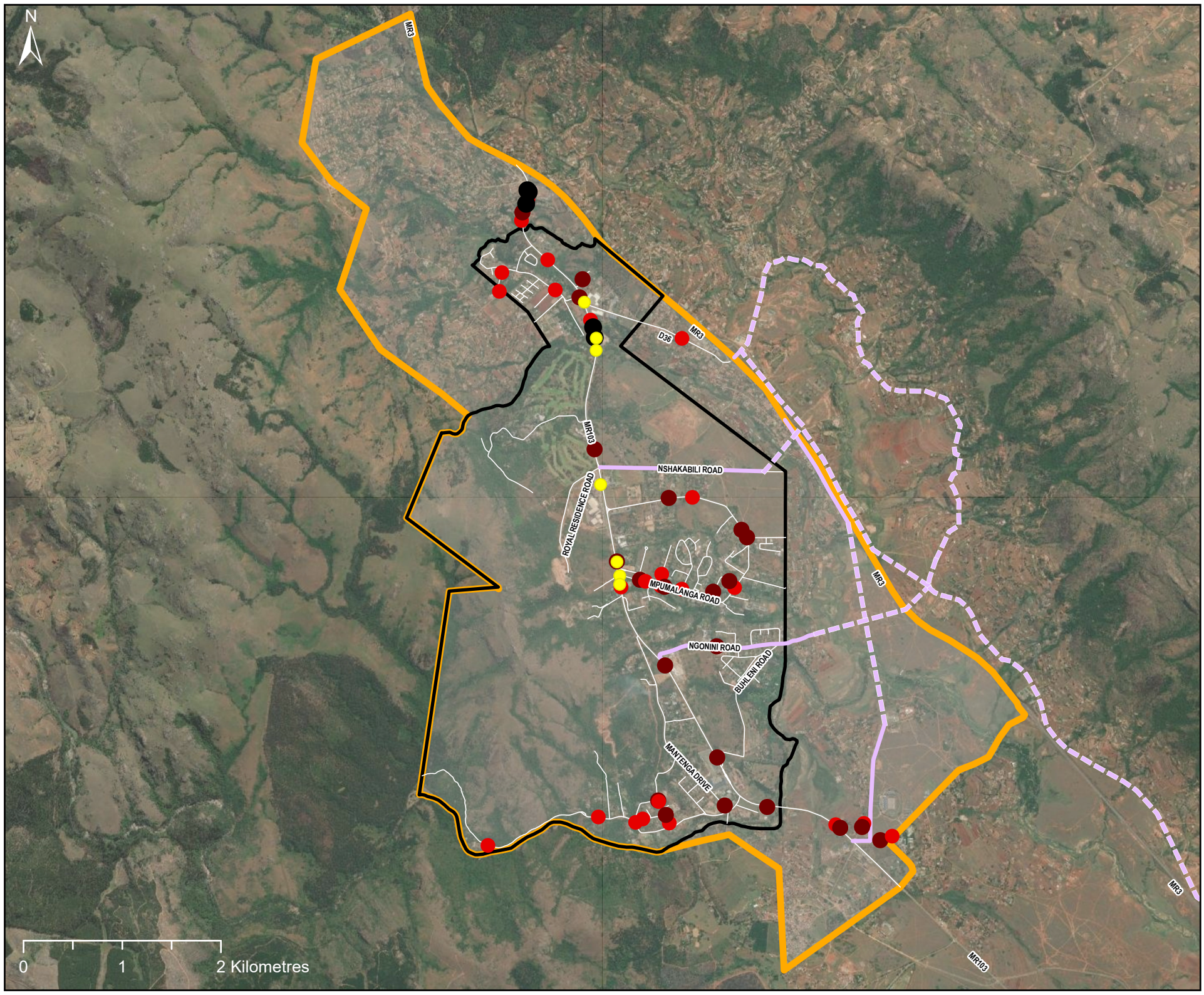
Legend

- Upgrade Pedestrian Bridge
- Widen Bridge
- Upgrade to Minor Arterial
- Upgrade to Collector Street
- Upgrade to 2 Lanes Per Direction (LPD)
- Existing Road
- Proposed Road
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D3

COMPREHENSIVE MOBILITY PLAN



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PROPOSED ROAD SAFETY MEASURES

Legend

- Speed Hump Warning
- Rumble Strip Warning

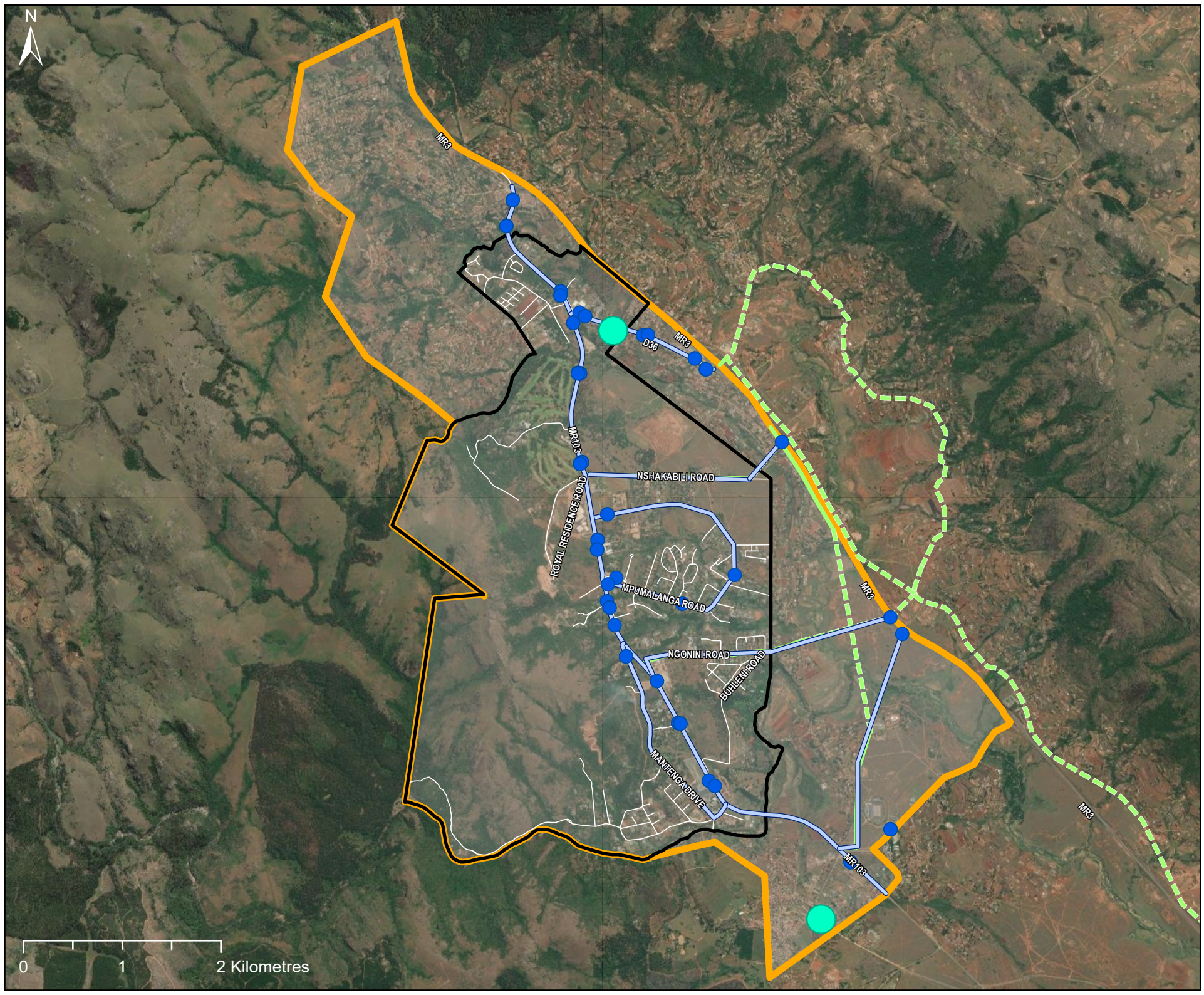
Maintenance

- Speed Hump Sign
- Speed Limit Sign
- Existing Road
- Proposed Road
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D4

COMPREHENSIVE MOBILITY PLAN



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PROPOSED PUBLIC TRANSPORT MEASURES

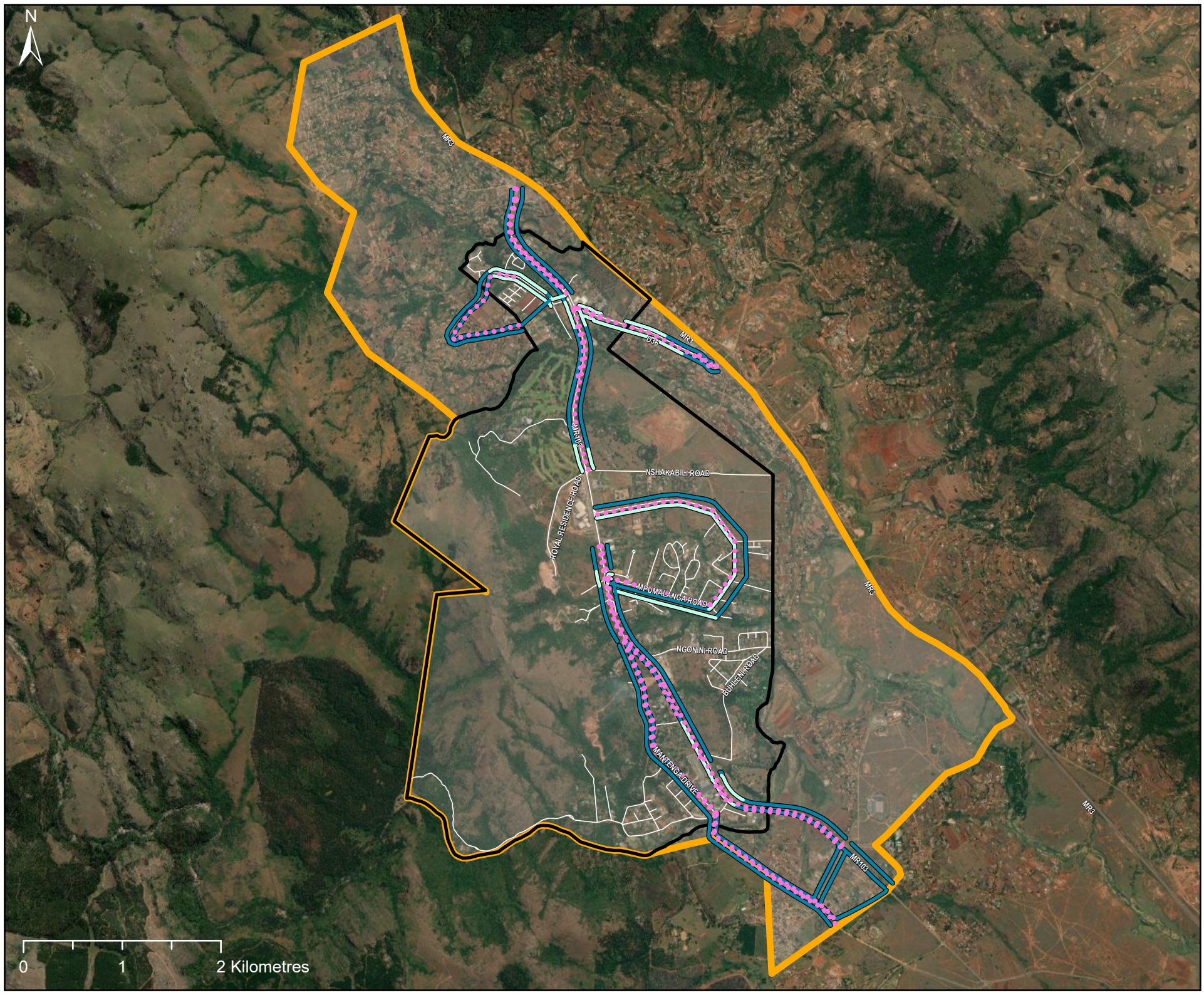
Legend

- Proposed Public Transport Sign
- Proposed Rank
- Proposed Public Transport Route
- Existing Road
- Proposed Road
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D5

COMPREHENSIVE MOBILITY PLAN



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PROPOSED NMT INFRASTRUCTURE

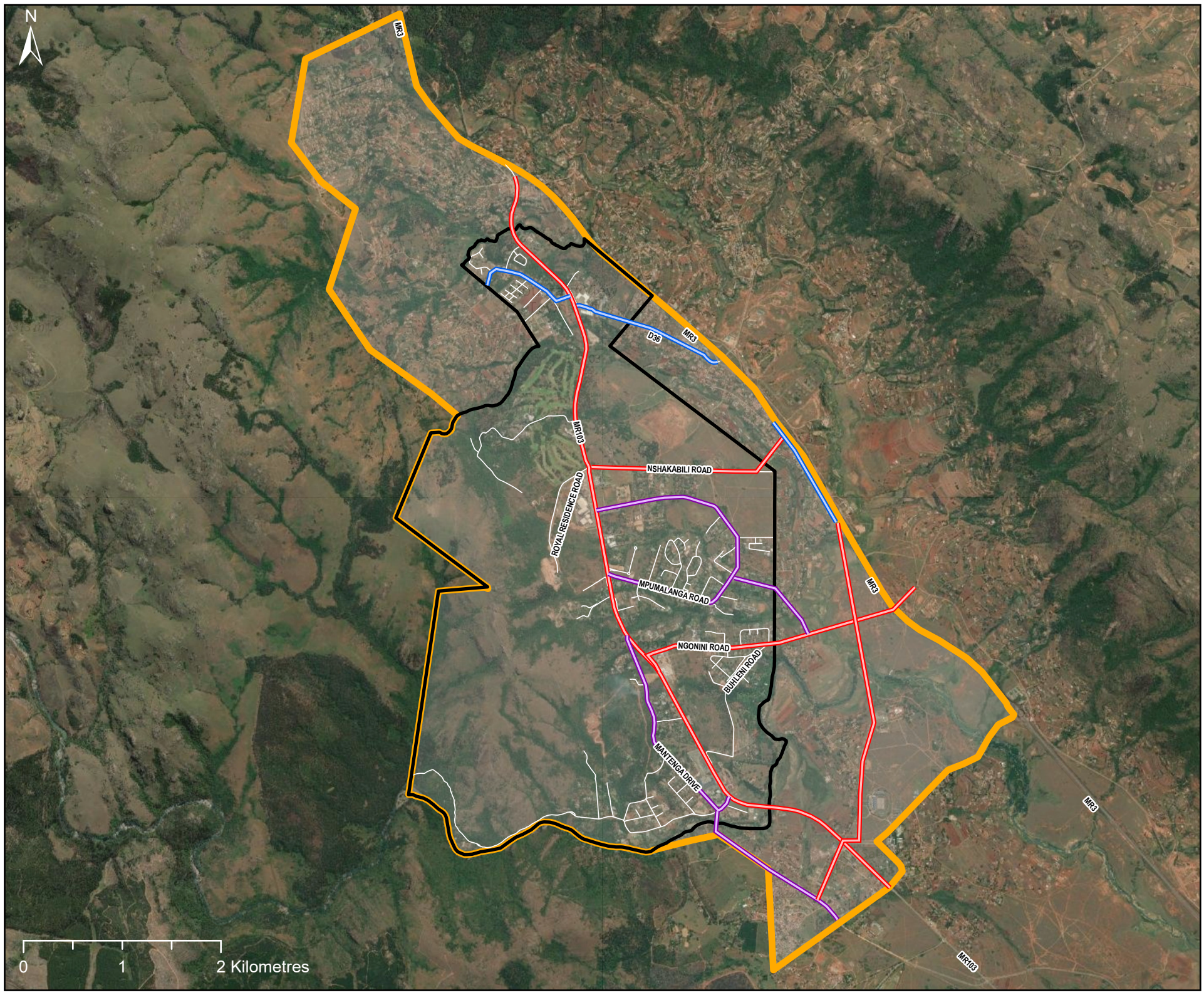
Legend

- Proposed Streetlights
- Proposed Sidewalk
- Widen Sidewalk
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D6

COMPREHENSIVE MOBILITY PLAN



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PROPOSED CROSS SECTIONS

Legend

Cross Sections

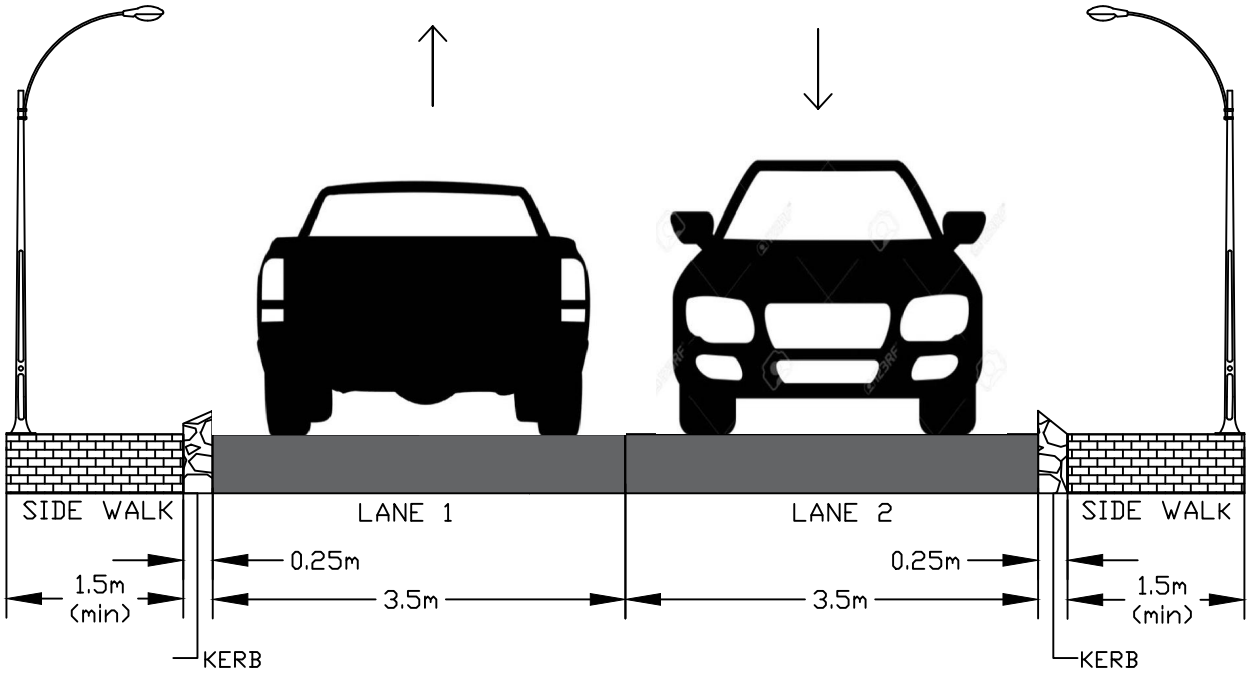
- Class 2 Options
- Class 3 Options
- Class 4 Option
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

D7

COMPREHENSIVE MOBILITY PLAN

ANNEXURE E: CROSS SECTIONS



OPTION 1

KOLEKO
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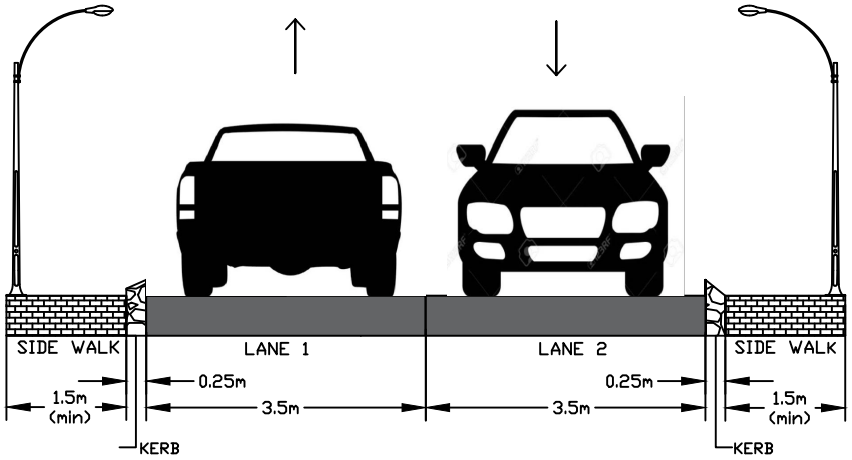
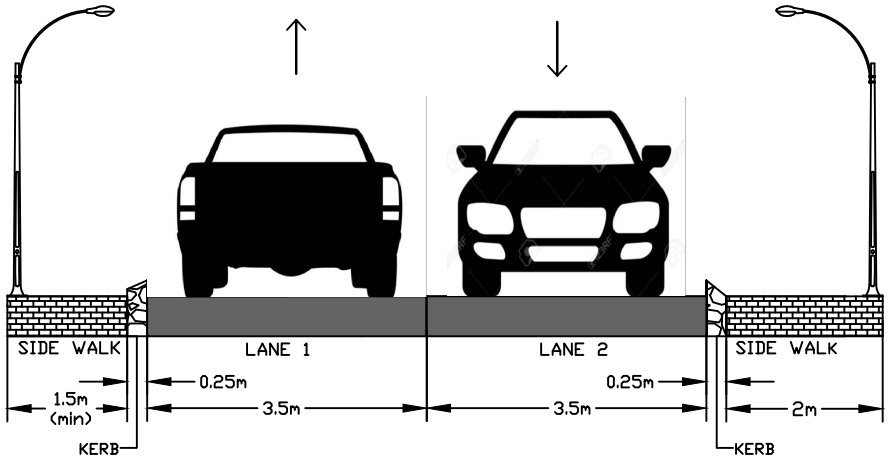
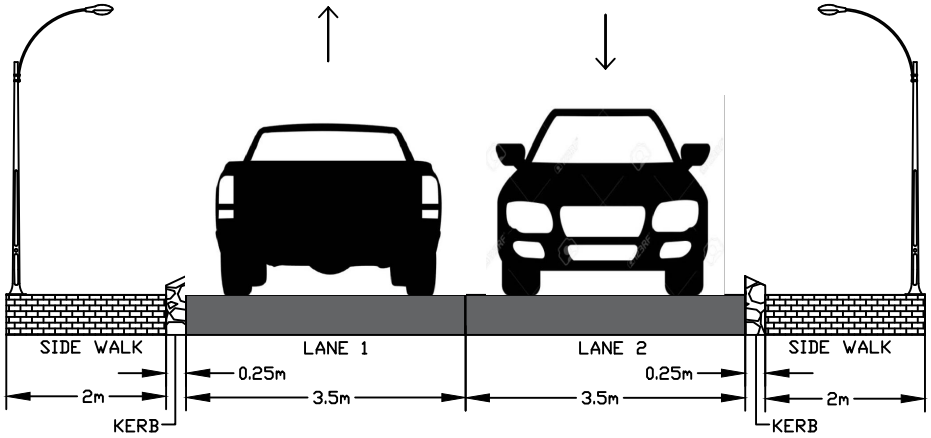
PROJECT:	TITLE:	FIGURE:
K0261 - EZULWINI CMP	CLASS 4 - ROAD CROSS SECTION	E1



OPTION 1



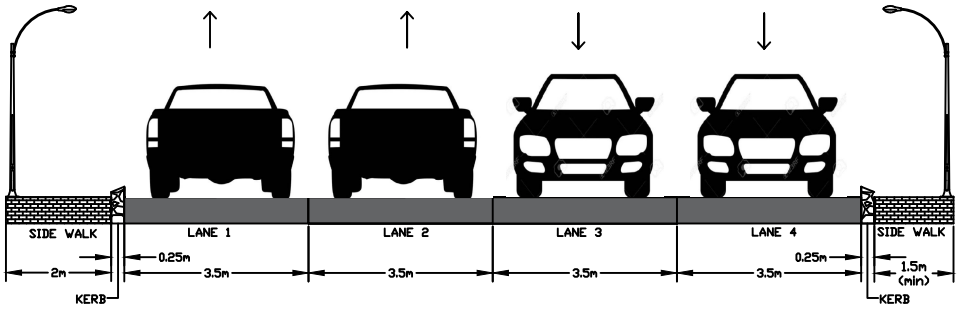
OPTION 2



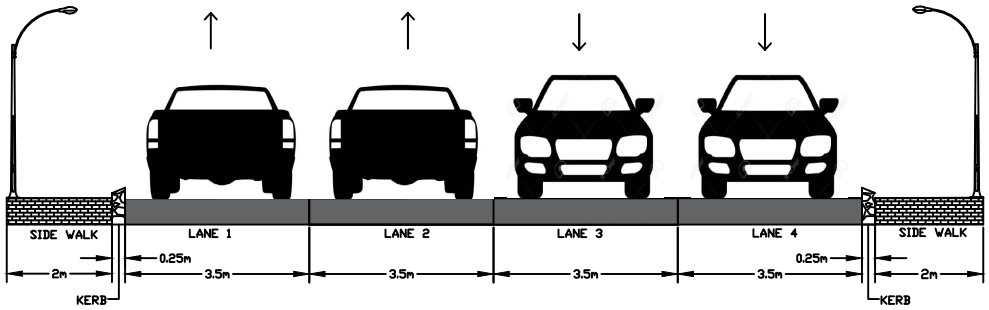
OPTION 3

KOLEKO
TRANSPORTATION ENGINEERING & PLANNING

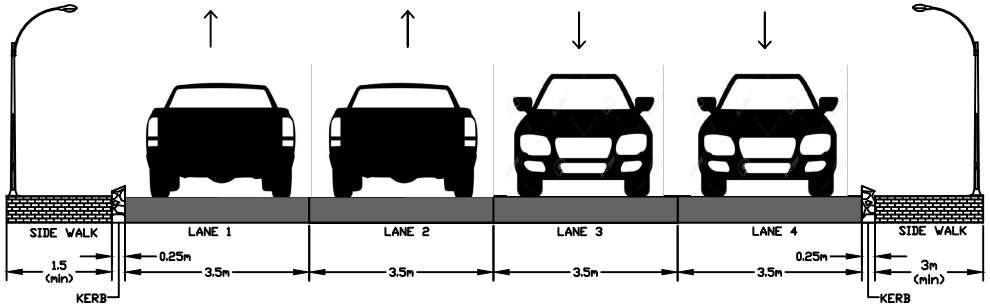
PROJECT:	TITLE:	FIGURE:
K0261 - EZULWINI CMP	CLASS 3 - ROAD CROSS SECTIONS	E2



OPTION 1



OPTION 2



OPTION 3

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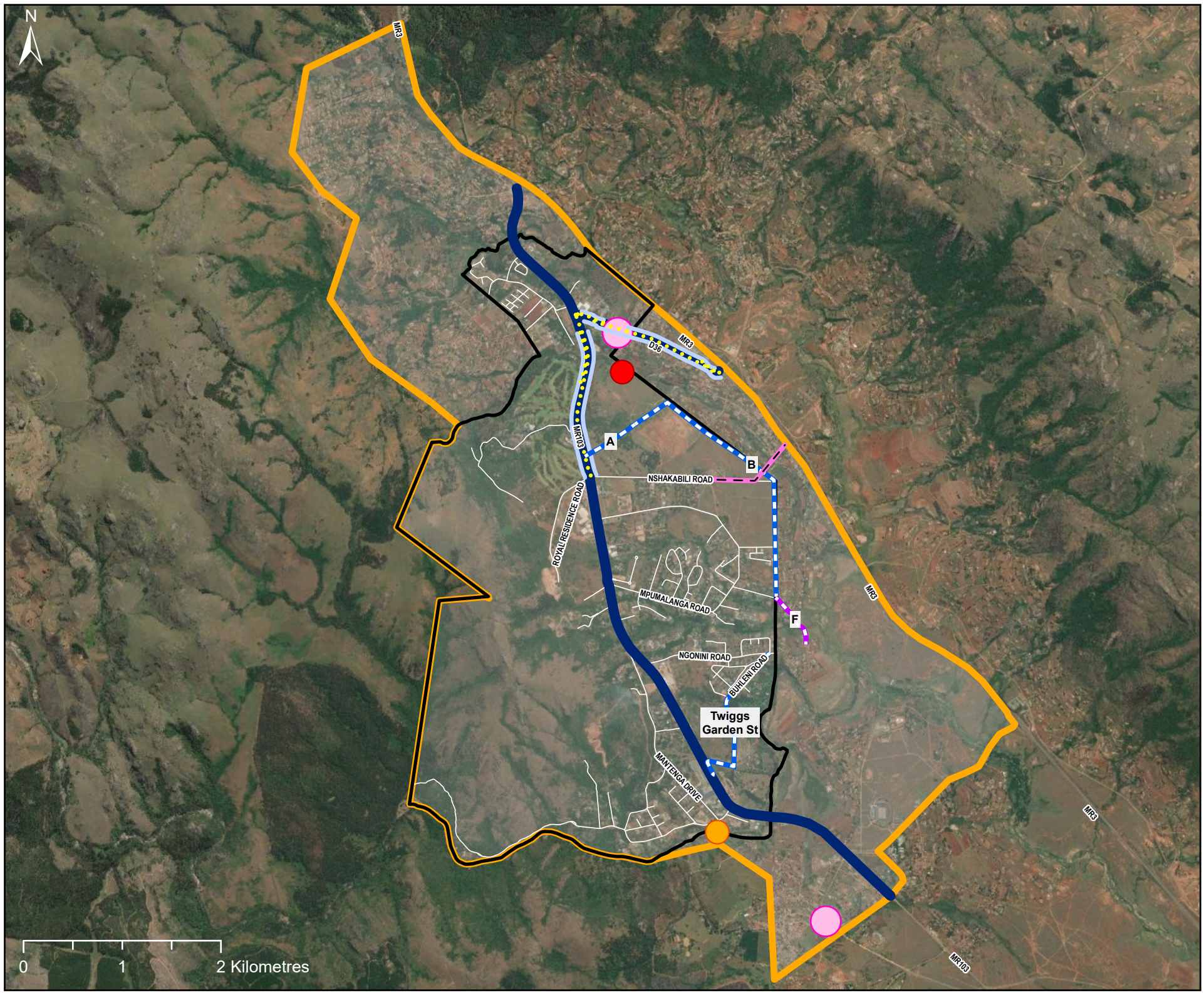
PROJECT:	TITLE:	FIGURE:
K0261 - EZULWINI CMP	CLASS 2 - ROAD CROSS SECTIONS	E3

ANNEXURE F: PHASING



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SHORT-TERM INTERVENTIONS

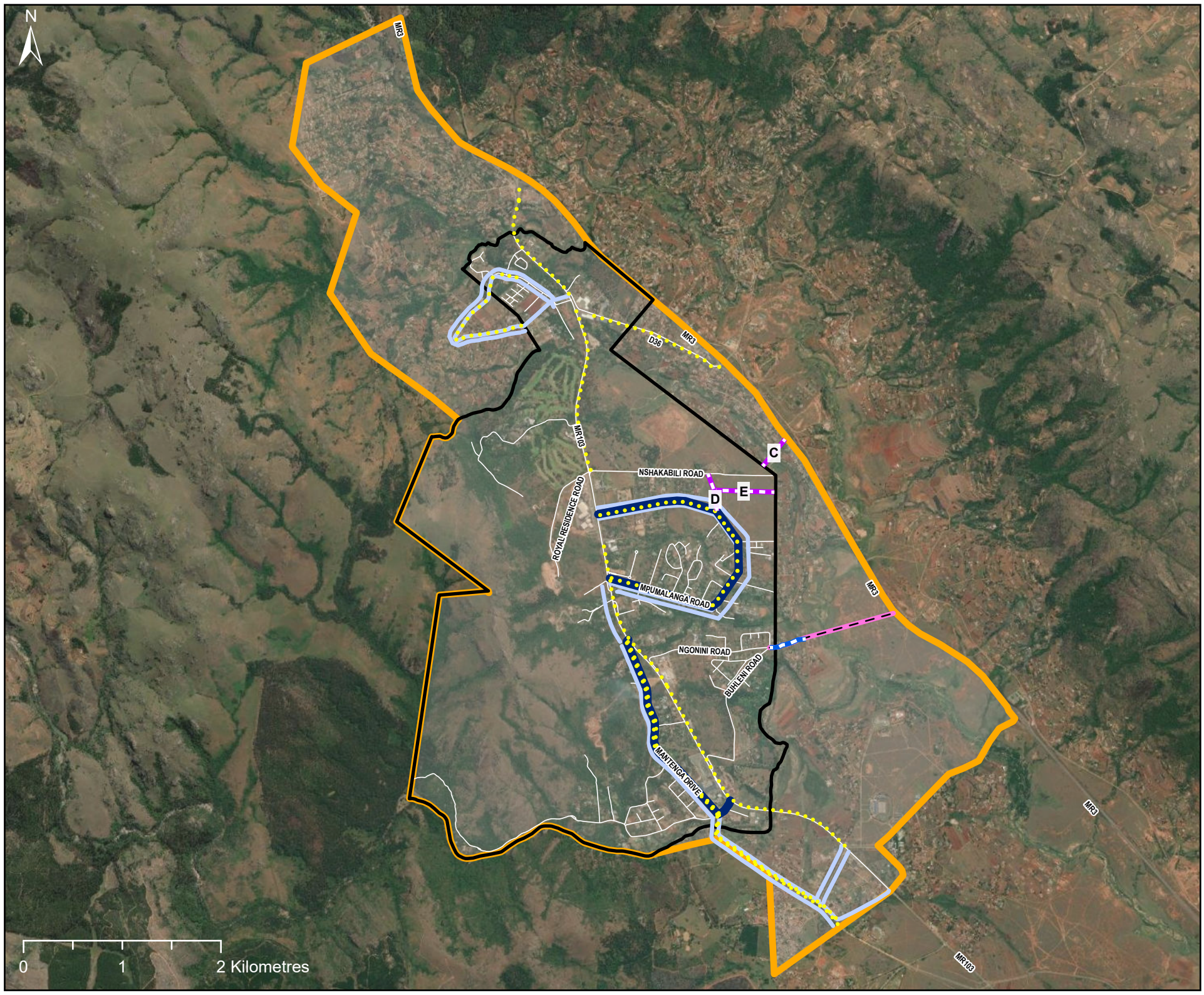
Legend

- Upgrade Pedestrian Bridge
- Upgrade and Pedestrianise Bridge
- Implement Minibus Taxi/ Bus Rank
- Implement Streetlight
- Implement Sidewalk
- Nshakabili Rd Extension
- Upgrade to Class 3 Minor Arterial
- Upgrade to Class 4 Collector Street
- Implement Public Transport
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

F1

COMPREHENSIVE MOBILITY PLAN



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MEDIUM-TERM INTERVENTIONS

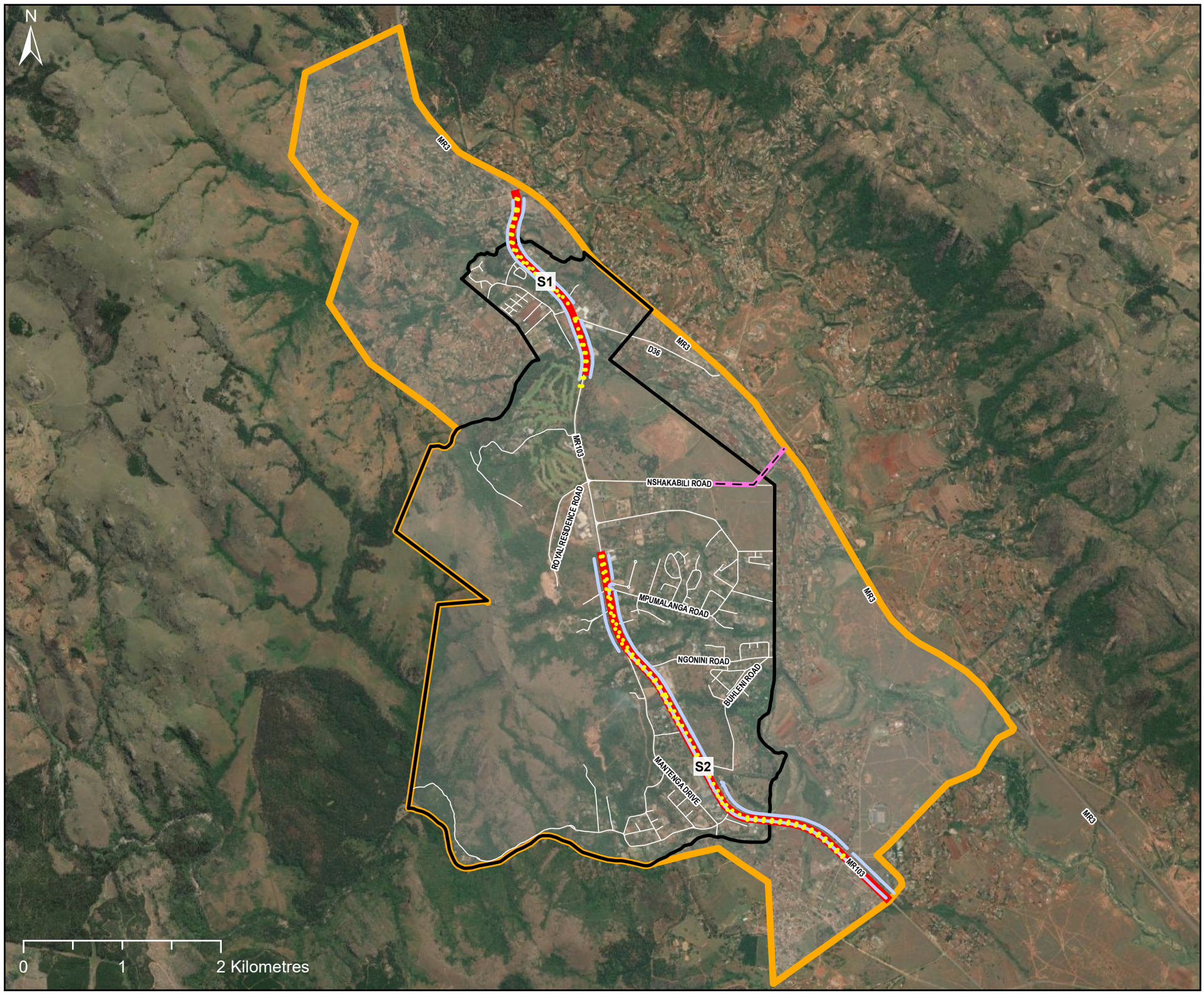
Legend

- Implement Streetlight
- Implement Sidewalk
- Extend Ngonini Rd
- Upgrade to Class 3 Minor Arterial
- Upgrade to Class 4 Collector Street
- Implement Public Transport
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

F2

COMPREHENSIVE MOBILITY PLAN



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LONG-TERM INTERVENTIONS

Legend

- Implement Streetlight
- Implement Sidewalk
- Nshakabili Rd Extension
- Additional Lane
- Ezulwini Urban Boundary
- Study Area

FIGURE NO.

F3

COMPREHENSIVE MOBILITY PLAN

ANNEXURE G: PRICING

PRICING

Rank	Project Description	Length (km)	Rate (sz)	Total (sz)
	Short-term			
1	Implement public transport (along MR103 and D36 with minibus taxi/bus rank)	10,44	1 155 600	120 644 64,00
2	Pedestrianise MR103 and D36	9,65	4 494 000	433 671 00,00
3	Upgrade pedestrian bridge within Lobamba			
4	Upgrade of bridge southern Mantenga Drive			
5	Upgrade of Road A to Class 3	1,01	39 020 760	39 410 967,60
6	Upgrade of Road B to Class 3	1,22	39 020 760	47 605 327,20
7	Upgrade of Road F to Class 4	0,61	39 020 760	23 802 663,60
8	Upgrade of Ngonini Road to Class 3	0,38	39 020 760	14 827 888,80
9	Upgrade of Twiggs Garden Street to Class 3	1,76	39 020 760	68 676 537,60
10	Implement Nshakabili Road extension and service road	1,02	39 020 760	39 801 175,20
Total		**26,09**		**289 556 124,00**
	Medium-term			
1	Implement public transport along Mpumalanga Rd and Mantenga Drive	5,71	1 155 600	6 598 476,00
2	Pedestrianise other roads throughout Ezulwini (Swaki Street, Mpumalanga Road and Mantenga Drive)	21,6	4 494 000	97 070 400,00
3	Upgrade of Road C to Class 4	0,36	39 020 760	14 047 473,60
4	Upgrade of Road D to Class 4	0,38	39 020 760	14 827 888,80
5	Upgrade of Road E to Class 4	0,62	39 020 760	24 192 871,20
Total		**28,67**		**156 737 109,60**
	Long-term			
1	Additional lane on section (S1) and section 2 (S2) of MR103	14,1	6 420 000	90 522 000,00
2	Pedestrianise S1 and S2 of MR103	17,35	4 494 000	77 970 900,00
3	Implement Ngonini Road extension with bridge	2,33	39 020 760	90 918 370,80
Total		**64,09**		**259 411 270,80**
Total Costs				**705 704 504,40**

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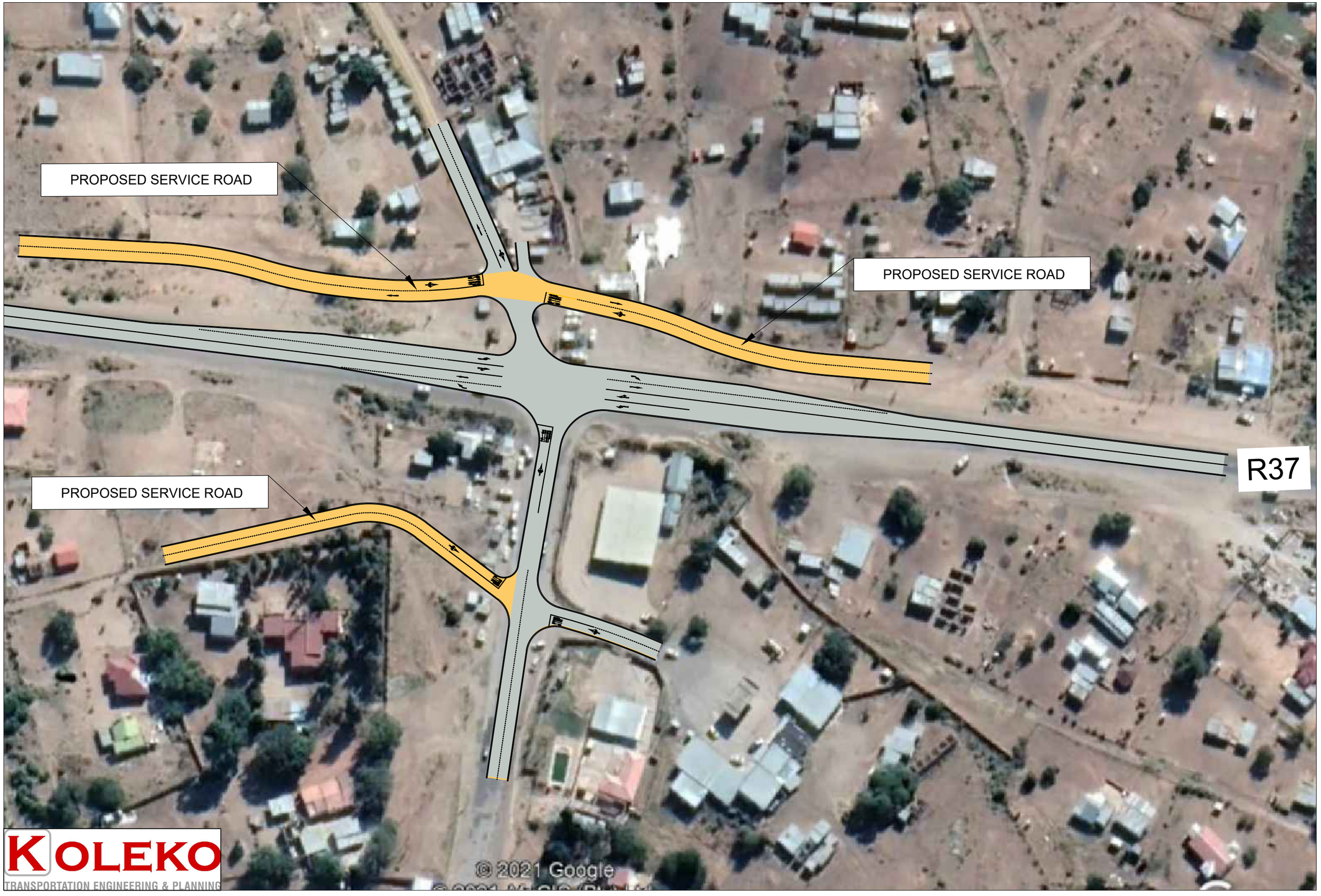
ANNEXURE H:

ACCESS MANAGEMENT CONCEPTUAL LAYOUTS



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REFERENCE PROJECT	TITLE: CONCEPTUAL LAYOUT	FIGURE: H1

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REFERENCE PROJECT	TITLE: CONCEPTUAL LAYOUT	FIGURE: H2

ANNEXURE I: REFERENCE IMAGES

ROADS

Road condition and inventory

Road safety

Inconsistent signs

Misplaced signs

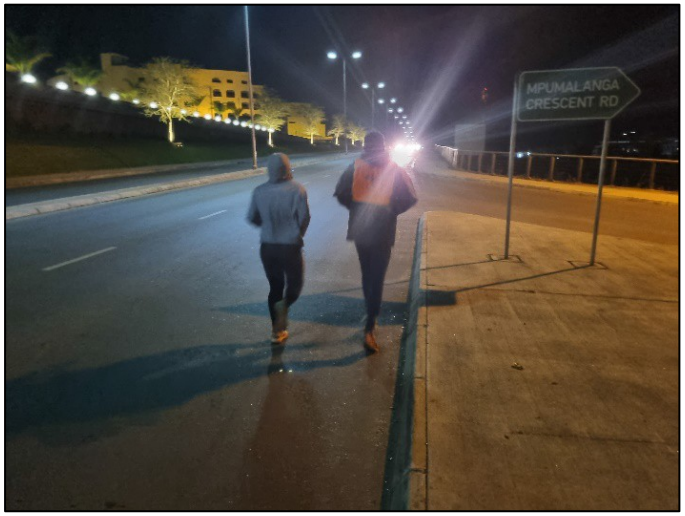
Road signs out of place

NMT

Pedestrian bridge within Lobamba

Sidewalks and streetlights

Absent sidewalks



Absent streetlights

Universal access challenges