Planning for walkable cities in South Africa: Marabastad, Kroonstad as a case study

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ABSTRACT

This dissertation aims to explore how spatial planning interventions can be used to enhance or create walkability of South African low-income cities. South African cities face unique challenges as they are fragmented due to the Apartheid era and related legislation Many South Africans live in low-income settlements that are separated from towns or cities where most of services, facilities and employment opportunities are. These residents are forced to travel far to access basic services and employment, often meaning that they spend more than 50% of their hard-earned salaries on transportation. As transportation is a clear problem for most South African, walkability seems like a natural solution. The research regarding walkability in developing countries such as South Africa is however lacking. This research is thus focused on creating walkable cities in South Africa, and Marabastad, Kroonstad was chosen as the case study.

This qualitative study, that was led by a singular intrinsic case study research design utilised SDA and spatial survey (fieldwork), in the form of walk audit, to explore the walkability in Marabastad, Kroonstad. The theoretical aspect of this study covered the development of different urban models throughout the years and how walkability was influenced by different morphologies; the theoretical part regarding planning for walkability was also thoroughly discussed and several elements were identified to be associated with highly walkable neighbourhoods. The research methodology paired with the knowledge of the theoretical findings was then utilised to provide recommendations on how to improve the walkability of Marabastad, as well as make generic recommendations to improve walkability in South Africa

key terms: walkability, low-income settlements, pedestrian friendly, spatial planning

OPSOMMING

Die skripsie was daarop gemik om vas te stel hoe ruimtelike beplanning ingespan kan word om die loopbaarheid van stede in Suid Afrika te verbeter, met spesifieke fokus op die loopbaarheid van lae-inkomste nedersettings. Suid Afrikaanse dorpe en stede staar unieke uitdagings in die gesig te danke aan die gefragmenteerde stedelike model wat veroorsaak is deur die Apartheidswetgewing. Die groter meerderheid van die Suid Afrikaanse werkersmag bly in lae-inkomste nedersetting buite die stede of dorpe en meot dikwels vêr reis om by werksgeleenthede uit te kom, of om toegang te verkry tot basiese dienste. Die fragmentasie lei ook daartoe dat individue n groot deel van salarisse of lone op publieke vervoer moet spandeer omdat dit nie te voet moontlik is nie, of omdat hulle nie privaat vervoer kan bekostig nie. Alhoewel die loopbaarhied van woonbuurte n gewilde navorsingsonderwerp in ontwikkelde lande is, is daar n tekort aan loopbaarheidsnavorsing vanuit die oogpunt van ontwikkelende lande. Hierdie navorsing is dus gerig op die skepping van loopbare omgewings in Suid Afrikaanse dorpe en stede, met Marabastad, Kroonstad as gevallestudie.

Die studie was van n kwalitatiewe aard, en is gelei deur die gevallestudie navorsingsontwerp. Data is ingesamel deur middle van sekondêre data analise, sowel as ruimtelike opnames in die vorm van veldwerk, waar n loopbaarheidsoudit uitgevoer is.Die teoreties aspekte van hierdie studie het verskillende stedelike modelle oorweeg en hoe loopbaarheid daarin voorgekom het, asook die ruimtelike elemente watvereenselwig word met hoogs loopbare omgewigs. Die navorsingsmetodolgie gepaard met die teoretiese bevindinge is gebruik om aanbevelings te maak aangaande die opgradering van die loopbaarheid van Marabastad, asook om aanbevekings te maak tot die bevordering van loopbaarheid in Suid Afrikaanse dorpe en stede.

sleutelterme: loopbaarheid, lae-inkomste nedersettings, voetgangervriendelik, ruimtelike beplanning

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CHAPTER 1 INTRODUCTION AND BACKGROUND

1.1 Introduction and background

With a rapid growing urban population, South Africa is one of the most urbanised countries on the African continent (Rogerson, Kotze, Rogerson, 2014:s1) Apart from this challenge, South Africa is facing unique challenges that differ from the rest of African countries of which fragmented cities caused by the Apartheid regime, is the most prominent (Rogerson, Kotze & Rogerson, 2014:s1). The segregated morphology of South African cities, paired with the rapid growth of settlements, especially informal settlements create urban sprawl that further marginalises the poor due to most employment opportunities that are located within the central business districts (CBDs) of South African towns and cities (Rogerson *et al*., 2014:s3). This segregated South African city structure relies heavily on motorised transport due to huge distances between where people live and work and expose pedestrians to possible unsafe situations (e.g. crime and hit-and-run). Almost one fifth (17.5%) of the South African population, out of a total of 59,31 million use walking as their primary mode of transport (National Household Travel Survey (NHTS), 2020 and StatsSA, 2021). Further to this, 10,1 million of these South Africans are children who reportedly walk to educational institutions every day (StatsSA, 2021). To exacerbate these high statistics of the walking population in the country, it is alarming that 70% of South Africans are spending more than 30% of their income on travel costs (StatsSA, 2021). Divided into income groups, walking remains the predominant transportation method for the lowest quintiles with 42,2%, and 42,9% respectively (NatMap, 2017). Taking in consideration the high percentage of a walking population together with the high overall expenditure on travel costs, the quality of walking and how the spatial/built environment supports walking as a mode of transport, it is argued here that walkability may well be an important focus area for research in South Africa. However, it is concerning that the sub-Saharan African cities, with the most walkers worldwide and a fast-growing population (Montgomery, 2008:12) yield the least number of studies on walkability and how the built environment can support walking (Oyeyemi, 2017:483).

Walkability from the perspective of spatial planning refers to the degree that the built environment supports walking and encourages walking by manner of offering safe and comfortable surroundings, that are connected to different destinations and that can be reached with minimal time and effort, that is aesthetically pleasing (Southworth, 2005:248). The comprehensive definition alludes to the fact that walkability is a multidimensional attribute that exists where certain elements are present in the built environment including safety, comfort, connectivity, complexity, imageability, enclosure, human scale, convenience, transparency and sociability (Southworth, 2005:247; Talen, 2013:44 ; Owen, 2007:387). Walkability has been extensively researched

internationally. International scholarship describes walkability as a desirable characteristic due to several benefits including environmental benefits, the economic benefits, transportation benefits, and the health benefits (Talen, 2013:44 and Jun, 2015:116 and Owen, 2007:387 and Singh, 2015:644; Speck, 2018:2-11; Moura, 2014:1). Frank's study (2006) focusses on the benefits of walkability from a health and transportation perspective, Litman's study (2003) highlights the economic value of walkability, and Ewing and Handy (2009) focus on the urban design qualities that relate to a walkable community. Although walkability research has been conducted from several perspectives, generic elements are propagated in academic scholarship as contributing factors to improve walkability of cities, regardless the unique contexts.

Publications regarding walkability on the African continent are extremely limited. Oyeyemi's study (2013-2017) focuses on the development of the Neighbourhood Environment Walkability Scale (NEWS) as adapted for the African continent and the study aimed to determine design features, as identified by residents, that can contribute to the physical activity of the residents (Oyeyemi, 2016:2). The existing studies are quantitative and focus on the distribution and measurement of walkability while the how to plan for walkability question remains unanswered. Therefore, the spatial planning perspective is lacking and warrants further investigation.

From the statistics that have been discussed in this section, the fact that African cities have a walking population, does not necessarily imply that African cities are walkable. Consequently, this study is a novel step towards filling this gap in existing scholarship on walkability in an African context as viewed from a spatial planning and design perspective. The lack of studies in Africa, where many residents are forced to walk significant distances to work/school/healthcare facilities, and the fact that in Sub-Saharan African cities have the largest number of walkers (Montgomery, 2008:12), resulted in the rational for conducting this research on walkability in a South African context.

This dissertation builds upon previous research that formed part of the author's fourth year research project in Urban and Regional Planning studies where the walkability of Marabastad (one of five townships in Kroonstad in the Free State Province) was evaluated against identified elements that are associated with walkable cities of developed countries. Kroonstad is a typical secondary city in a more rural oriented region. Marabastad provided fruitful grounds for investigating walkability in a low-income South African community due to the following reasons:

- It is an example of a spatially segregated city as it was subject to demolitions and forced removals as governed by the Group Areas Act, Act 41 of 1950. The Apartheid regime caused a fragmented urban environment where cities and towns such as Marabastad and

Brentpark were far removed from city centres where employment opportunities are located;

- Findings from the undergraduate study (used as a pilot study in this case) that was conducted for a fourth-year research project on walkability in Marabastad have revealed that the context is unique and that generic walkability design elements that are applicable for developed contexts are not necessarily relevant in this case; and
- An established trust relationship with the community of Marabastad existed pre-conducting this research that provided easy entrance and access to the community to conduct follow up research.

The above considerations together with the existing lack of research within the African, especially South African context, on walkability in low-income communities provided the opportunity to further investigate walkability in the same context (Marabastad).

1.2 Problem statement

Goal Eleven from the United Nations' Sustainable Development Goals (SDG) calls for human settlements that are safe, inclusive, resilient, and sustainable (United Nations, 2015). Making cities walkable is one of the listed solutions for safe, resilient, inclusive, and sustainable human settlements (UN Habitat, 2015). In South Africa, walking is considered as one of five major transportation modes, the others being car, taxi, train and bus. (NatMap, 2017). The problem is that little is known about walkability from a spatial planning perspective in a South African context, especially in communities that suffer from poverty and cannot necessarily make use of public transport.

While pedestrian friendly design is encouraged in the form of sidewalks accompanied by specific planning and design guidelines for the development of pedestrian-oriented streets, (CSIR, 2000) these guidelines are not explicitly highlighted by policies or legislation that regulate spatial development in South African such as the Spatial Planning and Land Use Management Act, Act 16 of 2013. In contrast to prioritising or promoting pedestrian-oriented development, mass transit-oriented developments are encouraged by South African policies such as the NDP, the NSDF, the National Transport Master Plan (NATMAP) and the New Growth Path). The current trend of transportation-oriented design will not only promote urban sprawl but will promote the further fragmentation of South African cities that in turn continues to promote the marginalisation of the poor (Rogerson *et al.,* 2014:s3).

Guidelines for local level walkable neighbourhoods are currently an underdeveloped theme in South Africa while it is noted as of critical importance in key policies e.g., the Sustainable

Development Goals by the United Nations and academic publications from key authors' Speck (2018), Forsyth (2015) and Southworth (2008).

1.3 Purpose statement

The purpose of this study is exploratory in nature. Explorative studies are useful when a phenomenon (walkability in this instance) is not familiar or not in a specific context. Exploratory studies are especially useful in the instance that the researcher seeks to develop a clearer concept and establish priorities relating to a certain concept (Ponelis, 2015:537). The purpose of the study is to explore walkability as a phenomenon in a low-income South African context where walking is the predominant transport mode with the purpose to formulate spatial planning and design proposals for creating a walkable environment. Marabastad, Kroonstad presents an example of a South African fragmented city, where walkability was raised as a concern in a pilot study conducted in 2019 where 153 participants have been included, based on a convenience sampling strategy to provide descriptions of their experiences as pedestrians of the Marabastad township.

1.4 Research questions

This study has been guided by a primary research question namely "How can spatial planning be utilised as a tool to improve the walkability of cities in a low-income environment" with special reference to a specific context namely Marabastad.

Secondary research questions concerned with this study include the following:

I. What does the concept walkability entail from a spatial planning perspective?
II. What is the role of spatial planning in terms of walkable cities?
III. How can the spatial environment contribute to the walkability of a city?
IV. How walkable is Marabastad?
V. How can walkability in Marabastad be optimised?

1.5 Aims of the research

The primary aim of the study is to illustrate how spatial planning can be utilised as a tool to plan for walkable cities in low-income environments by using Marabastad in Kroonstad, South Africa as a case study.

Secondary aims of the study include the following:

I. To conceptualise the meaning of walkability from a spatial planning perspective;

II. to describe the role of spatial planning in the creation of walkable cities;
III. to spatially analyse the walkability in Marabastad;
IV. to evaluate the existing Marabastad township in terms of walkability; and
V. to develop suggestions for spatial planning intervention to optimise walkability and integrate walkability in the spatial planning of Marabastad,

1.6 Research methodology

For the purposes of orientation, a brief statement is given to indicate the methodological aspects underpinning the research. Because the nature of the phenomenon walkability is less familiar in the African and South African context (see 1.1.), a **qualitative explorative approach** was selected as appropriate. The research design focuses on a **singular South African case study** of Marabastad, a fragmented city that is located in Kroonstad in the Moqhaka Local Municipality. The methods employed in this study entails the following: (i) a **scoping literature review** of walkability theories; (ii) a **secondary data analysis** of **semi-structured interviews** that were conducted in Marabastad in 2019 and (iii) spatial surveys of Marabastad including, a walkability audit. A comprehensive description of the methodology is discussed in Chapter 2.

1.7 Structure of the dissertation

The section concludes Chapter one by providing an overview of the structure of the dissertation comprising seven chapters in total, illustrated by Table 1-1 below. The table explains the purpose of each chapter and link to the relevant aim and research question. The first two chapters (Chapter one and Chapter two) set the scene for the remainder of the study by providing introductory notes (Chapter one) and explaining the scientific process that was followed to execute the research (Chapter two). The next two chapters (Chapter three and Chapter four) forms the theoretical foundation that underpins the research by including a chronological overview of urban models and how they responded to walkability from a spatial perspective (Chapter three) and providing walkability theories to plan for walkability (Chapter four). Chapter five and Chapter six both deal with empirical aspects by introducing the context of the research (Chapter five) following by an in-depth exploration of the findings about walkability in Marabastad (Chapter six). The final section is dedicated to recommendations for spatial planners and concluding remarks (Chapter seven).

Table 1-1: Summary of dissertation structure

Chapter 1: Introduction and background	
Purpose of the chapter:	The purpose of the chapter is to provide the background of the study, explain the structuring elements of the study, state the research questions and the aims of the study.
Chapter content:	The chapter offers the problem and purpose statements of the study, accompanied with the research questions and the aims of the research. The chapter also briefly discusses the research methodology utilised in the study.
Research aim met by chapter:	N/A
Research question addressed by chapter:	N/A
Chapter 2: Research Methodology	
Purpose of the chapter:	The purpose of the chapter is to identify the appropriate research approach, research design, data generation and data analysis methods in order to conduct the research.
Chapter content	The chapter contains summaries of the different research approaches, research designs, data generation methods and data analysis techniques
Research aim met by chapter:	N/A
Research question addressed by chapter:	N/A
Chapter 3: Urban models and walkability	
Purpose of the chapter:	The purpose of this chapter is to explore the various urban models and how they contributed to-, or impacted upon the walkability of the environment. The chapter also attempts to establish the theoretical frameworks concerned with neighbourhood walkability
Chapter content:	The content of this chapter can be summarised as an overview of different spatial planning models throughout the years from the historical cities to present day modernistic cities. The chapter also contains theoretical frameworks that encourage walkable neighbourhoods
Research aim met by chapter:	Secondary research aim 1 I. To conceptualise the meaning of walkability from a spatial planning perspective.
Research question addressed by chapter:	Secondary research questions one, two and three: I. What does the concept walkability entail from a spatial planning perspective?
Chapter 4: Planning for walkability: The theoretical approach	

Purpose of the chapter	The purpose of the chapter is to theoretically conceptualise walkability by manner of exploring the roots of the walkability concept and how walkability related theories have developed throughout the years, the different definitions associated with walkability and the several spatial planning interventions suggested for the creation of a walkable city.
Chapter content	The content of this chapters consists of the, advantages and disadvantages of walkability as built environment attributes, the different walkability measurement instruments/indexes. The chapter also identifies and explores specific spatial planning and design elements that are associated with walkability.
Research aim met by chapter	Secondary research aim 1 and 2: I. To conceptualise the meaning of walkability from a spatial planning perspective. II. To describe the role of spatial planning in the creation of walkable cities
Research question addressed by chapter	Secondary research questions one, two and three: I. What does the concept walkability entail from a spatial planning perspective? II. What is the role of spatial planning in terms of walkable cities? III. How can the spatial environment contribute to the walkability of a city?
Chapter 5: Contextualisation of Marabastad as case study	
Purpose of the chapter	The purpose of this chapter is to provide context regarding the study area with specific focus on the history and socio-economic climate of Marabastad in comparison to South Africa
Chapter content	The chapter offers a summary of the history of Marabastad with specific focus forced removals that occurred. The chapter also discusses the socio-economic status of South African and Marabastad residents. Lastly, the chapter also explores policies and legislature that influence the walkability and transportation planning of South Africa and Marabastad.
Research aim met by chapter	Secondary research aim three: III. To spatially analyse the walkability in Marabastad
Research question addressed by chapter	N/A
Chapter 6: Conceptualising walkability empirically: Marabastad as case study	
Purpose of the chapter	The purpose of the chapter is to analyse the secondary transcription data and the walk audit survey data that was gathered in order to establish the degree of walkability in Marabastad
Chapter content	The chapter contains the content analysis of the secondary data, as well as the spatial analysis of the walk audit.
Research aim met by chapter	Secondary research aim three and four:

	III. To spatially analyse the walkability in Marabastad IV. To evaluate the current walkability of Marabstad
Research question addressed by chapter	Secondary research question four: IV. How walkable is Marabastad?
Chapter 7: Recommendations and conclusion	
Purpose of the chapter	The purpose of the chapter is to make spatial planning recommendations with regard to planning for walkable cities in low-income settlements such as Marabastad.
Chapter content	The chapter contains generic and specific recommendations, as well as a concluding summary of the study. The research questions are answered, and the aims of the research are addressed.
Research aim met by chapter	Secondary research aim five: V. To develop suggestions for spatial planning intervention to optimise walkability in Marabastad
Research question addressed by chapter	Secondary research question five: V. How can walkability in Marabastad be optimised?

(Source: Author's own construction, 2020)

CHAPTER 2 RESEARCH METHODOLOGY

2.1 Introduction

Different understandings of what research entails exist in academic scholarship (Amaratunga, Baldry, Sarshar & Newton, 2002:17). Kothari (2004:14) describes research as a scientific art of investigation. Walliman (2011:15) and Amaratunga (2002:18) describe research as a methodical and systematic process to obtain new knowledge about a topic. Despite different descriptions, the method that is followed to conduct research plays an important role in its success. However, for research to be scientific, it requires a systematic and methodical process (Walliman, 2002:17). The aim of this chapter is to describe the methodical scientific process that was followed to investigate walkability.

In order to explain the scientific process that was followed, various aspects of the research methodology are discussed in this chapter. First, different research approaches are briefly explained followed by the motivation for choosing a qualitative approach as the most appropriate for this study. Following the research approach, the research design is discussed that has been chosen. Different research designs are introduced while the most appropriate for this study, a case study research design, is explained in more detail. The third aspect that is dealt with in this chapter, includes the methods of investigation that have been used to generate data (Gray, 2014;160). Different data generation methods are shortly discussed, after which the methods that have been employed in this particular study are unpacked in depth. Fourth, an explanation follows about how the data that was analysed and interpreted. The chapter is concluded by explaining how ethical considerations and trustworthiness have been established. Finally, the limitations of the research methodology are listed. The structure of this chapter is summarised in Table 2-1.

Table 2-1: Structure of Chapter two

Introduction (2.1)				
Research approaches (2.2)				
A quantitative research approach (2.2.1)	A qualitative research approach (2.2.2)	A mixed methods research approach (2.2.3)	Motivation for using a qualitative approach as point of departure (2.2.4)	Research design types (2.2.5)

<table>
<tr><td colspan="4">Case study research design (2.3)</td></tr>
<tr><td>Advantages of case study research design (2.3.1)</td><td>Limitations and disadvantages of case study research design (2.3.2)</td><td>Types of case studies (2.3.3)</td><td>Singular intrinsic case study design (2.3.4)</td></tr>
<tr><td colspan="4">Methods of data generation (2.4)</td></tr>
<tr><td colspan="4">Research phases that were followed (2.4.1)</td></tr>
<tr><td>Generation of primary data (2.4.1.1)</td><td colspan="2">Phase one: secondary data analysis (2.4.1.2)</td><td>Phase two: spatial survey (fieldwork) (2.4.1.3</td></tr>
<tr><td colspan="4">Data analysis and interpretation (2.5)</td></tr>
<tr><td colspan="2">Phase one data analysis: content analysis (2.5.1)</td><td colspan="2">Phase two data analysis: spatial analysis (2.5.2)</td></tr>
<tr><td colspan="4">Trustworthiness (2.6)</td></tr>
<tr><td>Triangulation (2.6.1)</td><td>Member checking (2.6.2)</td><td>Rich descriptions (2.6.3)</td><td>Peer debriefing (2.6.4)</td></tr>
<tr><td colspan="4">Ethical considerations (2.7)</td></tr>
<tr><td colspan="4">Conclusion (2.8)</td></tr>
</table>

(Source: Author's own construction, 2020)

2.2 Research approaches

According to Gray (2014:88) it is important to consider the type of research approach to follow for a particular study. The chosen approach impacts on the way that data is gathered and analysed (Amaratunga *et al.,* 2002:19). Different research approaches exist (Gray, 2014:88). Two distinct approaches that can be distinguish namely the qualitative and the quantitative approaches both that are widely accepted research approaches (Kothari, 2014:18 and Amaratunga *et al.,* 2002:10). A third research approach namely a mixed methods approach was later introduced as a hybrid approach that includes aspects of both qualitative and quantitative approaches (De Vos *et al.,* 2005:471).

The most important step is to decide whether the study will follow a qualitative approach, quantitative approach or both (Gray, 2014:88). The importance of this decision is emphasised by the fact that the type of research approach will guide the data generation methods as well as the methods of data analysis (Kothari, 2014:22). It is of utmost importance to select the most appropriate research approach for each study, as the approach can influence the total research methodology that follows.

In order to select an appropriate research approach, different approaches have been considered. The following section will briefly discuss the options that were considered namely qualitative research, quantitative research, and a mixed method approach.

2.2.1 A quantitative research approach

The first research approach of the three most common approaches is known as a quantitative approach (Amaratunga *et al.,* 2002:10). The following section will discuss the definition and purpose of the quantitative approach, as well as the characteristics and role of the researcher.

- **Definition:** The quantitative research approach is defined as research approach that seeks to generalise results, make predictions, find averages and patterns and test causal relationships by manner of collection and analysing data that is numerical of manner (Bhandari, 2021:1).

- **Purpose:** Quantitative studies are ideally suited for instances in which knowledge needs to be developed through postpositive claims (Creswell, 2009:21). Simply speaking, the main aim of the quantitative approach is to measure something (McCukser & Gunaydin, 2014:1). The question of when the quantitative approach should be used is answered by Kothari (2014:16) as when phenomena is being studied that can be expressed in quantities. Creswell (200:124) also encourages the use of a quantitative approach for research projects, dissertations and thesis'; for survey studies and specifically when a hypothesis is being tested. McCusker and Gunaydin (2014:2) describes the aims of a quantitative approach as the classification of features, the counting thereof and the construction of statistical models to ultimately describe what has been observed.

- **Characteristics:** As the qualitative approach had its own specifications and characteristics, so does the quantitative approach. Marczyk (2005:32) describes quantitative research as studies that obtain their findings using statistical analyses. The numerical manner of the data implies that it is very efficient for testing hypotheses but lacks contextual detail as opposed to qualitative data that is considered highly contextual (McCusker & Gunaydin, 2014:2). Quantitative data are subject to mathematical analysis

procedures (Kothari, 2004:18) that can range between simple analyses, such as percentages or counts, and more sophisticated statistical tests and mathematical models (Williman, 2011:87). It is required that these tests and models are designed to be structured and rigid to ensure high accuracy (Kumar, 2011:104). The use of mathematics and statistics is in fact a key feature of the quantitative research approach (Marczyk *et al.,* 2005:32). In order for the data to be analysed, the data should first be gathered. Creswell (2009:21) suggests inquiry methods such as experiments, surveys and predetermined instruments and models.

- **Role of the researcher:** As the data generation and analysis methods differ one can only assume that the role of the researcher will also be different for the quantitative research approach. Gray (2014:193) states that the researcher is often disengaged from the field or people that is being researched, this statement is supported and strengthened by McCusker and Gunaydin (2014:2) who claims that it is of the utmost importance for the researcher to 'remain objectively separated from the subject manner'. Quantitative data generation methods and data analysis methods allows the researcher to make generalisations and identify relationships between certain variables (Gray, 2014:193).

In summary, a quantitative research approach can be described as an approach concerned with data that can be measured and used in mathematical models and statistical analysis to test a hypothesis or answer research questions about phenomena that can be measured. A quantitative approach is considered to be statistically sound, but less contextual. The lack of contextuality disqualifies the quantitative research approach as being the most suitable approach as the aim of the research is to explore the walkability within the particular case of Marabastad.

2.2.2 A qualitative research approach

A qualitative research approach is a second option to choose as a research approach. Similar to the structure of the first (quantitative) approach, this section comprises a concise definition of a qualitative approach followed by the purpose of qualitative research, the most prominent characteristics of qualitative research and the role of the researcher in qualitative research.

- **Definition:** A qualitative research approach is defined as a research approach that studies specific populations and/or places to collect data that is not numerical of manner in order to better comprehend social life through the meanings of the interpretations made from the collected data (Crossman, 2020:1);

- **Purpose:** Qualitative research mainly aims to understand social aspects (McCusker & Gunaydin, 2014:1; Patton & Cochran, 2002), and is therefore exceptionally suited for

studies about social relations (Flick, 2009:12). Qualitative research seeks to comprehend phenomena through a naturalistic approach (Taylor et al 2015:9) – an approach within a specific context (Gray, 2014:192). Patton and Cochran (2002) simplify qualitative research as research that aims to answer the 'what', 'how' and 'why' questions of phenomena that is investigated as opposed to 'how many' and 'how much'. Therefore, qualitative research does not endeavour to quantify results statistically (Marczyk *et al.,* 2005:32) but rather to express data, that cannot be counted or measured, in words (Williman, 2011:88);

- **Characteristics:** qualitative research has unique characteristics that sets it apart from other approaches. According to Williman (2011:88) qualitative data sets are descriptive and expresses the importance thereof as they are rich and insightful sources of data. A qualitative approach assumes a descriptive role rather than a statistical role (Creswell, 2009:120);

- **Role of researcher:** One can assume that in the instance of different research approaches, the role of the researcher would also differ. Gray (2014:192) states that the role of the researcher in a qualitative research approach is to obtain a holistic understanding of the study context. The role of the researcher is also described as one where the researcher emerges themselves within the community or context that is being studied (Taylor *et al.,* 2015:9). Qualitative oriented researchers are concerned with phenomena and behaviour within an specific context and should therefore conduct their research at the site in question (Kothari, 2014:16 ; Taylor, 2015:9 ; Gray, 2014:194)

A qualitative research approach can be summarised as a holistic approach that is used to obtain an in-depth understanding or a new perspective about a particular phenomenon that is unfamiliar or now well known in a particular context that cannot necessarily be extrapolated to other contexts but may well provide insights that are transferable and serve as lessons (Anney, 2014:277) for e.g. spatial planners.

2.2.3 A mixed methods research approach

The third, and final research approach is known as a mixed methods approach. The following section will also discuss the mixed methods approach as the previous approaches have been discussed. First, a definition of a mixed methods research approach, followed by the purpose and unique characteristics of a mixed methods approach, as well as a discussion regarding the role the researcher must assume whilst conducting research using the mixed methods approach.

- **Definition:** The mixed methods research approach is defined by Creswell (2012:11) as a research approach that utilises both qualitative and quantitative data- collection and, -analysis methods in order to fully comprehend a research problem of a single study.

- **Purpose:** As suggested in the name, a mixed methods approach is the combination of at least one qualitative and one quantitative component within the same research project (De Vos, 2002 ; Gray, 2014:223). Creswell (2009:21) describes that a mixed methods approach may be favourable in the case that the researcher wants to base knowledge claims on pragmatic grounds and such an approach can gather data that is both numeric and contextual. The aim of the mixed methods research approach is to fully utilise data by manner of integration of qualitative and quantitative data collection and data analysis methods (Wisdom & Creswell, 2013:1)

- **Characteristics:** The main characteristic of the mixed methods research approach is that mixed methods are used throughout the research process (Wisdom & Creswell, 2013:2). De Vos (2002) defines the mixed methods approach as one with methods of inquiry as well as philosophical assumptions. A mixed methods approach would therefor need research questions that are both of a qualitative and quantitative nature (Creswell, 2009:131). The collection of qualitative and quantitative data can happen independently or simultaneously, the same can be said for the analysis thereof (Gray, 2014:229 ; De Vos, 2002). A mixed methods research approach offers several advantages; De Vos (2002) states that a combination of approaches provides a more comprehensive understanding of a research problem as it gathers rich and comprehensive data (Wisdom & Creswell, 2013:3). Gray (2014:229) elaborates on the advantageous nature of the mixed methods research approach by stating that it can broaden the range of a research study, generate new insights, and reframe research questions. The mixed methods approach is a very flexible research approach, that reflects the perspective of the participants whilst encouraging participation amongst scholars (Wisdom & Creswell, 2013:3)
- **Role of the researcher:** The role of the researcher will differ depending on the chosen methods to better understand a research problem. Some researchers do not acknowledge the mixed method approach as a singular approach as it requires a team of multidisciplinary researchers, resulting in a more complex, labour and resource intensive study (Wisdom & Creswell, 2013:5).

In summary, a mixed method approach utilises both qualitative and quantitative methods to obtain an understanding of the subject under study. The data can be collected separately or simultaneously and analysed either way as well.

2.2.4 Motivation for using a qualitative approach as point of departure

The aims of this study, as discussed in chapter one, are to illustrate how spatial planning can be utilised as a tool to plan for walkable cities in low-income environments by using Marabastad in Kroonstad as a singular in-depth case study. In order to explore the phenomenon of walkability within this context of Marabastad, a researcher needed to immerse him/herself in a particular community (in this case Marabastad) in order to experience the walkability of the research context from the ground up. This type of inductive way of conducting research implies a qualitative approach.

As stated in chapter one of this dissertation, walkability and research regarding walkability in the South African context is limited, thus requiring the need for exploratory research. The exploratory research will also need to be conducted within a specific research context to produce knowledge that is theoretically and practically relevant (Duminy *et al.,* 2014:2). A qualitative research approach in this instance has allowed for contextual data to be generated that further allowed for the development of in-depth insights regarding walkability in the context of Marabastad.

In the following section the different research designs associated with a qualitative research approach will be considered. A research design will be selected and discussed with specific focus on suitable data generation methods, and techniques for analysing the data.

2.2.5 Research design types

Kothari (2014:44) describes a research design as the blueprint for the gathering, measuring and analysis of data, an arrangement of circumstances for the gathering of data and the analysis thereof to form a conceptual structure for the research that needs to be conducted. This description is supported by Gray (2014:160) by stating that the research design is an overarching plan for the collection, measurement and analysis of data.

A research design will typically describe the aim of the study as well as the associated research questions being addressed along with the above-mentioned collection, measurement and analysis information (Gray,2014:160). Kothari (2014:45) states that a research design facilitates a seamless undertaking of the research operations hereby ensuring that the research is done as efficient as possible and produces the maximum amount of information, herewith expressing the importance of a good research design.

Walliman (2011:24) states that there are different types of research designs that are suitable to the different types of research projects and each research design has various research methods that are used to collect and analyse the accumulated data. A research design that is based on a

qualitative research approach differs from that of a quantitative design. As this study takes a qualitative approach as point of departure, the focus will be directed to qualitative research designs.

Creswell (2009:210) distinguishes between five different qualitative research design types comprising narrative analysis, phenomenology, ethnography, case study and grounded theory. Brewer (2000:12) and Gray (2014:196) added ethnomethodology, participatory action research, cultural studies and gender studies as other options that are suitable research design types qualitative approaches. Table 2-2 offers a brief summary of the respective research design types.

Table 2-2: Different research design typologies

Research design type	Description of research design type
Narrative analysis and biographical research	Narrative analysis is described as being the analysis of a story told in a chronologic manner. The main focus of narrative analysis is to explore the manner of the sequencing of the various elements of the story. The researcher wishes to study the live of the participant and uses narrative interviews as main method for data collection.
Phenomenology	Phenomenology aims to understand phenomenon from the point of view of the participant, to comprehend how the world is apprehended by structures of consciousness of real-life experiences. Phenomenology is marked as a method as well as a philosophy due to keen desire to understand lived experiences.
Ethnography	The aims of Ethnography are to understand social processes of specific phenomena that occur within natural settings over a prolonged series of time. The researcher has to assume the role of a participant rather than a reporter or researcher. One can assume that the data collection method would be predominantly observational of manner. The research process is very flexible and evolves in reaction to realities rather than following a set plan and schedule.
Case study	Case studies study a system that is bounded by time and activity. The researcher can explore a variety of phenomena such as in-depth programs, events, activities, processes, and individuals. Researchers make use of a variety of data collection methods during such a study.
Grounded theory	Grounded theory aims to produce a general theory of a process, action or interaction grounded in the views of participants in the study. Grounded theory is characterized by a constant interplay between data collection and analysis to produce said theory.
Ethnomethodology	Ethnomethodology are studies that take a closer look at- and seeks to understand people's everyday procedures their social world and how realities in their daily lives are accomplished. The researcher assumes that social order is an illusion and has to remain objective during observation and analysis of the procedures being studied
Participatory action research	Participatory Action Research (PAR) aims to understand the role of knowledge as an instrument of power and control through a cyclical process containing

	planning, taking action, observing and a critical reflection on the context of the action that is taking place
Cultural studies	Cultural studies aim to understand how our ways of working is affected by social customs and values and expectations therewith. The study of a complex web of social customs, values and expectations that affect our way of ways of working. The predominant source of information is the analysis of texts, images, observations and transcripts.
Gender studies	The predominant focus of gender studies is to comprehend the process of constructing and differentiating genders and specifically inequalities thereof. The researcher observes gender as a social construct, it is not simply what an individual is but rather the role that sexes assume in different societies.

(Source: Gray, 2014:199 ; Creswell, 2009:16 ; Brewer, 2002:12)

As the aim of the study is to illustrate how spatial planning can be utilised as a tool to plan for walkable cities the case study research approach is adequately suited for the task as it allows the researcher to study a phenomenon within a specific context (Duminy *et al.,* 2013:24), the context is not limited by size or sort and the case study focusses on the actors as well as the actions within a real-life, non-staged context (Flyvbjerg, 2001).

2.3 Case study research design

Case study research design is predominantly associated with research studies that are of a qualitative nature and qualitative research and case study design are often used synonymously (Gray *et al.,* 2014:195). As the case is with all research design typologies, several definitions exist to describe a case study research design. Duminy (2014:21) offers an extensive definition and description of the case study research design, stating that “the case study method is the intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to environment” and dissects the definition as described in table 2-3

Table 2-3: Analysis of case study research design definitions

Definition	Analysis
The case study method is the intensive analysis of an **individual unit** (as a person or community) stressing developmental factors in relation to environment”	The case study is therefore a study of the complexity and uniqueness of something in particular, a bounded system investigated in a real-life setting.
the case study method is the **intensive analysis of an individual unit** (as a person or community) stressing developmental factors in relation to environment”	The core of case study research is the desire to recognise and understand complexity, developing such a deep understanding of complexity requires detailed knowledge that is best obtained through a large amount of data and the analysis thereof.

the case study method is the intensive analysis of an individual unit (as a person or community) **stressing developmental factors in relation to environment**"	The purpose of this methodological approach is to understand-, and to be able to intervene in complex environments and social processes
"**the case** study method is the intensive analysis of an individual unit (as a person or community) stressing developmental factors in relation to environment"	This could refer to an object, institution, a system, a social process, anything that there is a desire for light to be shed upon. The case study method offers a process of studying a phenomenon within conceptual, spatial and temporal boundaries.

(Source: Duminy *et al.,* 2014:23-24)

The case study design works best when 'why' and 'how' questions are being asked, specifically concerning events the researcher has no control of (Gray, 2014:299). Case study research aims to advance the understanding of a chosen topic through a very detailed investigation (Cousin, 2014:421), and allows for the conception of multiple perspectives through multiple data collection (Gray *et al.,* 2104:195).

2.3.1 Advantages of case study research design

Case study designs have numerous benefits (Searle, 2002 ; Zaidah, 2003:4 ; UKEssays, 2018 ; Yin 1994). In order to make a legitimate case for the using a case study research design the most relevant advantages that a case study design holds for this study were considered. These advantages include:

- Case study research has the potential to stimulate new research when extraordinary behaviour is highlighted during a primary study;
- Case study research may uncover information that contradicts established theories, therefor establishing new theory and broadening knowledge surrounding the case at hand.
- Due to the rich nature of case study information, case studies often give new insight into phenomena that would not have been uncovered otherwise;
- Case study research permits investigations of situations that would have been inaccessible otherwise, specifically for psychological researchers;
- Data is examined within the context of its use and not deliberately isolated to a limited number of variables;
- The case study research design, although mostly associated with qualitative research, allows for the qualitative and quantitative analysis of data;

- Case studies does not only explore data in a natural real-life setting, it also describes complexities that arise in real-life situations;
- Case studies possesses the quality to simplify complex scientific studies that make it accessible to a non-scientific audience;
- The format of a case study is flexible and broad, that ranges between brief descriptions or summaries to long in-depth accounts; and
- The researcher has a lot of freedom regarding the methods of data collection.

Despite numerous advantages, disadvantages and limitations of case study designs are also important to take cognisance of.

2.3.2 Limitations and disadvantages of case study research design

The case study research design also possesses several disadvantages and limitations (Yin, 1994).

- First, the question with regard to reliability is an issue. Gray (2014:300) is of the opinion that it is difficult for a researcher to remain objective and therefore the legitimacy of the case is questioned;
- Second, according to Searle (1999) the reliability of case studies is problematic due to the 'uniqueness' of the data because the findings cannot be duplicated. it would be impossible to recreate or replicate the findings, the findings can thus not be accepted as reliable. However, according to Duminy (2014:22) the value of a case study lies exactly in the ability of the data to voice the opinion of the respondents. According to him (Duminy, 2014:24) case studies are valuable in SA context due the value and in-depth knowledge that case study research adds to topics that are under researched.
- Third, the large amounts of data that is generated may be problematic as a large volume of data can be confusing and overwhelming for the researcher (Gray, 2014:300 ; Yin, 1994).
- Fourth, aspects such as subjectivity and personal bias of the researcher is considered by some e.g., Searle (1999) as a potential influence on the study, especially pertaining to how data is generated and analysed as researchers often tend to focus on self-identified important factors (Hayes, 2000).
- A fifth obstacle is identified by Duminy (2014:26) as access, whether it be to sources or key informants within a case. Several problems can arise specifically when working with people such as community entrance, language barriers and the development of trust between the researcher and the participants (Duminy *et al.,* 2014:26 ; Gray, 2014:260 ; Yin, 1994). On the other hand, the case study research approach offers the researcher a

wider selection of resources to utilise in order to further the knowledge of the context of the case study (Duminy *et al.,* 2014:25).

Regardless of the numerous disadvantages and limitations that the qualitative case study has to offer the qualitative case study is in this instance particularly suitable as it offers the researcher flexibility and freedom regarding data collection methods, as well as the opportunity for researchers to gain new insights and stimulate new research about phenomena that has already been studied. It is very applicable to the aims of this study as walkability has been thoroughly researched in developed countries but has however been neglected in developing countries such as South Africa.

2.3.3 Types of case studies

A variety of case study types can be distinguished (Duminy, 2014:25; Gerring, 2007, Gray, 2014:307 and Cousin, 2014:422)). This section attempts to explore the different types where after a suitable type of case study is selected and discussed in more detail. Table 2-4 illustrates the distinction between main case study designs.

Table 2-4: Different types of case studies.

Type of Case Study	Description
Intrinsic Case Study	The desire of the intrinsic case study is to gain a meaningful understanding of a specific case. The researcher will thus undertake such a case study when there is a desire to fully understand a specific case 'on its own terms'. The aim of the intrinsic case study is to generalise within the specific case. Intrinsic case study cases are chosen due to the interest appeal and the desire to know more about the case as opposed to knowing more about a phenomenon.
Instrumental Case Study	The main aim of an instrumental case study is to create a generalisation, and rests in the assumption that cross level inference between a certain case and general phenomena is possible to some degree. Instrumental case studies will more likely be selected when the researcher has the desire to study a general phenomenon. The phenomenon will often be dictated by the research question and from thereon cases to be explored will be selected.

Critical Case study	Critical case study, also known as the theoretical case study, is a case study that is deliberately selected and provides a specific focus for detailed empirical analysis of a myth or contradiction. Critical case studies are seen as strategically important with reference to the problem that is being investigated.
Paradigmatic Case study	The aim and focus of the paradigmatic case study is to provide the researcher with a metaphor for understanding complex actions and context in society. Paradigmatic cases are said to have values that are metaphorical and prototypical.
Multiple/Collective Case Study	As the name suggests multiple or collective case studies research more than one case study of the same class in order to investigate a population, phenomenon general condition, this aids the researcher in gaining a degree of representation in research sites.

(Source: Duminy et al 2014:25 ; Gerring, 2007 ; Gray, 2014:307 and Cousin,2014:422)

Table 2-4 summarises the five most common and widely accepted case study types, including the intrinsic case study, the instrumental case study, the critical case study, the paradigmatic case study and the multiple or collective case study. Upon selection of the type of case study that will best suit the study the decision regarding the unit of analysis needs to be made, meaning that the case can either be singular or it can be multiple cases (Stake, 2005). Gray (2014:301) argues that the selection of the case or cases is of the utmost importance with specific reference to the desire of constructing theory from these cases, this statement is supported by Duminy (2014:25) and is elaborated upon, stating that researchers concerned with African issues, specifically planning and development problems, investigate cases as a means to better understand the phenomenon and contribute thereto with propositions that are of a theoretical or legislative manner.

This study intends to investigate the walkability of Marabastad, Kroonstad, therefor it is interested in a specific bounded case. The case study most suitable for the intended study will thus be the singular intrinsic case study.

2.3.4 Singular intrinsic case study design

As stated in Table 2-4 “the aim of the intrinsic case study is to gain a meaningful understanding of a specific case”. The aim of the intrinsic case study is to generalise within the specific case and not extrapolate the same findings to other cases. The main interest that the researcher has in an intrinsic case study, is to comprehend the case at hand, to be able to answer the “what”, “why” and “how” questions associated therewith (Cousin, 2014:422). The intrinsic case study is considered appropriate for the investigation of a single person as a case, or a single process as

a case in order to generalise within the case as opposed to generalising from the case (Duminy *et al.,* 2014:26). This study investigates the walkability in Marabastad in order to make spatial planning recommendations that will improve the walkability of Marabastad, the recommendations will be specific to Marabastad and will not necessarily be applicable to other locations, therefore generalisation will be made within the case study, and not from the case study. However, although qualitative findings cannot be extrapolated to other contexts, the findings of a particular case study are argued here to be of value due to lessons that can be learned about a particular case(s) and can sensitise spatial planners about particular aspects to attend to. This type of knowledge that is generated is known as phronetic knowledge that can guide future actions (Duminy *et al.,* 2014:192).

In conclusion, this study has followed a qualitative approach as the concern related mainly to the contextuality of walkability and not the related statistical representation or quantification of the phenomenon . The qualitative approach has included a singular intrinsic case study design of walkability in Marabastad with the unit of analysis being the experiences of walkability within a low-income neighbourhood, and supported by the extent to which the spatial environment supports walkability in this particular context. Qualitative intrinsic case study designs mostly include multiple methods to generate data. In this study two methods were used as discussed in following section.

2.4 Methods of data generation

Kothari (2014:18) states that the term ‘data generation methods’ should be comprehended as all the techniques and methods to be used whilst conducting research, and that data collection starts once the research problem has been identified and research design has been chosen (Kothari, 2014L108). With reference to the case study research design, data generation often includes several sources and will utilise instruments that have previously been developed where qualitative researchers tend to create their own data collection instruments (Gray, 2014:89).

Qualitative data emerges from a wide spectrum of sources (Gray, 2014:208). The most widely used, trusted and accepted data generation methods for qualitative research include interviews, observations, audio visual material, document review, secondary data analysis and surveys (Creswell, 2009:213, Emulsharaf, 2012 ; Patton & Cochran, 2002 ; Szabo *et al.,* 1997:76). Table 2-5 offers a summary of different kinds of data generation methods.

Table 2-5: Summary of data generation methods

Description of different data collection methods	
Interviews:	An interview can be described as an oral questioning technique, these interviews can be face to face with respondents or conducted over the phone, it also makes provision for interviewing a group of people in a focus group format. Interview data is captured via recording of interviews or written down data or both. Interviews can be conducted in various different styles like informal or conversational interviews with open-ended questions, semi-structured interviews where additional probing questions are used in conjunction with open-ended questions and standardised interviews that are very structured. The aim of interviewing is to extract opinions and views from the participants with regard to information that the researcher needs for his/her study. Interview techniques should always aim to be reproducible, systematic, credible and transparent.
Observations	Observation is known as one of the prime data collection method, it is described as a technique of systematically studying behaviour of selected phenomena, objects or characteristics of living beings. The main aim of observation is to fully comprehend the complexities associated with certain situations. The key to the success of observations is good field notes that are accurate and highly detailed as observation data is highly descriptive of nature. The researcher can assume the role of a non-participant observer to a complete participant. During non-participant observation the observer does not take part but watches openly or concealed. During participant observation the observer tends to partake in the situation being observed.
Audio & Visual material	Audio and visual data can be found in the form of photographs, objects, videos and sounds of any form. This method of data capturing allows the researcher to investigate processes that happen too fast to observe in real time. In some instances, the subjects take part in the data collection phase as the researcher would often encourage the subjects to photograph or document a certain subject.
Document review	Document review can be described as a process of document collection by the researcher or investigator about the research topic. The types of documents to be collected depends on the research question of the study, and can include documents such as journals, minutes of meetings, strategic plans, newspapers, diaries, letters, emails and official reports.
Secondary data analysis	Secondary data analysis is, simply stated, the analysis of data that has already been collected and analysed for a previous study. The secondary analysis can be done by the original researcher or by a researcher studying the same topic but is addressing new research questions. Secondary data analysis makes it possible to examine data more closely or from a different point of view. Secondary data analysis can be done with any existing data set, including sources such as fieldnotes, transcripts, audiotapes and videotapes.
Surveys	Surveys are described as a systematic way of collecting data. The biggest advantage of surveys is the extreme flexibility with regard to the actual methodology. Surveys allow the researcher to obtain information about any desired topic through the use of multiple collection methods, such as interviews, questionnaires and observations. Surveys aim to make a generalisation about something in a population.

(Source: Creswell, 2009:213, Emulsharaf, 2012 ; Patton & Cochran, 2002 ; Szabo *et al.,* 1997:76).

This study utilised two different methods of data generation, the first being secondary data analysis (hereafter referred to as SDA) of semi-structured interviews that were conducted with

153 participants, that are residents of Marabastad and who use walking as their primary mode of transport. The SDA was followed by a spatial survey that analysed and evaluated the walkability of Marabastad according to spatial aspects of walkability according to theories.

2.4.1 Research phases that were followed

The research followed a phased approach comprising two phases: (i) Secondary Data Analysis and (ii) a spatial survey tool (walkability audit). However, before the SDA that has been utilised in this study can be discussed, it is necessary to provide more information about the primary study in order to contextualise the SDA. SDA in this case refers to a re-analysis of previously generated data known as primary data.

2.4.1.1 Generation of primary data

One of the most important aspects when secondary data is used is to provide the background of the conditions under which the primary data was generated (Gray, 2014:556 ; Cheng & Phillips, 2014:375). In this case the researcher was involved as the primary data formed part of a research project conducted as part of an undergraduate study. Table 2-6 provides a summary of the primary study.

Table 2-6: Summary of the primary research

Purpose of the primary study	
The purpose of the study was to explore walkability in a South African context namely Marabastad, Kroonstad to ultimately make planning recommendations on how walkability can be improved within the spatial environment	
Research questions	
Primary research question	**Secondary research questions**
What does walkability entail in a SA context and how can spatial planning interventions support the creation of more walkable neighbourhoods?	What does the concept walkability entail?
	How can the spatial environment contribute to make areas walkable?
	How walkable is Marabastad, Kroonstad?
	How applicable are existing walkability criteria in a context such as Marabastad, Kroonstad?
	How can walkability in Marabastad be improved?
Aims of the primary study	
Aim 1: To compile a literature overview of the concept of walkability from a spatial planning perspective.	

Aim 2: To explore walkability in Marabastad, Kroonstad by means of observing people's walking patterns and interviewing participants about their experience of walkability of their neighbourhood.

Aim 3: To evaluate the walkability of Marabastad according to theoretical criteria.

Aim 4: To evaluate the applicability of international criteria used to guide walkability.

Aim 5: To make recommendations to improve pedestrians' experience of walkability in the Marabastad neighbourhood.

Research approach

The study followed a qualitative research approach

Research context

Walkability is an under-represented field of academia within the African context. Extensive studies have been done to identify elements that encourage walkability within neighbourhoods of developed countries. Marabastad was used as case study to evaluate whether the same criteria for walkability applies in Africa as is applicable in Developed countries.

Research methodology

The research was framed by the ethnography research design; ethnography describes studies that are associated with participant observation in social settings in order to understand certain social processes/phenomenon

Methods of data gathering

Observations	**Semi-structured interviews**
15 Observation points were identified, observation notes were made based off the presence or absence of 7 identified elements relating to walkability (connectivity, enclosure, transparency, human scale, complexity, imageability and safety)	153 semi-structured interviews were conducted and consisted of the following type of questioning: • The main modes of transport • Where the respondents travel to daily (work, shop, clinic, e.g.) • Where do they walk? • Why do they walk? • Do they enjoy walking? • Why do they/don't they enjoy the walk? • Do they feel safe walking? • What would improve their walking experience?

Participants

153 Participants were selected through a convenience sampling method, the participants were pedestrians located in Marabastad, Kroonstad.

Main findings

Out of the seven identified criteria, only two were present in a positive way in Marabastad, Kroonstad, however Marabastad displayed high volumes of pedestrian activity. Walkability in a African context is subjected to a different set of criteria with different interpretations of the existing criteria.

Ethical considerations

All participants took part willingly, and signed informed consent letters;

(Source: Kruger, 2018)

2.4.1.2 Phase one: Secondary Data Analysis (SDA)

Secondary data analysis is defined as data that has been collected by other researchers or for previous studies (Szabo *et al.,* 1997:66; Heaton,1998:1 ; Rew *et al.,* 2000:225 ; Harris, 2001:192 ; Goodwin and O'Connor, 2006: Smith,2008:324 ; Long-Sutehall *et al.,* 2010:344). Smith (2008:324) elaborates by stating that SDA is an additional analysis of existing data that aims to produce conclusions and knowledge other than what has already been discovered. In this case the data of the primary study was generated by the researcher with assistance of fieldworkers and analysed in this dissertation for a second time with a new research question and aims in mind and are thus accordingly treated as secondary data. Secondary data analysis can use any type of data set that is relevant to the aims and objectives of the researcher, these data sets range between archives of private organisations, public statistics, recent or historical data (Cowton, 1998:427) audiotapes, videotapes, transcripts and fieldnotes (Rew *et al.,* 2000:225) interviews and questionnaires (Heaton, 2008:34).

SDA is applicable in several instances; the researcher of the original study can utilise the secondary data to address new questions (Szabo *et al.,* 1997:66), a researcher can utilise such data sets in similar studies with different research questions and approaches (Heaton, 1998:1), secondary data analysis is often also used to verify findings of previous studies (Heaton, 2008:35). In order to successfully utilise the secondary data, it is very important for the researcher to become familiar with the data set (Rew *et al.,* 2000:225), the researcher also needs to have a clear understanding of the process used to collect the data and the intentions for the data collection (Goodwin & O'Connor,2006:375). Due to the data been generated as part of a study the researcher was involved in, the researcher is familiar with the data and a secondary analysis created more in-depth engagement with the data set.

Different approaches to secondary data analysis exist. These options are listed and explained in Table 2-7.

Table 2-7: Different approaches to qualitative secondary data analysis.

Approaches to qualitative secondary data analysis	
Re-analysis	Re-examining data from previous studies to validate the original findings
Supplementary analysis	More in-depth research than the original study with focus on the emergent issues thereof.

Supra analysis	The aims and objectives of the secondary study surpass the aims and objectives of the primary/pilot study.
Amplified analysis	The comparison of two or more sets of existing qualitative data sets.
Assorted analysis	The study re-uses an existing data set as well as collecting and analysing primary data for the same study.

(Source: Gray, 2014:566)

As the data generation process of this study aimed to be executed in two different phases, the assorted analysis approach was utilised for this study due to the fact that a primary data collection survey will be conducted

2.4.1.2.1 .Advantages of Secondary Data Analysis

Secondary data analysis is praised as a data collection method with a vast array of advantages. Five of these advantages are discussed. First, the principal advantage of using secondary data analysis is the cost-effectiveness thereof (Szabo *et al.,* 1997:67 ; Cowton, 1998:427 ; Nicoll & Beyea, 1999:430 ; Rew *et al.,* 2000:226 ; Hofferth, 2005:893 ; Cheng & Phillips,2014:374 ; Gray, 2014:555). In some instances, secondary data is free of charge (Heaton,1998:3)

A second advantage of secondary data analysis is the convenience thereof (Szabo *et al.,* 1997:67). This advantage directly correlates with the cost-effectiveness of secondary data. Convenience refers to the amount of effort spent to collect or obtain the desired data (Heaton, 1998:3 ; Rew *et al.,* 2000:226), implying that the data can be collected and analysed in less time than a primary analysis (Nicoll & Beyea, 1999:430). Therefore, secondary data analysis can save the researcher valuable resources e.g., money and time.

Third, Many researchers vow that secondary data analysis is a credible method to generate new knowledge (Heaton,1998:3 ; Szabo *et al.,* 1997:67) because in most instances the researcher has the opportunity to analyse the data from an objective and detached point of view and allows for new academic knowledge to be produced (Hofferth, 2005:894 ; Long-Sutehall, 2005:336).

Fourth, SDA holds an advantage for novice researchers because of the accessibility of secondary data sets (Hofferth, 2005:893), especially when the researcher has limited resources. In many instances SDA allows researchers to access large data sets that are not easy/possible to replicate (Smith, 2008:328). The available data sets are often cleaned and analysed by professionals and accompanied with detailed documentation about the processes used to a) collect the data, and b) clean the data (Cheng & Phillips, 2014:374). Therefore, SDA is a very convenient method to access data as it exposes researchers to large data sets that have been collected over a long period of time, analysed by professionals and used in primary studies. The method can be utilised by any researcher and is very accommodating to novice/student researchers with regard to the

cost-effectiveness, availability and convenience. However, in this instance the data sets consist of the transcriptions of 153 semi-structured interviews that was conducted by the researcher and fieldworkers for a primary study.

Fifth, secondary data analysis is extremely useful when researching topics that are of a sensitive nature or include 'elusive' populations that are difficult to access (Long-Sutehall *et al.,* 2010:336). The unobtrusive manner of secondary data analysis ensures the protection of the participants' privacy and anonymity and prevents the researcher to need to return to the population (Gray, 2014:555).

2.4.1.2.2 Disadvantages and limitations of Secondary Data Analysis

As with every aspect of research, there are also disadvantages of secondary data. This section aims to shed light on the disadvantages and limitations in using secondary data. Several disadvantages are discussed that were considered before using secondary data.

First, there are concerns regarding the 'age' of the dataset, the data may be outdated thus rendering it inapplicable (Nicoll & Beyea, 1999:430). In this instance the age of the data set was not a concern as the data has been gathered in 2018 rendering the data relevant and applicable.

Second, another disadvantage is the fit of the secondary data set to the research aims and objectives (Heaton, 2008:40) the concern is although the data may be flexible will it be adequate to use data that has been collected for the primary purpose for the secondary study. In this instance the aims and objectives of the primary and secondary study are closely aligned and is thus adequate for use in this study.

Third, secondary data analysis involves large amount of data in some instances that can be overwhelming for the researcher (Nicoll & Beyea, 1999:430) this can influence the interpretation of the data if it is not comprehended as the primary researcher intended (Cowton,1998:428). Fourth, Misinterpretation is another limitation of secondary data analysis, often the data was collected for a completely different purpose and the secondary researcher is unaware of that fact (Smith, 2008:328). Both studies have been done by the same researcher for the same purposes, the possibility of misinterpretation does not apply to this study.

Fifth, one of the most frustrating disadvantages is the fact that the secondary researcher has no control over the content of the research process (Szabo *et al.,* 1970:70). It is therefore limited to the original data set and some research questions may be left unanswered by the secondary data set (Rew *et al.,* 2000:226 ; Cheng & Phillips, 2014:374). This correlates with the disadvantage of having two different researchers, the secondary researcher is mostly unaware of the whole data

collection process (Cheng & Phillips, 2014:375) this means that the secondary researcher has no idea what the collection process was and how thorough the primary researcher was (Gray, 2014:556). Having no control over the data collection process also means that the secondary researcher does not obtain the skill of primary data collection (Walliman, 2011:94).

Other disadvantages include the possibility that the secondary data set might not be sufficient and would require the need to collect primary data (Heaton, 1998:3), the researcher might need to adjust the study and research questions to fit with the secondary data set (Rew *et al.,* 2000:226). The availability, although considered an advantage, can be a disadvantage as access to specific data sets can be restricted (Cheng & Phillips, 2014:372) or very expensive to get access to, the possibility also exists that the data sets can be incomplete or vague (Long-Sutehall *et al.,* 2010:337 ; Rew *et al.,* 2000:226).

In conclusion, many aspects that are considered to be advantages of secondary data analysis can also be considered disadvantages with reference to the circumstances. In this instance the secondary data was gathered and analysed by the same researcher, the aims and objectives closely align, and the research questions fit with the secondary data set resulting in benefits far outweighing the disadvantages of using secondary data.

2.4.1.3 Phase two: Spatial survey (fieldwork)

As per definition, surveys as described as systematic data collection method, about specific or general topics, (Gray, 2014:268 ; Glasow, 2005:5 ; Rew *et al.,* 2000:223). Surveys are considered to be a good data gathering method for descriptive studies because they are focused on describing, recording, analysing and interpreting situations that may or may not exist (Kothari, 2014:133). The flexible nature of survey data (Rew *et al.,* 2000:223) allows the researcher to collect data with various methods, such as interviews, questionnaires and observation methods (Gray, 2014:268).

According to Gray (2014:269) surveys can fall into two broad categories that consist of descriptive surveys and analytical surveys, Binns (2014:15) offers a third option, known as field-based/spatial surveys. Table 2-8 describes these different categories of surveys.

Table 2-8: Categories of surveys

Categories of surveys	
Analytical survey	Analytical surveys aim to find associations between dependant and independent variables and to test theories. This type of survey is quantitative.
Descriptive survey	Data from descriptive surveys often form the basis for more detailed analytical investigations. These types of surveys are designed to measure certain characteristics of a selected population, they measure the what rather than the why. Descriptive surveys often cause policy change and social action.
Spatial Surveys (fieldwork)	Data provided from field-based spatial surveys offer real-time detailed insights as to people and the environment that they live in, the data contributes to a global understanding of a localised phenomenon or problem. Field based surveys should have a clear objective in mind as the outcomes have the potential to impact the individuals as well as the community. Data is acquired regarding a specific phenomenon in the setting where it occurs

(Source: Gray, 2014:269 ; Binns, 2006:13 ; Javed, 2021)

It has been established that walkability is a well-researched topic from a global north-, or developed country perspective; walkability research within the context of a developing country, such as South Africa, is however severely lacking. As surveys grants the researcher flexibility as to the methods to be used (Rew *et al.,* 2000:223), and specifically the descriptive and insightful data offered by field-based spatial survey (Binns, 2006:14), the spatial survey method is the most fitting to the outcomes of the study. Binns (2006:14) also specifically recommends using the field based spatial survey method whilst conducting research in a developing country.

2.4.1.3.1 Advantages and disadvantages of spatial surveys (fieldwork)

Spatial surveys, with specific focus on field research, is mainly encouraged as a data generation method due to the following four reasons, as listed by Javed (2021), QuestionPro (2021) and Binns (2006:14):

Firstly, overcoming lack of data**:** field based spatial surveys aid in the collection of data that both "fills in the gaps" as well as validates data from primary research, often utilised when there is limited data available about a specific topic

Secondly, understanding the context of a study; field-based survey research also contributes to understanding existing data with more descriptive reasons as to why outcomes present in a certain way

Thirdly, improving the quality of the data; Several types of data generation methods can be utilised during field-based spatial surveys, this produces higher quality data that inferences can be made from.

Fourth, collection of additional data; During field-based spatial surveys researchers are subject to localised thinking that can lead to collecting data that wasn't originally planned for.

Apart from the abovementioned reasons field-based spatial surveys/fieldwork offer the following advantages:

- Data gathered is accurate, extensive and thorough, thus allowing the researcher a deep understanding of the phenomenon, subjects or environment (Binns, 2006:13 ; QuestionPro, 2021).
- Data is gathered within a natural environment and is not tampered with, improving the legitimacy and trustworthiness of the data gathered (QuestionPro, 2021).
- Field-based spatial surveys have the potential to be interdisciplinary as it offers the researcher the opportunity to gather additional data (QuestionPro, 2021 ; Javed, 2021).

Similar as to why fieldwork/spatial surveys are encouraged as described above, it is also discouraged due to particular disadvantages and limitations as listed by Javed (2021), QuestionPro (2021) and Binns (2006:14):

- Field-based spatial surveys are expensive and time consuming
- Researchers are challenged with remaining unbiased
- Field-based spatial surveys rely heavily on the ability of the researcher as the method is subjective and interpretive
- External variables cannot be managed, resulting in the nature of the research constantly changing.

2.5 Data analysis and interpretation

The next logical step after data generation is to process and analyse the data (Kothari, 2014:135). Gray (2014:650) describes data analysis as the process where data is broken down in order to reveal the characteristics, elements and structure of the data. The importance of data analysis is emphasised by Marczyk (2002:110) by stating that inappropriate measurement strategies will render even the best designed studies useless.

The analysis of data is important because it allows the researcher to gain new insight into data while providing the basis for a contribution to existing knowledge of a certain topic (Gray,

2014:651). Data analysis is not only the most important part, but the most difficult part of research (Patton & Cochran, 2002). As there is a wide range of data collection methods, one can assume that there would exist an equally as wide range of approaches to data analysis, Gray (2014: 651) and Kothari (2014:134) discuss the most common analysis approaches, being descriptive analysis, thematic analysis, narrative analysis, content analysis, conversational analysis and discourse analysis. The different analysis approaches will be summarised and explained further in Table 2-9.

Table 2-9: Different types of analysis.

Different types of analysis	Summary of analysis type
Thematic analysis	Thematic analysis aims at identifying themes surrounding common issues that recur and is therefore the most common analysis method for qualitative studies that are of a descriptive manner. The thematic analysis is concerned with identifying and analysing patterns/themes. Themes capture important aspects pf the data regarding the research questions and gives meaning to the data.
Content analysis	Content analysis is described as being one of the most common approaches to data analysis. Content analysis makes inferences about data through systematic and objective identification of unique characteristics within data sets. An important step in content analysis is to sort the data in classes, three classes are presented: 1. Common classes -containing categories for everyday thinking 2. Special classes- containing labels used to distinguish between different things 3. Theoretical classes- containing data that provide key linkages and patterns
Narrative analysis	Narrative analysis is the best way to capture lived experiences of participant. Narrative analysis encourages the use of told stories and histories and any form of oral data.
Conversational analysis	The analysis of conversations is precisely what conversational analysis is. It is very concerned with the specification of the mechanisms and principles that participants express themselves through in social settings. The context of these conversations is deemed important as it provides an insight into the meaning and order of the conversation.
Discourse analysis	Discourse analysis focusses on social context and how spoken and written language is used. Regularities of patterns and properties in language is the main focus of discourse analysis. The construction of events from the different version of participants receives a lot of attention with special emphasis on the organization and structure of language.
Spatial analysis	Spatial analysis is focussed on the various methods to study spatial phenomena, with specific emphasis on the location-, distribution-, and relationship of the spatial phenomena in question.

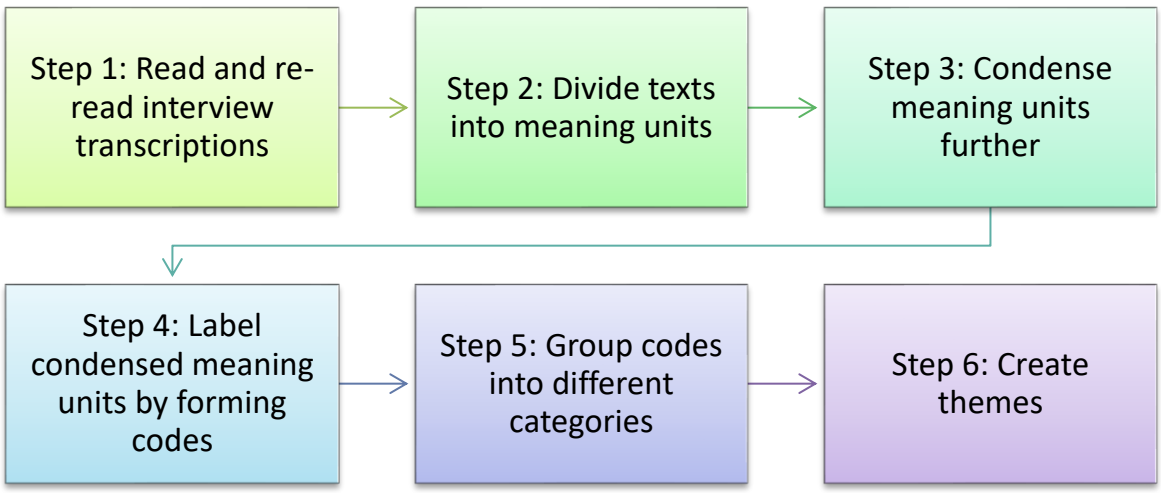
(Source: Flick, 2009 ; Gary, 2014:666 ; Kothari, 2014:143 ; Schulze Bäing, 2014)

Data analysis for the purpose of this study includes secondary data (textual data namely interview transcriptions) and spatial data (collected by means of an audit tool). The interview transcriptions (a total of 153 interviews) was analysed by using content analysis as described in Table 2.9. The spatial analysis was conducted by means of fieldwork in Marabastad where a walk audit tool (AARP walk audit toolkit) was used to analyse and evaluate walkability.

2.5.1 Phase one data analysis: Content analysis

Content analysis is defined as a systematic and objective analysis method that allows the researcher to draw legitimate conclusions to describe specific phenomena from data that is of a verbal, written or visual manner (Bengtsson, 2016:9). The objective of content analysis is to connect the outcomes to the environment or context from where they were gathered (Neuendorf, & Kumar, 2015:4). The process of content analysis consists of the following five steps (Erlingsson and Brysiewicz, 2017:94.), as illustrated in figure 2-1:

Figure 2-1: Steps in content analysis.



(Source: Author's own construction, 2021)

Figure 2-1 offers a summary of the basic steps followed during a qualitative content analysis; the steps were executed as follows:

- **Step 1:** Read and re read interview transcriptions: Traditionally the first step in content analysis is to transcribe the interviews (Erlingsson & Brysiewicz, 2017:94), however, the secondary data set used for this study consisted of 153 semi-structured interview transcriptions. These transcriptions were read multiple times in order to fully comprehend what the participants were saying. The reading and re-reading of the transcriptions also

allowed the researcher to start singling out key concepts or areas of concern that the participants shared.

- **Step 2:** Divide texts into meaning units: During the initial research process the interviews were multi-functional as it served as a data gathering tool for several studies, thus not all questions were related to walkability. During this step texts that related to walkability and actions or features that either inhibit or prohibit walking were singled out as being important to the findings of this study.
- **Step 3:** Further condense the meaning units: This step in the process involves condensation. In this specific context condensation is referred to as a text shortening process (Erlingsson & Brysiewicz, 2017:95). During condensation it is of utmost importance to preserve the core meaning of the texts whilst shortening. The texts that were flagged as important and relevant in step 2 underwent condensation.
- **Step 4:** Label condensed meaning units by forming a code. A code can be seen as an exact description label of a specific condensed meaning unit that is usually no longer than two words (Erlingsson & Brysiewicz, 2017:96). During this step the meaning units were given descriptive labels, also known as codes, it is important that the codes accurately and concisely described the meaning unit that it has been assigned to.
- **Step 5:** Group codes into categories: In this context categories represent codes that closely contextually relate to each other, these codes are then grouped together into different categories. Categories are composed out of codes that address the same problems, or share the same features (Erlingsson & Brysiewicz, 2017:97). During the categorisation step of content analysis, the codes that were generated in step 4 were then grouped into categories of likeness.
- **Step 6:** Create themes: Themes are created when categories are grouped together, these can be two or more categories. Themes generally contain an underlying meaning of the categories of codes that they consist of (Erlingsson & Brysiewicz, 2017:97).

For an example of how a transcription was coded, refer to **Annexure A**

2.5.2 Phase two data analysis: Spatial analysis

The second phase of the data collection consisted of a walk audit, using the AARP (the American Association for Retired Persons) Walk Audit Tool Kit as guideline. The AARP walk audit tool kit is a user-directed walk audit survey designed to assess the walkability of neighbourhoods, streets, sidewalks and intersections in communities (AARP, 2016). The walk audit tool kit is very user-friendly as it offers step-by-step instructions regarding the examining of the area that is being audited, additionally the AARP also offers an instruction guide to be used by the individual assigned as leader of the walk audit survey (AARP, 2016). The tool kit allows the surveyors the

freedom to spend as much time as needed (AARP, 2016). Another great benefit of the AARP walk audit tool kit is that you do not need any specialised training or qualifications to conduct-, or take part in a walk audit (AARP, 2016). The toolkit was used as a base survey document but adapted to accommodate the unique contextual circumstances.

For an example of a completed walk audit refer to **Annexure B**

The toolkit consisted of six different 'assignments', each analysing a particular aspect about the walkability of a location. The six assignments assessed the following, respectively:

- **Crossing streets and intersections:** This assignment assesses the safety and user-friendliness of the crossings and intersections that the pedestrians have to use on their daily walks.
- **Sidewalks**: This assignment is aimed at assessing the state of the sidewalks and whether there are any sidewalks present for pedestrians to use.
- **Driver behaviour**: This assignment focusses specifically on driver behaviour that could potentially place pedestrians in unsafe situations.
- **Safety**: The safety assignment consists of the assessment of various elements and actions that could endanger pedestrians.
- **Comfort and appeal**: The fifth assignment is an assessment of the spatial environment of the pedestrians, the areas are assessed on how comfortable they are or not, as well as how appealing they are or not.
- **Overall ratings and observations**: The sixth and final assignment of the walk audit tool kit is an overall summary of the ratings that the participant scored the community throughout.

The walk audit was completed with the assistance from fieldworkers. The fieldworkers included 23 undergraduate Urban and Regional Planning students from the North West University. The fieldworkers received extensive training to equip them with the necessary skills to complete the walk audit. The training was facilitated over three sessions that included an orientation phase, a skill development phase and, lastly, the fieldwork phase, as illustrated in table 2-10 below.

Table 2-10: Fieldworker training schedule

Phase	Activities
Phase one: Orientation	During the orientation lecture the fieldworkers were introduced to the case study area, the background and living conditions in Marabastad, Kroonstad. The lecture also covered the basic principles of walkability and the importance thereof in a community. The details of the primary study (from where the SDA set came from) was also discussed, along with the research aims of this study. Lastly, the fieldworkers were introduced to the AARP walk audit tool kit and it was explained in depth to the fieldworkers
Phase two: Skill development	After the initial orientation and introduction to the tool kit the fieldworkers attended a second lecture where they got the opportunity to put theory into practice. Each fieldworker was given an AARP walk audit tool kit and instructed to audit different parts of the North West University's Potchefstroom campus. After the audit a group discussion was held to ensure that there was no confusion as to what was expected of each fieldworker, and that the tool kit could be adjusted to certain South African scenarios.
Phase three: Fieldwork	The fieldwork consisted of two main activities; these included a pedestrian count during the morning session. During this session fieldworkers were assigned strategic locations from where they could observe and count the pedestrian activity. The afternoon session consisted of the walk audit. Marabastad was demarcated into five different groups that meant that the fieldworkers were subsequently divided into five different groups as well. Each group was assigned a study area that they were to audit. Within the groups fieldworkers were allocated different responsibilities, these responsibilities included taking photographs, mapping the route and auditing the assigned area accordingly. Each intersection was numbered for the purpose of completing assignment 1 of the AARP walk audit tool kit. Individual audits where then conducted within each assigned area.
Phase four: Monitoring	The fieldworkers were required to take photographs of all intersections and any and all notable observations, any additional statements or

progress and quality control	reported problems were required to be backed up with a photograph. This allowed the researcher to check and monitor the quality of the data, it also granted the researcher the opportunity to identify critical details that may have been over looked by the fieldworkers.

(Source: Author's own construction, 2021)

The data was analysed from the evaluations that were assigned for each respective aspect, as well as the feedback from the statements connected to each assignment. This allowed for the identification of problem areas and aspects in the spatial environment that need to be addressed in order or improve the walkability of Marabastad. The systematic analysis of the survey data allowed for the identification of emerging themes regarding the walkability of Marabastad.

2.6 Trustworthiness

The overall purpose and reason for research is to provide well-founded conclusions (Marczyk,2002:81). Research should always strive to be a trustworthy as possible (Graneheim & Lundman, 2004:107). There are multiple strategies that can be followed to address the issue of trustworthiness and ensure trustworthy data (Shenton, 2004:64), these strategies will be discussed in this section.

2.6.1 Triangulation

The triangulation of different data sources can construct a legitimate justification to defend themes and results produced from the study (Creswell, 2009:224). Triangulation is mostly used in qualitative studies to gain an exhaustive understanding of phenomena through the use of multiple data sources (Carter *et al.,* 2014:545 ; Birt *et al.,* 2016:1805). It is important to highlight that the use of triangulation can corroborate findings, as well as offer alternative perspectives, thus expanding the workable knowledge of the phenomena being studied (Carter *et al.,* 2014:545). As mentioned, triangulation makes use of multiple data sources, these data sources often include fieldnotes, observations and interviews (Polit & Beck, 2012).

2.6.2 Member checking

Member checking is another suggested method to determine the accuracy of findings, (Shenton, 2004:67). Member checking is described as being a method to investigate the integrity of the results (Birt *et al.,* 2016:1805). Member checking can be achieved by allowing participants to

comment on the final report (Shenton, 2004:67) participants will comment whether the facts are accurate and true, and whether the facts resonate with their experience (Birt *et al.,* 2016:1804).

2.6.3 Rich descriptions

Creswell (2009:224) also advises in using rich descriptions to explain findings, this will explain the setting of the research that will create an element of shared experiences. Researchers are also advised to spend long times in the field to gain a rich in-depth understanding of the subject/phenomena being studied (Graneheim & Lundman, 2004:108). According to Shenton (2004:66) & Creswell (2009:224) the researcher should also present information that contradicts themes and give negative discrepant information to offer the reader different perspectives that ultimately adds to the credibility of the findings.

2.6.4 Peer debriefing

Peer debriefing entails the minute discussion of the collected data immediately after it has been collected, these debriefings tend to be goal-oriented (Creswell, 2009:224 ; McMahon & Winch, 2018). The act of debriefing is a valuable tool to check trustworthiness as is allows the researcher immediate insights to the data content, and also allows for changes to be made should unforeseen challenges arise (McMahon & Winch, 2018).

As explained in this section, multiple steps can be taken in order to establish the trustworthiness of the findings presented. This study utilised the triangulation method, member checking, as well as the peer debriefing method. Triangulation was utilised by means of comparing the different data sets available, the transcriptions from the primary study were compared to the observations made during the walk audit; the observations from the walk audit were also compared to the photographs provided by the fieldworkers; observations associated with the secondary data set were also compared with the transcriptions as well as the walk audit survey data. This ensured that there weren't any contradicting or false reports being made from the fieldworkers. Member checking and peer debriefing was utilised simultaneously as the researcher consulted with the fieldworkers and community representatives (who acted as guides during the fieldwork) after the walk audit was conducted, this consultation consisted of a discussion of the findings, the fieldworkers were also required to submit their findings and were allowed to address any additional observations and/or problems they encountered.

2.7 Ethical considerations

As researchers of qualitative studies often work very closely with the participants and over prolonged periods of time ethics might become a problem (Gray, 2014:212). Two major themes

arise when ethics is being addressed, these are consent and confidentiality (Szabo, 1997:70 ; Heaton, 1998:4 ; Walliman, 2011:63 ; Patton & Cochran, 2002). Table 2-11 offers a summary of the ethical implications that researchers face.

Table 2-11: Ethical Implications.

Ethical implications	
Consent	Participants in a study should freely consent to be part of the study. Some situations may create the need for special signed consent from participants. It is very important that participants take part in the study at their own will, and that they do not feel pressurised to take part. When using secondary data, it is important to comprehend how consent was obtained, and some instances might cause for special consent to be obtained again.
Confidentiality	Protecting the identity of participant is essential because the dangers within a certain context are not always known and cannot be foreseen. The identity of informants must always be kept private in order to protect the informant and maintain the relationship of trust between researcher and participant.

(Source: Gray, 2014:212 ; Szabo, 1997:70 ; Heaton, 1998:4 ; Walliman, 2011:63 ; Patton & Cochran, 2002)

The necessary steps were taken during the primary study to ensure that the research was conducted in an ethical manner; all participants of the semi-structured interviews signed an informed consent form that specifically allows for the data to be used in secondary studies (see example of Informed Consent form in Annexure C).

In the case of this secondary study, the research was screened by an internal Scientific Committee and referred to the Faculty of Natural and Agricultural Sciences Ethics Committee as a low-risk study. Ethics approval was obtained under ethics number NWU-01395-20-A9 (see Annexure D for ethics certificate).

2.8 Conclusion

Chapter two consisted of the research methodology to be followed in this study. As discussed in the chapter, the research will be of a qualitative nature because the descriptive data is desired to

address the research questions. Within the qualitative research approach, a case study research design will be followed.

The case to be studied is Marabastad, Kroonstad, and the motivation being that a similar pilot study was recently conducted in the same area. The case study type will thus be a singular intrinsic case study. Within the case study design the data will be collected in two different phases. Phase one will consist of secondary data analysis and will be analysed using the content analysis approach. The second phase data will be collected through the use of a survey. The AARP Walk Audit survey instrument has been chosen as it is already developed and has shown great success in similar studies. Phase two data will be analysed by manner of spatial analysis.

Lastly the importance of reliable and trustworthy data, as well as ethical aspects were discussed. The trustworthiness of the data will be ensured through the use of triangulation, member-checking and peer debriefing. Adequate steps have been taken to ensure that the research was conducted in an ethical and non-obtrusive manner.

CHAPTER 3 URBAN MODELS AND WALKABILITY

3.1 Planning for Walkability: spatial planning models in retrospect

Spatial planning and different city models have evolved throughout the years due to a number of reasons, such as technological advances, wars, urbanisation and different needs and priorities of the residents. Walkability has been accommodated differently and to different extent in the various spatial planning models. This section will explore the different cities and spatial planning models with specific emphasis on how walkability was accommodated and how the design principles of the spatial models influenced walkability. The following sections will cover the development of the historical cities, the development of the industrial cities as well as modern cities and also the post-modern and contemporary cities.

3.1.1 Historical cities

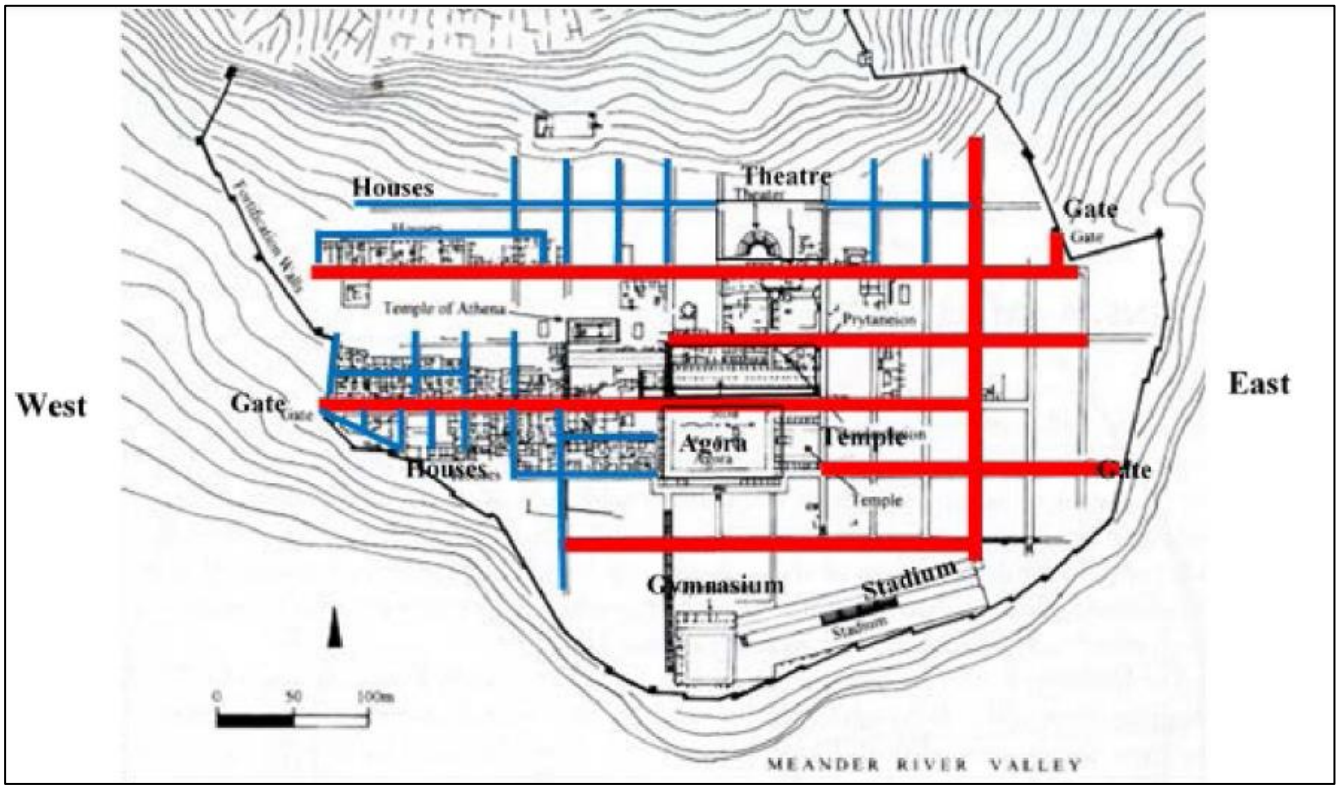
The first historical cities appeared as urban settlements in Mesopotamia, the Indus Valley and Egypt around 3000 B.C. (Ellis, 2011:1). Historical cities possessed both a planned-, as well as an organic urban form (Ellis, 2011:1). The planned urban form was linked to the precincts situated within these historical cities, the precincts were dedicated to the respective military, religious and political activities. As opposed to the planned precincts the residential areas had an organic form as they developed slower and in irregular patterns (Ellis, 2011:3). Historical cities had different forms and manifestations, however each historical city had two definitive features being a wall for defence purposes, and the citadel that was a precinct utilised for political and religious functions (Ellis, 2011:4). This section will analyse the five most prominent historical city's spatial models, these are the Greek city spatial model, the Roman city spatial model, the Medieval city spatial model, the Renaissance city spatial model as well as the Baroque city spatial model.

3.1.1.1 Greek city spatial model

The historic Greek city spatial models were characterised by their irregular and organic form that was dictated by the topography of the environment (Ellis, 2011:4). Greek cities developed slowly from old villages, in fact, Greece 100bC was described as a world of villages (Sdoukopoulos, Verani, Nikolaidou, Tsakalidi, Gavanas, Pitsiava-Latinopoulou, Mikiki, Mademli and Pallas, 2017:339). Ancient Greek cities had street layouts that followed communication lines and contributed towards walkability by bending and curving in order to avoid obstacles and steep gradients, the gradient problem was also addressed by converting to stairs. (Al-Sabbagh and Gorgees, 2019:3)

As illustrated by figure 3-1 most ancient Greek cities had a common repetitive pattern that included long, slim blocks that were separated by the narrower feeder streets (blue lines in figure 3-1); these feeder streets then led into the wider main streets (red lines in figure 3-1) at a right angle (Al-Sabbagh and Gorgees, 2019:3). Greek cities were also known by three important landmarks, known as the agora (market place/town square), the temple that was usually situated on the highest ground and a special facility (amphitheatre, stadium or gymnasium) according to Al-Sabbagh and Gorgees (2019:10).

Figure 3-1: Greek city spatial model



(Source: Al-Sabbagh and Gorgees, 2019:10)

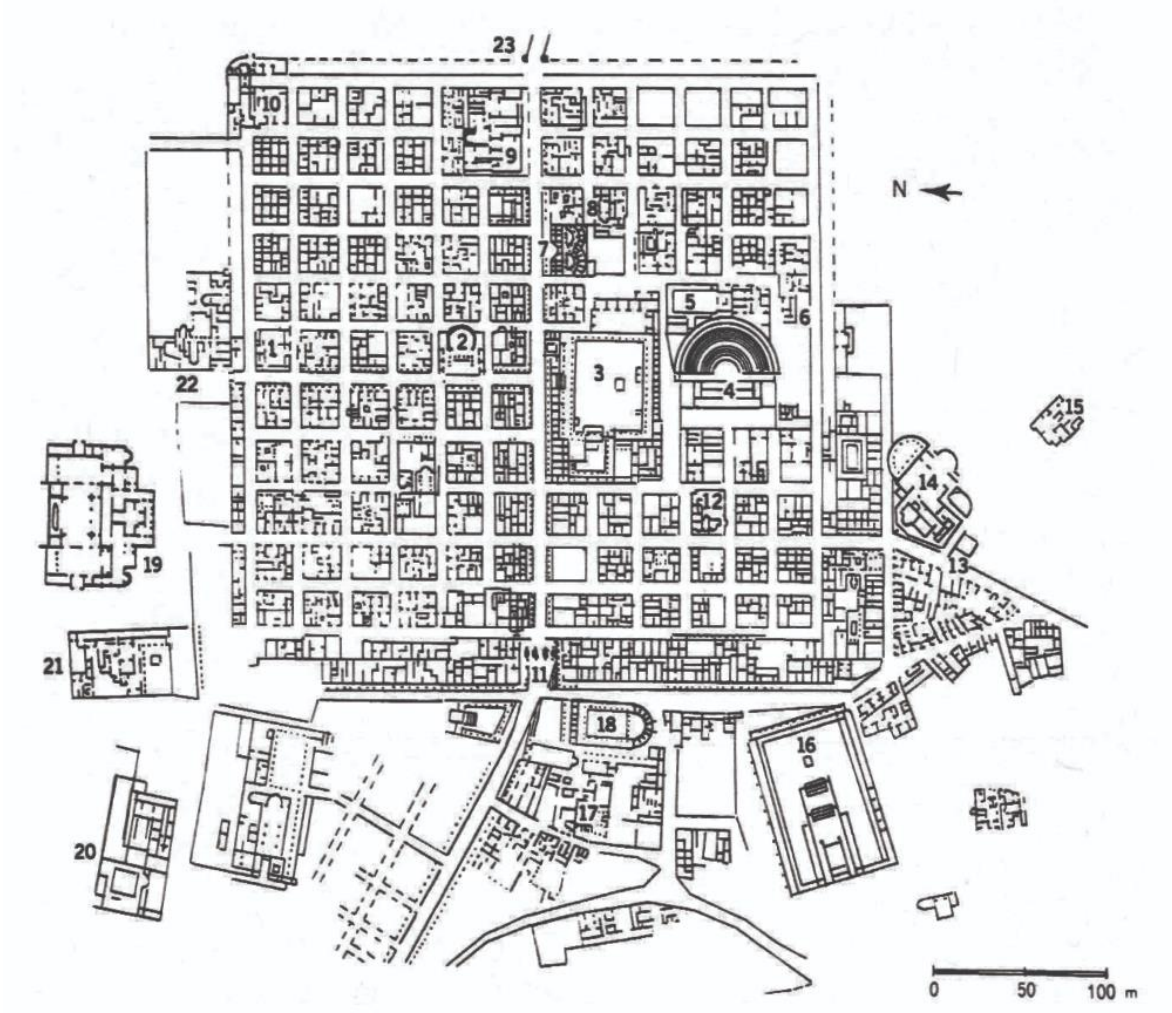
3.1.1.2 Roman city spatial model

Historical Roman cities also displayed irregular and organic growth patterns (Ellis, 2011:4). Roman spatial planning much resembled Greek spatial planning with the attribution of new materials and building techniques that produced facilities such as walls and watchtowers. Functioning first as military camps the romans perfected the rigid grid layout pattern (Ceron, 2011). The grid layout pattern allowed for organic growth within the confines of the wall.

Apart from the grid layout, the historic Roman cities had one main street (Haverfield, 1913:5), the Cardo Maximus, that ran from North to South, and the secondary street, known as the

Decumanus, that ran from east to west. At the ends of the Cardo Maximus and the Decamanus were gates to access the Roman city Haverfield, 1913:116). The forum (public buildings) where situated were these two roads cross (Haverfield, 1913:8). Roman cities were regarded as walkable due to the high-density, compact manner paired with the grid street layout as illustrated by figure 3-2. However, the centralised and clustered manner of the forum (public buildings and facilities) caused social inequality as not everyone has the same proximity and accessibility to these facilities (Ceron, 2011)

Figure 3-2: Roman city spatial model



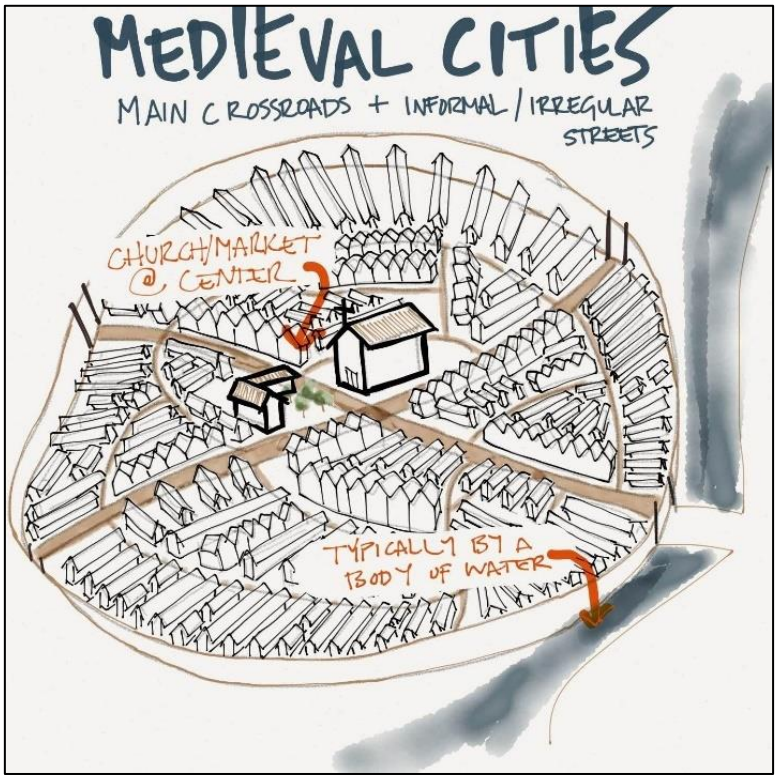
(Source: UrbanRegions, 2011)

3.1.1.3 Medieval city spatial model

Historic medieval cities are categorised by Pounds (2005:21) as either planned towns or unplanned towns. Typical unplanned Medieval cities developed organically and were characterised by winding narrow streets, market squares, a cathedral and city hall pattern, these

cities were surrounded by walls for defence purposes, additional walls were built as the medieval empires expanded (Ellis, 2011:4 ; Pounds, 2005:23). Planned medieval city layouts demonstrate straight streets that intersect at right angles (Pounds, 2005:22); this implies the presence of a grid pattern layout that supports walkability. Figure 3-3 illustrated the typical layout of a historic medieval city, displaying attributes of both the planned and the unplanned medieval city, as well as the typical landmarks associated with medieval cities, such as protection walls, market centres and churches.

Figure 3-3: Medieval city spatial model



(Source: Teagarden, L. 2015)

3.1.1.4 Renaissance city spatial model

The Renaissance era focussed on the role of architecture as an agent to create aesthetically pleasing spaces with a functional order (Ellis, 2011:4) as an attempt at creating optimal conditions for humanity to reside in (Schutten, 2021:6 ; Bielas, 2016). Old medieval cities were partially rebuilt to include symmetrical building arrangements, elegant town squares and longs street vistas (Ellis, 2011:4). The gridiron pattern, as utilised in historical Greek, -roman, and medieval cities were now being replaced by eight radial avenues (as can be seen in figure 3-4), the function of these radial avenues was to connect the piazza (city centre) with the gateways at the outer walls (Schutten, 2021:5). City walls were also redesigned with star shaped points and large earthworks

to protect the city against firearm advancements (Ellis, 2011:4), the new symmetrical and geometrical manner of the infrastructure was utilised as a tool for establishing order and organisation within the city walls (Schutten, 2021:6). The Renaissance cities were very walkable as the planning of these cities were led by “humanistic thinking” and the importance of human-scale was acknowledged in the planning for people (Bielas 2016)

Figure 3-4: Renaissance city spatial model

(Source: Hisour, 2014)

3.1.1.5 Baroque city spatial model

Baroque cities were associated with dramatisation (Alcantara, 2016:1), grander great nation-states and extravagant public spaces (Ellis, 2011:4). Much like the Renaissance cities Baroque cities were constructed with radial street-networks, long avenues, geometric parks and gardens and big town squares and large walls intended for protection (Alcantara, 2016:2 ; Ellis, 2011:4), as illustrated by figure 3-5.

What separates the Baroque city form the Renaissance city is the level of power and control the city states had over the development of the city; the formation of spatial hierarchy and allocated spaces for different purposes resulted in the separation of classes (Alcantara, 2016:2). While Baroque cities were still walkable to some extent, the class separation meant that not all residents had equal access and opportunities and as the cities expanded distances became too great to comfortably walk everywhere. Baroque cities did however accommodate pedestrians with the

easy to navigate radial street network and the addition of frequent green open spaces and secondary public and commercial spaces (Alcantara, 2016:3).

Figure 3-5: Baroque city spatial model

(Source: British Library, 1987)

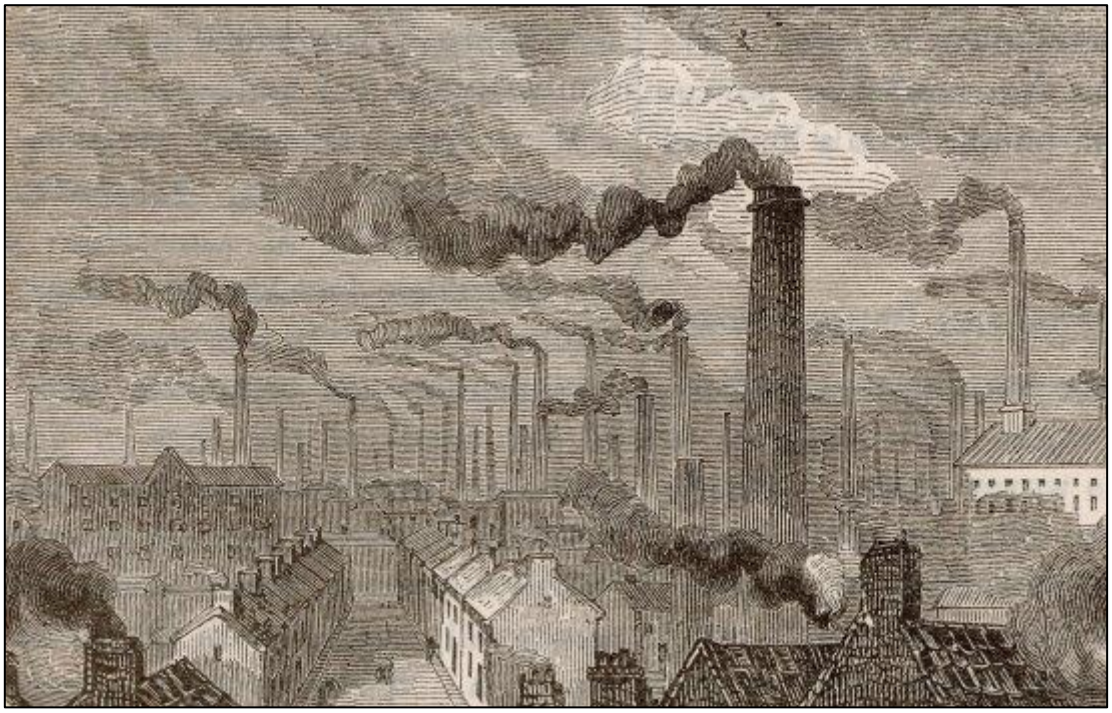
3.1.2 Industrial city

Industrial city development was caused by the technological advances made during the Industrial Revolution (Ellis, 2011:3); the development of the steam-engine meant that the location of factories and industries no longer had to be situated near a water source but were built near a large labour source, city centres, instead (Simkins, 2020:1). The development of industries created employment opportunities that, in turn, resulted in mass rural to urban migration (Simkins, 2020:1). The urban form of the industrial city was characterised by a large central business district with offices, factories and warehouses where railroad and trolley systems intersected, the working-class citizens lived in densely populated districts that were within a close proximity to their place of employment (Ellis, 2011:3)

Transport innovations also changed the urban form of industrial cities as railroads drove into the centre of cities and thus expanding the size of the town or city (Ellis, 2011:3). Along with the development of rapid transportation the advancements made in communication (telegraph and telephone) meant that activities did not have to take place within a close proximity of one another

(Sociology Guide, 2020:1 ; Ellis, 2011:3). The changing urban form along with technological advancements and mass industrial developments greatly impacted the walkability of cities as planning efforts were transport-, and industrial development oriented. Rapid transportation development created an unsafe and uncomfortable environment for pedestrians, paired with air pollution caused by large scale industrial factories resulted in less than ideal circumstances for pedestrians, as can be seen in figure 3-6 below.

Figure 3-6: Industrial city



(Source: Science Industry Museum, 2021)

In conclusion, the development of the industrial city was mainly influenced by the development of large industries in the city centres and the railroad and trolley systems associated therewith. Industrial cities can thus be described as a transportation and manufacturing oriented development, instead of a holistic “people oriented” design.

3.1.3 Modernistic cities

Industrial cities, whilst economically successful, posed many health and environmental issues due to the industries being located in the centre of cities amongst residential and commercial areas (Simkins, 2020:2). Modern city planning was thus introduced as a solution towards better

living conditions and a more structured approach towards spatial planning (Yiftachel, 1989:24). According to Ellis (2011:5) there are two distinct types of modern city planning, being:

- Visionary city planning: this perspective suggests radical changes to the urban form accompanied by changes to the economic and social order
- Institutionalised planning: this perspective suggests planning coinciding with the existing structures and regulation of urban growth by manner of moderate and pragmatic ways.

The following section will explore the most prominent modern city modes such as the Garden city, the Linear city, the Compact city, the Neighbourhood Unit, and the Superblock.

3.1.3.1 Garden city

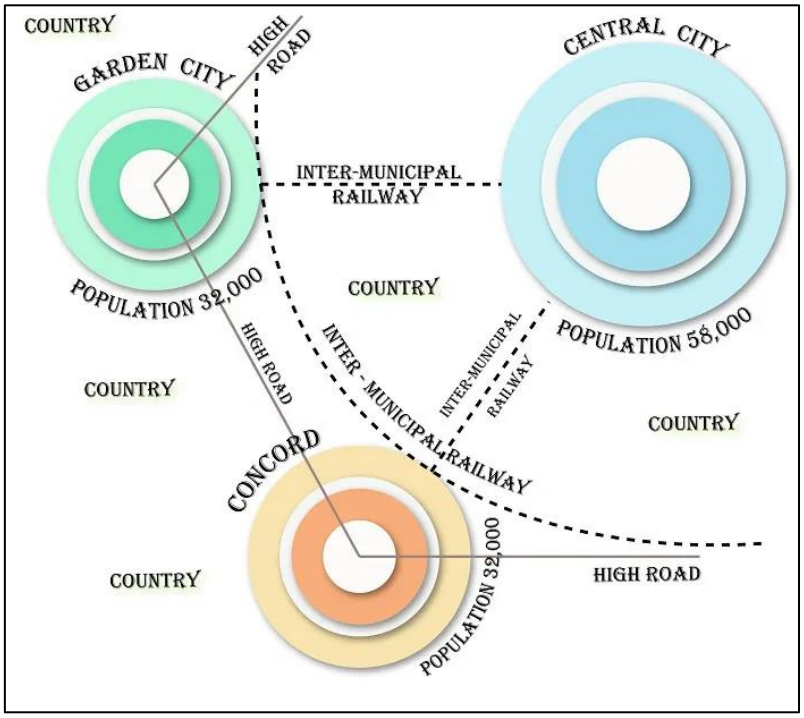
The Garden City concept was first developed by Ebenezer Howard and is defined as a settlement that is planned holistically (TCPA, 2018) and offers affordable, high quality residential options, accessibility to employment and other amenities, healthy and sociable environments (dan Husnus Sawab, 2011:18). The Garden City concept was Howards' response to social problems that emerged due to industrialisation and rapid growth (dan Husnus Sawab, 2011:19). The social problems included the exclusion of benefits that city life has to offer to rural living, fluctuating economies, the overcrowding and growth of slums, the affect that urbanisation had on rural life and the encroachment of rural areas by the adjacent contemporary cities.

The Garden City concept was derived from three basic elements, the first being decentralisation and self-sufficiency, the second was the development of a green belt/corridor to contain growth, and the third was the public ownership of land (Batchelor, 1988:185 ; dan Husnus Sawab, 2011:19) . Howard's vision was the development of self-sufficient satellite towns containing no more than 32000 people and specializing in any particular trade/manufacturing which would be connected to Central City containing 58000 persons (Batchelor, 1988:185) as illustrated in figure 3-7. Ebenezer Howard was responsible for the successful implementation of his model through the development of Letchworth and Welwyn, that are still successful till this day (Batchelor, 1988:185). The main principles regarding the Garden City developments, according to the TCPA (2018), are:

- Land value capture for the benefit of the community
- Strong vision, strong leadership and community engagement
- Wider variety (tenure, housing type) of affordable housing options
- Aesthetic home designs with big gardens to combine urban and rural living
- A variety of employment opportunities within short commuting distance

- Development that is environmentally conscious
- Walkable, vibrant and social neighbourhoods with a variety of land uses
  Transport systems that are accessible and integrated

Figure 3-7: Garden city



(Source: Planning Tank, 2020)

Although the Garden City concept addresses walkability directly, several of the other principles as mentioned earlier also correlate with the features of a walkable neighbourhoods, such as the variety of housing (mixed land use) and aesthetics (imageability/complexity) thereof, the environmental consciousness as well as integrated transport systems(dan Husnus Sawab, 2011:18). Walkability has thus been accommodated and prioritised within the Garden City spatial plan.

3.1.3.2 Linear city

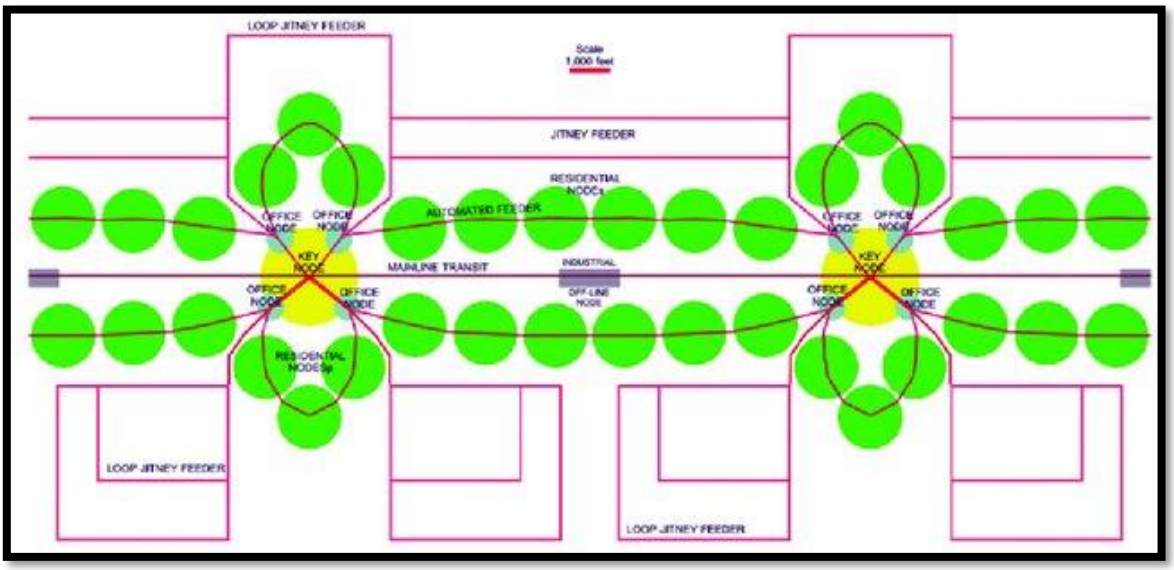
The theoretical concept of the Linear city urban planning model was first introduced in the 19th century by A. Soria Y Mata (Tufek-Memisevic & Stachura, 2015:190). The concept of the linear city was proposed as a solution that will both preserve the values and heritage of historic cities as well as aid in the growth of public space and urban areas (Antyufeev & Antyufeeva, 2019:1). The principles of the linear city formation were aimed at accentuating the significance of

connection with the natural environment as well as walkability between elements in a city; there are however some that argue that linearity was inspired by mass production, repetition, and traffic connections as a fordist concept (Tufek-Memisevic & Stachura, 2015:190). Nevertheless, the linear city was seen as a promising development concept that aimed at eliminating various social problems caused by industrialism such as the spatial form caused by territorial economic development and the management of the growing urban population and structures (Furundzic & Furundzic, 2013:722).

The linear city concept emphasised the main transport route as the main structuring element of the conceptual layout with all other city functions positioned along the transportation axis (Furundzic & Furundzic, 2013:722 ; Tufek-Memisevic & Stachura, 2015:190 ; Antyufeev & Antyufeeva, 2019:2) as illustrated in figure 3-8 The typical linear city layout consisted of:

- Main transportation axis (indefinite length)
- City functions arranged along the axis with
  - A defined width
  - Indefinite length
- Intersections at secondary perpendicular streets
- Large residential buildings
- Vegetation surrounding residential blocks
- Commercial and public land uses situated at intersections (Furundzic & Furundzic, 2013:722 ; Tufek-Memisevic & Stachura, 2015:190).

Figure 3-8: Linear city concept



(Source: ResearchGate, 2018)

The linear city concept proposes the concept of walkability by manner of improved connectivity, and accessibility to the natural environment. The unrestricted growth potential of the transportation axis does however threaten the walkability of the linear city due to the possibility of linear expansion that would lead to greater walking distances for pedestrians.

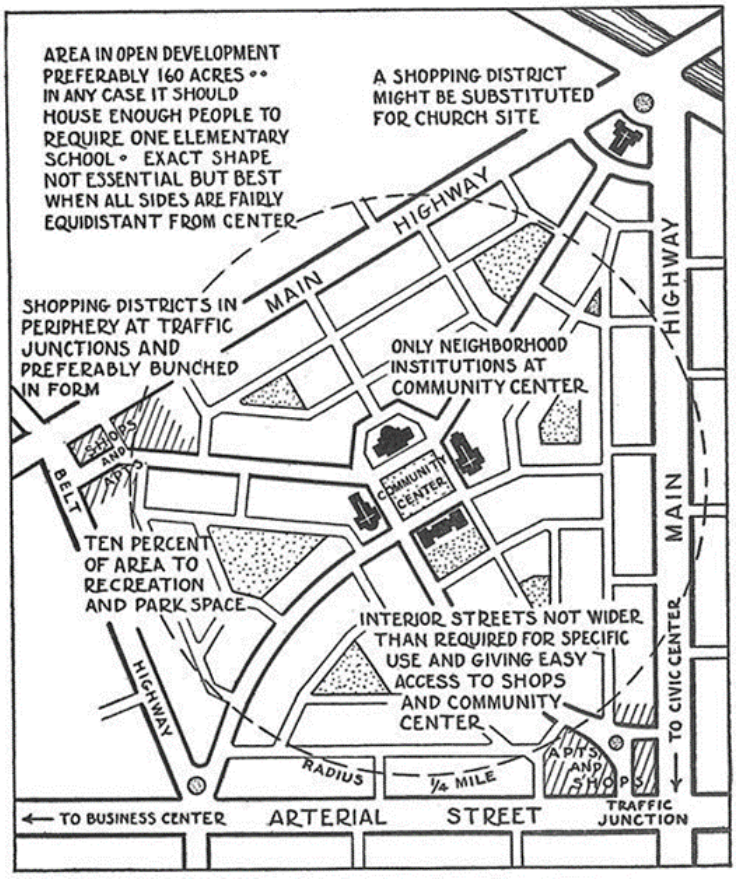
3.1.3.3 Neighbourhood Unit

The Neighbourhood Unit concept was designed by Clarence Perry and introduced in 1920 (De Chiara *et al.,* 1984 ; Southworth, 2005:250 ; Lu, 2006:369). The motivation in creating the Neighbourhood Unit was due to the degradation of the natural environment and the increasing numbers of heavy traffic and traffic congestions that caused unsafe circumstances for pedestrians, especially scholars (Azmi, 2012:205). The aim was thus to create a model that will facilitate the development of sustainable, healthy and safe neighbourhoods for pedestrians (Azmi, 2012:205 ; Southworth, 2005:250). The Neighbourhood Unit model was solely intended for pedestrian use as opposed to vehicular use (Azmi, 2012:206).

Clarence Perry defined a neighbourhood as a component of a town or city and defines the adequate size of such a neighbourhood as being within a 5 minute walking radius that is approximately 160 acres (Patricios, 2002:27 ; Lu, 2006:375). Clarence Perry modelled a layout (Lu, 2006:369) that represented a residential environment that offered community facilities, public parks, local shopping, and a variety of housing options (Brody, 2013:340). The whole Neighbourhood Unit design was based on 6 basic principles as summarised below and illustrated by figure 3-9 (De Chiara *et al.,* 1984 ; Patricios, 2002:27)

- The overall size of a neighbourhood is to be determined by the size of the population that is necessary to sustain an Elementary School
- The neighbourhood is to be bounded by wide arterial roads that serves to eliminate through traffic
- The street layout and design should be done in such a manner that discourages vehicle use and through traffic
- Approximately 10% of the gross area should be dedicated open spaces and/or recreation facilities
- A school should be the central point of the neighbourhood, therefor placed at the centre with a walking distance of 0,4km.
- Local shops should be located on the periphery and are intended to serve approximately 4 adjacent neighbourhoods

Figure 3-9: Layout of the Neighbourhood Unit



(Source: Southworth, 2005)

The whole aim of the Neighbourhood Unit concept was to create a neighbourhood for pedestrians, thus, to create a walkable neighbourhood as it places pedestrians at the focus of all planning considerations (Southworth, 2005:250 ; Lu, 2006:375). The principles associated with the Neighbourhood Unit have been successfully applied to neighbourhood design and can aid in the development of a detailed walkability related neighbourhood model.

3.1.3.4 Superblock

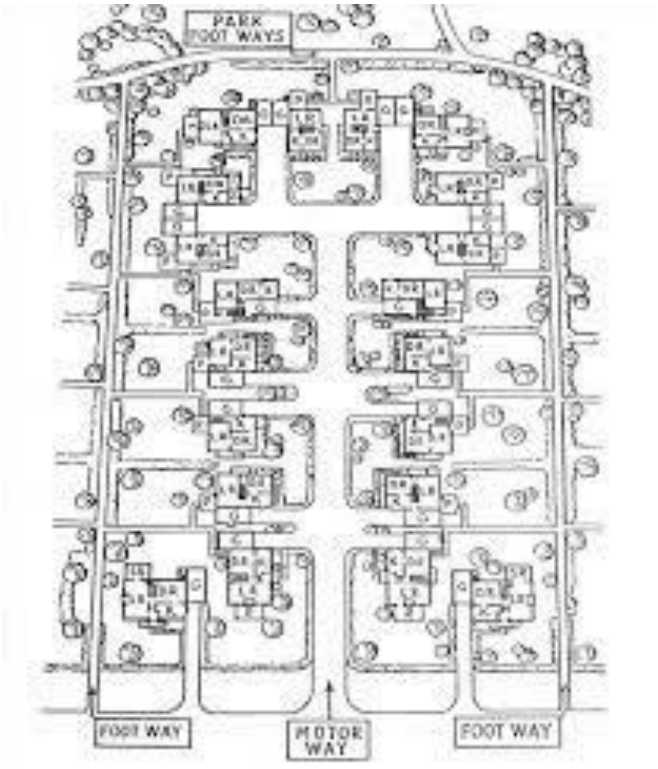
The superblock model emerged as a planning model in response to poor living conditions in overpopulated 19th century cities (Gajer, 2015:21). The superblock is described as transport and urban planning strategy aiming at reducing motorised transportation to promote active lifestyles and sustainable mobility by means of reclaiming public open spaces and advocating for urban greening to alleviate the effects of climate change (Mueller *et al.,* 2020:132 ; Rueda, 2019:135).

The design of the superblock rests on the following basic principles, as described by Mueller et al (2020:133) and Rueda (2019:137) and illustrated in figure 3-10:

- The desired city pattern will be laid out in an orthogonal grid pattern
- The superblock will cover an area of 1600 m^2 (400m x 400m)
- Interior roads within the superblock are primarily accessible to pedestrian and cyclists
- Superblocks are connected to the rest of the city by the basic road network that accommodates the through traffic
- The basic road network accommodates segregated bicycle lanes, pedestrian lanes and bus lanes.
- Bus stops are located every 400 metres at the intersections.
- Public transport is to be favoured above private vehicle usage

The superblock model places planning and advocating for the development of public open green spaces at the forefront, creating a paradigm shift from transport-oriented planning to people-oriented planning (Mueller et al., 2020:133; Gajar, 2105:24). People-oriented planning highlights the importance of walkability and the road networks within the superblock and surrounding the superblocks favours active transportation methods such as walking and cycling. The superblock model also favours walkability by manner of restrictive vehicle access

Figure 3-10: The superblock concept



(Source: repository.nwu.ac.za)

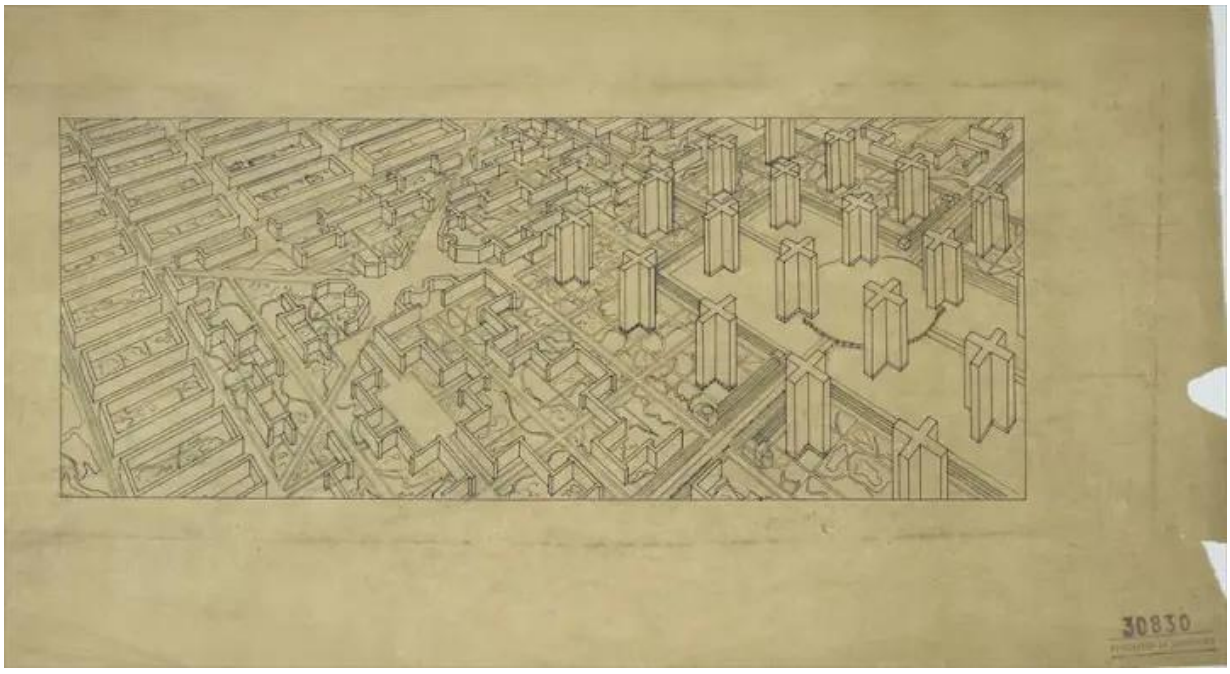
3.1.3.5 Cities of the future (Le Corbusier)

Another attempt at righting the wrongs of the Industrial revolution that created the Industrial cities was a concept by a French-Swiss architect, Le Corbusier, to be known as the City of the Future or the Radiant city (O'Donnell, 2019). The plan for the city of the future was a universal layout concept for a population of 3 million people that is situated on a clear and level site, the rationale behind this was to start from a clean slate (Anthony, 1966:280). The city envisioned by Le Corbusier was proposed to have:

- 24 identical skyscrapers made from glass, to form the CBD, situated on 400-yard grid and surrounded by public open park spaces between the skyscrapers
- The skyscrapers were to be connected to the rest of the city via a complex transportation system comprising a number of transportation modes including raised highways and an aerodrome for airborne transport
- Low-rise buildings, placed geometrically around the centre (skyscrapers) represents the residential area
- The housing area is surrounded by a protected green area comprising of woods, fields and sporting grounds

Figure 3-11 illustrates the basic principles of Le Corbusier's concept for cities of the future discussed above, as documented by O'Donnell (2019) and Anthony (1966)

Figure 3-11: City of the future concept



(Source: Urban Utopias, 2019)

Le Corbusier's city of the future concept is of great importance to the walkability movement as Le Corbusier was a pioneer in advocating, with great success, for the separation of pedestrian and vehicular traffic (Anthony, 1966:279). Le Corbusier was described as "the first man to treat the pedestrian with the respect and honour we now accord only to the automobile" (Anthony, 1966:279). Unfortunately, many Architects and Town Planners did not possess the vision that Le Corbusier had and failed in interpreting City of the future concepts as they were intended (O'Donnell, 2019)

3.1.3.6 Mass suburbia

During the 20th century there was a mass movement from the city centres to suburban areas, this movement was made possible by private vehicle ownership and adequate public transportation (Mumford, 1961:486). Suburban areas were characterised by low-density development of uniform housing situated outside the city as illustrated by figure 3-12 (Mumford, 1961:509). The increased distances between homes and workplaces resulted in the mass construction of highways and even more homes within the suburbs (Lesh). Mass suburbia, paired with the construction boom resulted in the development of urban sprawl (Lesh)

Figure 3-12: Mass suburbia

(Source:CourseHero, 2014)

Mass suburbia with the consequent need for highways impacted walkability in two major ways, the first being the distances from the suburbs to the cities; the greater the distance, the less likely it is for a pedestrian to walk to a destination. Greater distances thus forced individuals to utilise

vehicular transportation. The second impact mass suburbia had on walkability was the effect that the construction of highways had on the pedestrian environment, highways are dangerous to pedestrians and also alienate pedestrians as they are solely planned for vehicles without consideration of pedestrians.

3.1.4 Post-modern and contemporary cities

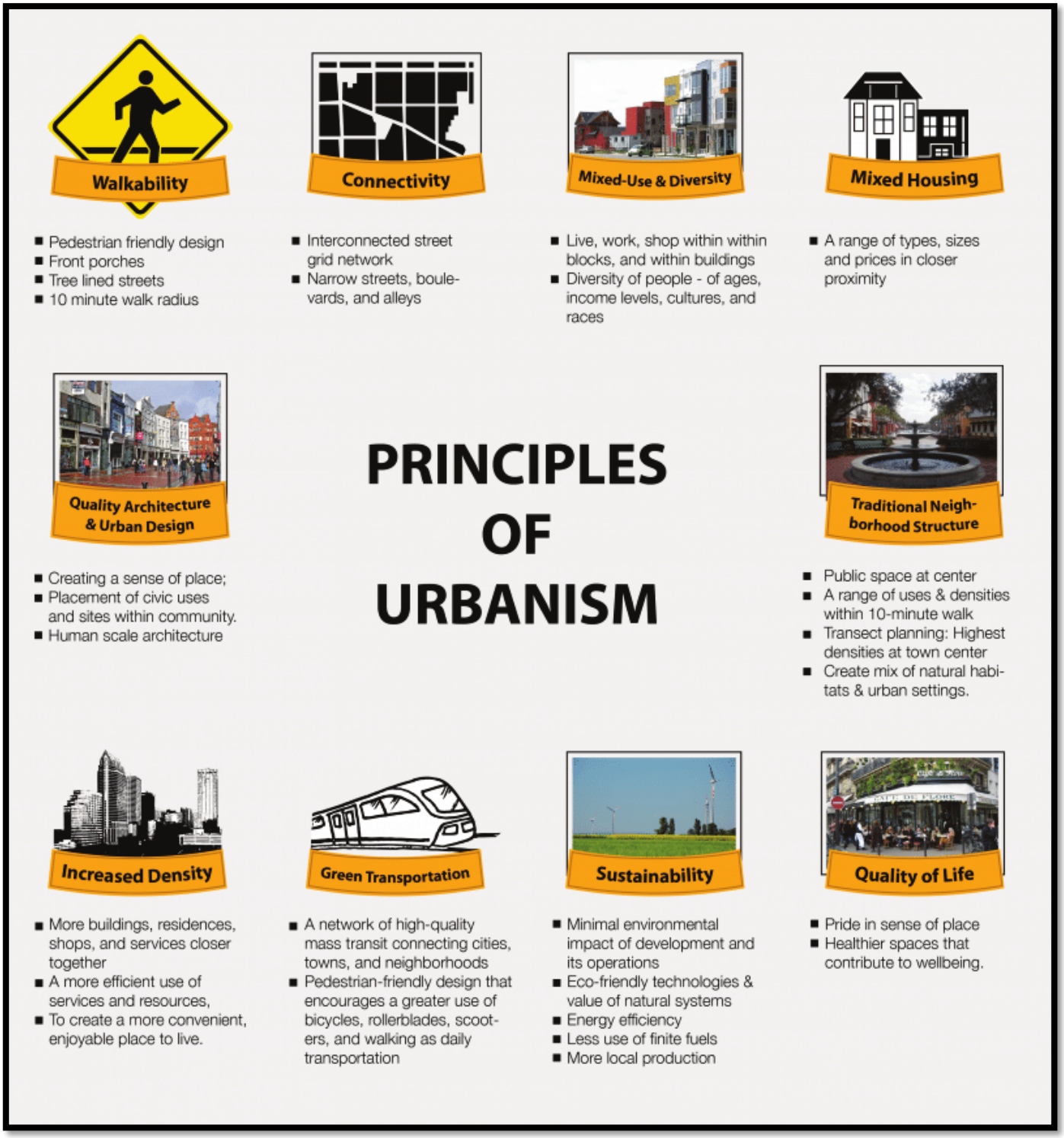
Contemporary and post-modern urban movements were introduced as an anti-modernist movement as modernism represented contrast, segregation, negativity, and contradiction (Léon, 2017:6). As opposed to the spatially segregated social functions, disappearing suburban sidewalks and abolishment of the grid system that was encouraged by modern city planning post-modern and contemporary movements aimed at integration and the creation accessible neighbourhoods and public transportation modes (Léon, 2017:6 ; Besteliu & Doevendans, 2002:234). The main aim of the anti-modernist movement is to return society to a community-friendly model (Léon, 2017:6). The following sections will explore the most prominent post-modern and contemporary city models, such as new urbanism, and the compact city model.

3.1.4.1 New Urbanism

Walkability has become somewhat of a “buzzword” in the Urban Planning industry (Azmi, 2012:206) due to the growing popularity of New Urbanism. New Urbanism is considered to be a controversial substitute (Ellis, 2002:261) to modern urban developments (Dobesova, 2012:180 ; Azmi, 2012:206) that encourages sprawl and automobile dependence (Saelens et al. 2003:81). New Urbanist neighbourhoods are thus more prone to pedestrian and cyclist activity than to automobiles (Cervero & Radisch, 1996:127), New Urbanism is in fact a reaction to sprawl (Al-Hagla, 2009:139) and promotes walkability (Dobesova, 2012:180 ; Mendoza *et al.,* 2012:442).

As the focus is placed on creating pedestrian-friendly environments (Mendoza *et al.,* 2012:442 ; Cervero & Radisch, 1996:127) New Urbanist neighbourhood designs promotes social capital as it creates the opportunity of economic and social exchanges (Jun & Hur, 2015:115). Pedestrian pavements are designed to be suitable from an aesthetic, economic and technical perspective. Special care is not only applied to pedestrian pavements; New Urbanism calls for designs that are compact and are accommodating to mixed land uses, that have grid-like street patterns and amenities to accommodate pedestrians (de Cambra, 2012:23 ; Cervero & Radisch, 1996:127). The Charter for New Urbanism (CNU), an organisation devoted to the promotion of New Urbanism, have stipulated 10 definite principles of New Urbanism, as listed below in Figure 3-13.

Figure 3-13: 10 Principles of New Urbanism



(Source: ResearchGate, 2020)

3.1.4.2 Compact city model

The compact city model was designed and developed to address the negative impacts that urbanisation had on the environment, such as urban sprawl and air pollution (van der Waals, 1999:111), and has been adopted by Western countries as the guiding principles for new urban development (Dempsey, 2010:111). The compact city model is widely accepted as being the most sustainable urban development form as the compact city model advocates for the protection of natural and rural areas and the reduction of traffic congestion (Burgess, 2000:11). The compact city model mainly focusses on the urban growth in and near existing cities to promote higher densities in existing cities (van der Waals, 1999:118)

According to Dempsey (2010:5) the compact city model has the following characteristics,:

- Sustainable
- High residential densities
- Mixed land uses
- Efficient public transport system
- Layout that encourages walking and cycling
- Energy efficient
- Reduced pollution
- Sociable
- Safe

As displayed, the typical layout of the compact city is supportive of walking and cycling, the compact city model is therefore an advocate for walkability as it is an important characteristic associated therewith. Apart from the positive characteristics associated with the Compact city model it is also encouraged from a political perspective as the urban form promotes independence from vehicles and will therefore require less, and more affordable infrastructure (Dempsey, 2010:6).

3.1.5 Synthesis of walkability in spatial planning models

Walking is the oldest method of transportation known to man (Singh, 2016:644), before industrialisation, urbanisation and technological advances we are accustomed to today people had to rely on walking and/or horse drawn carriages to get from point A to point B (Southworth, 2005:247). Understandably cities were structured in such a way that all amenities are connected (Southworth, 2005:247), accessible and in close proximity to each other to accommodate walking (McNally, 2010:5). Walkable city design is dated pre 19th Century (Talen & Koschisky, 2013:43).

The end of World War II changed the face of urban planning as cities were perceived as machines (Dobesova, 2012:180) aiding mass industrialisation, the focus of development shifted from accommodating walking to accommodating car-centric development (Southworth, 2005:246).

The rise of the 20th Century saw increased use of private vehicles, low-density sprawling developments (McNally, 2012:2), bigger yards meant space for garages encouraging private vehicle ownership (Bicycle Federation of America, 1998:17). Increased reliance on vehicles for transport also meant decreased access to the city for pedestrians (Dobesova, 2012:180 ; Southworth, 2005:246). As fast-paced and modernised development was peaking (Singh, 2016:644) the sustainability of these car-centric development was being questioned (Moura *et al.,* 2017:282). Private vehicle use does not contribute positively to urban sustainability as they contribute to air pollution and congestion, they consume a lot of energy and resources and they cost a lot of money (Singh, 2016:644). A reaction and solution to urban sustainability is walkability, walkability is claimed to be the basis of the sustainable city (Moura *et al.,* 2017:282).

Research regarding walkability gained momentum and popularity in 1997 (Tong *et al.,* 2016:132), with many studies focussing on the impact that walkability has on the environment as well as the influence that walkability has on physical activity and health (Choi, 2012:9 ; Talen & Koschinsky, 2013:42 ; Tong *et al.,* 2016:132). Many of the re-design attempts relied on the historic manifestation of walkable cities (McNally, 2010:5). Several theories and concepts where developed, facilitating walkability or incorporating pedestrian friendly designs in the concepts, these were the Garden City Movement, the Neighbourhood Unit, the concept of Smart Growth and New Urbanism (Talen & Koschinsky, 2013:45).

3.2 Planning for walkability: Theoretical framework to encourage walkability

The spatial development of cities throughout the ages seem to either favour pedestrians (walkability) or vehicular forms of transportation, the spatial models explored in the previous sections were however not planned purely to be walkable (or not), the walkability was a result of the presence of the right elements or circumstances. By manner of studying these circumstances authors have been inspired to formulate theories as to what creates a walkable neighbourhood and how to create such.The following section will elaborate on two prominent theories associated with walkability and creating walkable environments, these are the General theory of Walkability formulated by Jeff Speck, and the walkability framework formulated by Zuniga-Teran.

3.2.1 General theory of walkability (Speck)

The General Theory of Walkability was formulated by Jeff Speck. Speck has worked extensively with revitalisation of American “downtowns” and formulated the General Theory of Walkability

from the experience and observation that he has obtained while working within these areas (Speck, 2012:4). According to Speck, a walkable city can serve as a practical solution to address societal, health, cultural, environmental, and economic problems (Speck, 2012:11). The core idea of the theory is that walking must be favoured as transportation mode, or leisurely activity and for walking to be favoured four main conditions regarding “the walk” have to be satisfied (Popova, 2012). The walk must be useful, the walk must be safe, the walk must be comfortable, and the walk must also be interesting. All these conditions must be satisfied; each alone will not be sufficient to encourage walkability (Speck, 2012:11 ; Popova, 2012).

A useful walk is described as one that allows the pedestrian access to a variety of amenities located close enough to walk, therefor a neighbourhood that is compact, connected and has mixed land uses (Popova, 2012 ;(Speck, 2012:11). A safe walk refers not only to actual safety, but to perceived safety as well, meaning that pedestrians are not only physically protected against traffic, but they feel safe as well (Popova, 2012 ; Speck, 2012:11). A comfortable walk relates to a neighbourhood that feels enclosed due to the buildings and landscape of the urban street (Popova, 2012 ; Speck, 2012:11). An interesting walk is one that offers pedestrians visual interests along the way in the form of unique building architecture, civic art, and landscaping, therefor an imageable and complex neighbourhood (Popova, 2012 ; Speck, 2012:11).

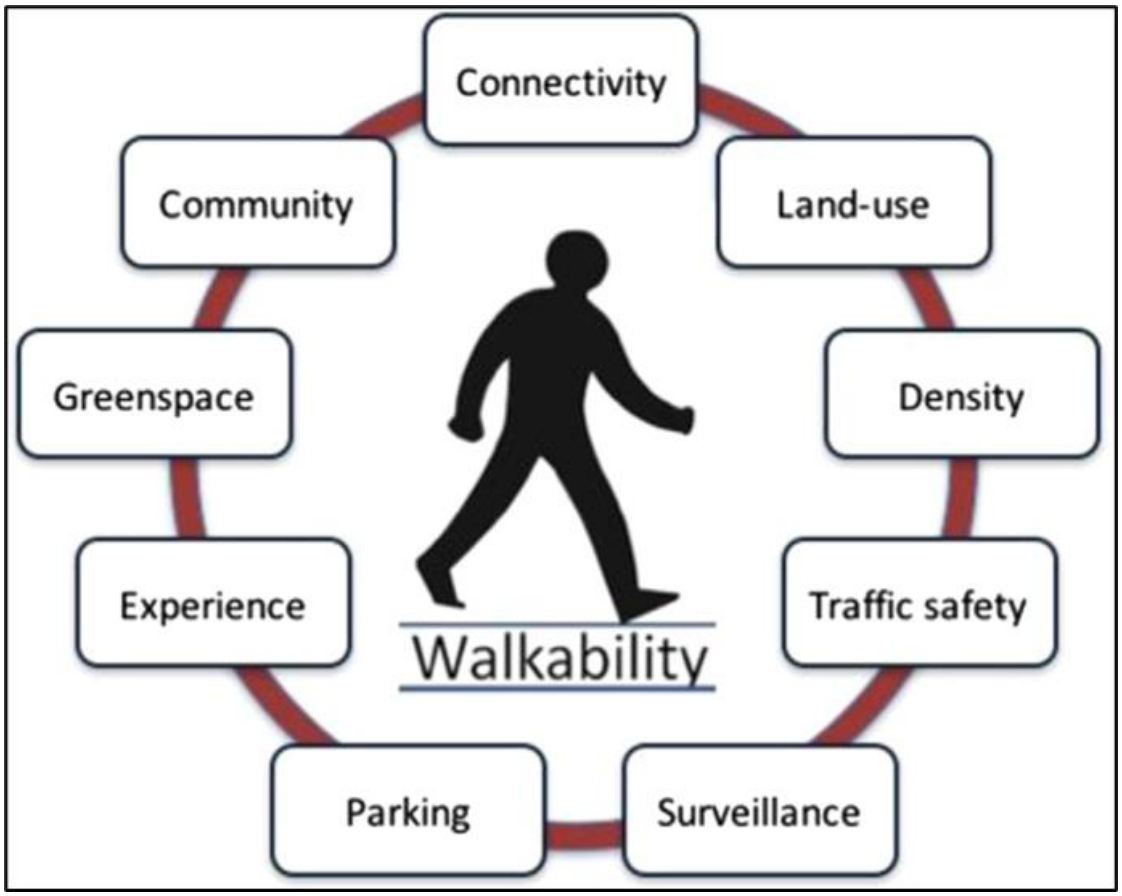
Speck’s General Theory of Walkability includes many of the identified neighbourhood elements that contribute to walkable neighbourhood. The General Theory of Walkability was formulated in America and is therefore based on American pedestrian behaviour and can be seen as biased towards American conditions, however the theory is very generalised and non-specific, and correlates well with identified elements relating to walkability.

3.2.2 Walkability framework (Zuniga-Teran)

The Walkability Framework, proposed by Adriana Zuniga-Teran, is based upon the hypotheses of a variety of disciplines that investigated the relationship between walkability and the built environment; these disciplines include architecture and urban design, as well as research relating to physical activity, public transport, health, thermal comfort, global warming and greenspaces (Zuniga-Teran *et al.,* 2017:64). Zuniga-Terans’ research investigated the neighbourhood design elements and how they influence walkability; the Walkability Framework ultimately divided these built environment attributes into nine categories (Blečić *et al.,* 2020:4). The nine categories are: connectivity, land-use, density, traffic safety, surveillance, parking, experience, greenspace and community (Blečić *et al.,* 2020:4 ; Zuniga-Teran *et al.,* 2017:64) as illustrated by figure 3-14 below. Table 3-6 offers a brief summary of these nine categories, many of which have also been covered

in the design elements section of this dissertation. According to Zuniga-Teran (2016:65) a neighbourhood with the combination of these nine categories is considered walkable.

Figure 3-14: Zuniga-Teran walkability framework



(Source: Zuniga-Teran, 2016:66)

Zuniga Teran (2016:64-65) describes these categories as

- **Connectivity**: A measure of the number of direct and short routes provided by a network to reach multiple destinations. Achieved by small blocks and a grid street pattern
- **Land uses:** A measure of the variety of land uses located within walking distance from the residential areas.
- **Density:** A measure of residential density.
- **Traffic safety**: Relates to the necessary infrastructure needed to facilitate walking and cycling, as well as slowing traffic.
- **Surveillance**: A measure of the transparency of the streetscape and the level of perceived safety of the pedestrian.
- **Parking**: A measure of the availability of parking as well as the location thereof. Less parking results in more pedestrian activity.

- **Experience**: A measure of the pedestrian experience of the environment, taking into consideration the complexity, imageability, comfort, convenience, and presence of wildlife.
- **Green space:** A measure of the availability and accessibility of open green spaces
- **Community**: A measure of sociability and the availability of spaces that facilitate social exchange.

CHAPTER 4 PLANNING FOR WALKABILITY: THE THEORETICAL APPROACH

4.1 Introduction

Walkability is considered as the oldest and most primal method of transportation (Schneider, 2019:1 ; The Bicycle Federation of America (1998:2) as it forms part of each individual's everyday routine; every trip/journey/errand/activity begins and ends with walking. Therefore, every individual partaking in daily activities can be seen as a pedestrian (de Cambra, 2012:4).

Walkability has become an ever-increasing buzzword in spatial planning over the past decade. Spatial planning in this sense includes all urban planning procedures such as land-use planning, zoning, subdivisions, site planning and highway and street design. It is especially in spatial planning for walkability that much scope for further research exists as many cities in the world still bears the legacy of what is the complete opposite of a walkable city namely car-dependent cities (Azmi, 2005:6). Car dependent cities encourage sprawling-, low density developments in cities (de Cambra, 2014:4) that means greater distances between home and work, increased traveling costs and decreased active lifestyles. When a walkable city is the goal, the sprawl model is not the method (Speck, 2013). The popularity of walkability in spatial planning has been strongly promoted by New Urbanism (Amzi, 2012:206; Talen & Koschinsky, 2013:42). Walkability is in fact so important to the New Urbanism movement that it is listed as one of the principles of New Urbanism and encourages an interconnected street-grid design pattern (Elshater, 2021:830)., New Urbanism prioritises the quality of public spaces and advocates for mixed use designs, that are both recognised as attributes of walkable communities (Elshater, 2021:830).

Walkability not only has roots in New Urbanism but is seen as the linchpin to achieving the "sustainable city" (de Cambra, 2012:4). The importance of walkability and its potential benefits for communities seem to be important in the creation of global sustainable communities (Ramfiemanzelat, Emadi & Kamali, 2017:25). The goal of sustainable communities is propagated in international policy namely the Sustainable Development Goals (SDG's) of the United Nations (Bexell & Jönsson, 2017:14) and in particular, goal eleven that focuses on sustainable cities and communities.

Despite its widely accepted benefits for all communities, walkability has been studied extensively in developed countries but has received much less attention in scholarship from developing countries. Ironically according to Lofti *et al.,* 2011:402) it is exactly the poor communities from developing countries that would benefit even more from walkable environments. Similarly, the South African organisation 'Open Streets Cape Town (2007) considers walking as important

among lower-income groups as it is, for most, their only transportation option and means of accessing daily activities (de Cambra, 2012:4). However, it is a challenge to simply create a walkable community. Firstly, because there are limited tools developed to identify areas that are not walkable (Abley, 2005:6), and, secondly, there has not been a general consensus regarding the meaning of walkability (de Cambra, 2012:27). It is therefore a challenge to plan for walkability or upgrade the walkability if the problem site can't be properly identified and if one does not fully comprehend what it is that they are planning for.

This chapter will aim to answer three broad questions, such as: what is walkability? where did the concept of a walkable neighbourhood/city originate from? and how can spatial planners plan for walkable environments. The structure of the chapter is displayed in Table 4-1 below.

Table 4-1: Structure of the chapter

<table>
<tr><td colspan="5">Introduction (4.1)</td></tr>
<tr><td colspan="5">Defining walkability (4.2)</td></tr>
<tr><td colspan="5">A critical discussion of walkability (4.3)</td></tr>
<tr><td colspan="3">Benefits of walkability (4.3.1)</td><td colspan="2" rowspan="3">Challenges of walkability (4.3.2)</td></tr>
<tr><td>Economic benefits (4.3.1.1)</td><td>Environmental benefits (4.3.1.2)</td><td>Social benefits (4.3.1.3)</td></tr>
<tr><td colspan="2">Health benefits (4.3.1.4)</td><td>Transportation benefits (4.3.1.5)</td></tr>
<tr><td colspan="5">Planning and designing for walkability: Assessment tools to evaluate (4.4)</td></tr>
<tr><td colspan="5">Planning and designing for walkable environments (4.5)</td></tr>
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(Source: Author's own construction, 2020)

4.2 Defining walkability

Walkability is a complex phenomenon that is associated with several disciplines, including physical health, spatial planning, engineering, social sciences, economics and transportation planning (Abley, 2005:6; de Cambra, 2012:27). The process of designing and/or planning for a walkable community is complicated by the fact that there exists no clear "one-size-fits-all" definition of walkability as different disciplines make use of their own jargon and terminology (Abley, 2006:6). Different disciplines infer different meanings to the concept walkability (Abley, 2005:6). Although walkability has emerged as a popular topic of discussion there still seems to be a lack of a widely accepted understanding of the concept (de Cambra, 2012:13 ; Lo, 2009). This implies that there is `no "one-size-fits-all" design or plan to plan/design a low-quality walkable environment or create a walkable environment from scratch. Therefore, the aim of this section is by no means to attempt to formulate a universal definition for walkability, but to highlight its complexity by analysing various definitions.

At its most basic core, walkability can be classified as a "quality of place" (Bradshaw, 1993), Bradshaw elaborates this statement by adding four basic characteristics that this "quality of place" entails; (i) a pedestrian-friendly, man-made, micro-environment (ii) that is walking distance from a range of different active destinations; (iii) a natural environment that protects users from the extremes of weather, and (iv) an environment that offers a social and diverse culture. Considering Bradshaw's definition, it is already clear that walkability is a multi-dimensional topic. Table 4-2 offers an analysis of the different walkability definitions used across the various disciplines.

Table 4-2: Walkability definitions

Author/Authors	Definitions	Walkability environmental quality
Labuschagne, 2014:5 Abley, 2005:6 Moura *et al.,* 2017	The extent to which the built environment is walking friendly	• Pedestrian friendliness
Abley, 2005 Zakaria, 2014	A built environment that is friendly with the presence of diverse activity	• Pedestrian friendliness • Diversity of activities
Llewelyn-Davies, 2000 Zakaria, 2014	Level of the pedestrian's comfort and safety such as the existence of casual surveillance, spaces between	• Safety • Casual surveillance

Author/Authors	Definitions	Walkability environmental quality
	pedestrians and vehicles as well as high quality connected pedestrian pathways	• Buffers between pedestrians and vehicles • Connectedness (pathways)
Litman, 2004 Steve, 2005 Zakaria,2014	Walkability is the extent to which walking is readily available as safe, connected, accessible, and pleasant mode of transport	• Safety • Connectedness • Accessibility • Pleasantness
Southworth, 2005 Zakaria, 2014	Walkability relates to the ability of places to connect people with varied destinations within a reasonable amount of time and effort, and to offer visual interest in journeys throughout the network	• Connectedness • Accessibility • Visually appeasing
Litman, 2011 Tiwari, 2015	Walkability refers to the quality of walking conditions in an urban space which is inclusive to comfort, safety, connectedness, and permeability	• Comfortability • Safety • Connectedness • Permeable
Southworth, 2005	Walkability is the extent to which the built environment supports & encourages walking by providing for pedestrian comfort & safety, connecting people with varied destinations within a reasonable amount of time and effort, and offering visual interest in journeys throughout the network.	• Pedestrian friendliness • Comfortability • Safety • Connectedness • Accessibility • Visually appeasing

Author/Authors	Definitions	Walkability environmental quality
Southworth & Forsyth, 2008	A highly walkable environment invites walking by means of a richly connected path network that provides access to the everyday places people want to go to. It is safe and comfortable with street that are easy to cross for people of varied ages and degrees of mobility. Spaces are attractive with street trees or other landscape elements. The pedestrian network links seamlessly, without interruptions and hazards with other transit modes, it supports walking for utilitarian purposes, as well as for pleasure, recreation and health.	• Connectedness • Accessibility • Safety • Comfortability • Age inclusive • Visually appeasing • Linked with other transport modes • Buffers between pedestrians and vehicles • Supports multi-purpose walking.
Talen & Kochinsky, 2013	It is a safe, well-serviced neighbourhood imbued with qualities that make a walking positive experience, meaning that the streets, sidewalks and paths are comfortable and interesting	• Safety • Serviced • ComfortabilityVisually appeasing
McNally, 2010:4	Walkability generally refers to features of a community or neighbourhood that create a place that is easily able to be travelled without the use of an automobile.	• Accessibility • Connectedness • Pedestrian friendliness
McNally, 2010:4	Another key characteristic which defines walkability is a wide range of land uses within a community	• Mixed land uses

Author/Authors	Definitions	Walkability environmental quality
Marshall *et al.,* 2009	Walkability captures the proximity between functionally complementary land uses (live, work, play) and the degree of route directness or connectivity between destinations	• Mixed land uses • Connectedness • Accessibility
Moura *et al.,* 2017	the extent to which characteristics of the built environment and land use may or may not be conductive to residents in the area walking for either leisure, exercise or recreation, to access services, or to travel to work".	• Pedestrian friendliness • Connectedness • Multi-functional
Stafford & Baldwin, 2017	Walkable neighbourhoods are those that are pedestrian focused, affording people the choice and opportunity to move about safely and effortlessly to services, facilities, and transport in their neighbourhood without the use of a motor vehicle	• Pedestrian friendliness • Safety • Serviced • Linked to other transport modes

(Source: Author's own construction, 2020)

4.3 A critical discussion of walkability

The following section will include a critical discussion of walkability. According to Taylor (2021) one must fully comprehend exactly what is expected of a critical discussion before it is attempted. A critical discussion is described as the act of in-depth writing or talking about a topic that involves the advantages and disadvantages of the topic at hand (van Eemeren, 2018:34). The aim of this section is to consider and reflect the various advantages and disadvantages of walkability

4.3.1 Benefits of walkability

The best way to argue for walkability is by explaining its benefits/advantages for stakeholders (Municipality/governing body, community etc.) (Speck, 2018:1). Research regarding the health benefits offered by walkable communities initially sparked new found interest in walkable communities (Moura *et al.,* 2017:282). This was soon followed by studies describing benefits that are related to sustainability, economy, social life, liveable communities, safer communities, equity

and healthier environments (Choi, 2012:1; Moura, 2014:1; Tong *et al.,* 2016:131; Moura *et al.,* 2017:282; Sietchiping *et al.,* 2012:185)

Increasing evidence is provided for the general benefits that walkability has to offer to communities/neighbourhoods (Walk21, 2006:1). Walkability is proposed as a solution to problems such as unhealthy lifestyles (Open Streets Cape Town, 2017; Malambo *et al.,* 2017:2 ; Saelens, 2003:80), car-dependant urban sprawl models (Speck, 2013), unsafe streets (Speck, 2013) and developments that are not consistent with environmentally friendly and sustainable environments (Saelens, 2003:80; Oyeyemi *et al.,* 2013:2). Talen and Koschinsky (2013:42) describe a walkable community as one that encourages environmental goals, pedestrian-based urbanism, improved health, improved economic climates and communitarian goals. In terms of direct benefits, walkability is linked to healthy, efficient, socially inclusive, sustainable, safe and high-quality neighbourhoods and therefore viewed by Singh (2016:643) as crucial in accessing these benefits.

Planners and Urban designers have been advocating for walkable cities for decades, rather unsuccessfully (Forsyth & Southworth, 2008:2). As of late benefits of walkable communities have come to light, that in turn resulted that the planning and design of such communities has received considerable attention (Choi, 2012:1); increased activism by pedestrians, as well as new health related research along with incentives and regulations from government are also to thank for the changing situation (Forsyth & Southworth, 2008:2). Although creating such communities can be costly, Speck (2018:1) states that one can best advocate for walkability with arguments in support of walkability.

Upon review of the available literature regarding walkable communities and the benefits that they offer to pedestrians, the environment and the governing bodies, the benefits can be classified in five broad categories. These categories include health benefits, economic benefits, community benefits, transportation benefits and, lastly, environmental benefits. The following sections will attempt to explain walkability by elaborating on the benefits that a walkable community has to offer, as well as highlight the interconnected manner of these benefits.

4.3.1.1 Economic benefits

Walking is relative low-cost, if not cost-free, activity (de Cambra, 2012:13 ; McNally, 2010:3) that is accessible (Bicycle Federation of America, 1998:6) to a vast majority of the population. Free or affordable exercise is however not the only economically related benefit that walkable communities have to offer. Implementing walkable communities is of a costly manner, therefor it is wise to advocate for walkability through stating how a walkable community will be economically beneficial in the long term.

The discovered economic benefits can be subdivided in two categories, the first being the economic benefit for the pedestrian/individual, and the second being the economic benefit for the Municipality/Government/governing body. Economic benefits for local governing bodies relates to healthier pedestrians that directly relates to reduced health care costs and relieving the pressure being placed on state facilities to care for uninsured individuals. The second benefit relates to tourism as walkable communities attract tourists that contributes to a healthy injection to the economy of a town or city. These benefits accumulate in order to eventually benefit whole communities and ultimately local authorities.

A second economic benefit relates to the cumulative reduced health care cost: Governing bodies, such as Municipalities and/or Government Departments are more likely to invest in a concept if they can benefit financially therefrom. As briefly mentioned in the health benefits section walkable communities yield lower obesity and obesity related diseases among individuals, the secondary effect being that health care costs are reduced (de Cambra, 2012:13). Governments benefit from this because many individuals cannot afford health insurance and must be cared for in State Hospitals that receive their funding from the Government, the netto effect thus being that walking individuals are healthy individuals who save themselves and the Government money (Speck 2018:5). Furthermore, walkability implies that tourists can reach tourist activities with more ease and experience the very essence of the city “on-foot” (Zakaria, 2015:642). Tourism is a known contributor to the growth of a city’s economy. Local businesses and street vendors also benefit from walkable streets (de Cambra, 2012:13), as they are exposed to more possible customers, that include locals and/or tourists, because they are easily accessible (Gilderbloom *et al.,*2014:14). Increased tourist presence thus benefits the local and governing economy.

The third economic benefit includes those aimed at the pedestrian/individual and community, e.g. where economic resilience is developed. . The desired design of a walkable community describes that of a dense, mixed use design, studies have revealed that mixed use communities promote economic vitality because it offers residents the ability to meet all their basic needs within their immediate environment and exposes them to different business and economic opportunities (McNally, 2010:5 ; Marquet & Miralles-Guasch, 2016:259 ; Speck, 2012:20). A recent American study claims that walkable neighbourhoods also attracts young talent (Speck, 2012:16 ; Speck, 2018:2), educated millennials value walkability and tend to move to places that offer a walkable urbanism lifestyle, the assumption is thus made that walkability contributes to the economic longevity and resilience (Gilderbloom *et al.,* 2014:14) of a city or community.

A fourth benefit pertains to increased real estate values that is considered to be both beneficial for homeowners and communities as a whole. Increasing real estate value and decrease transportation cost: Another underrated benefit of walkability as an attribute of a neighbourhood

is that it is revealed to increase the value of real estate (Gilderbloom *et al.,*2014:14 ; Speck, 2018:2) as walkability is a sought-after characteristic. Increased property values might suggest that walkability is associated only with the higher income communities; while this may be true to some extent studies have also revealed that, because walkability is a low/no cost activity and transportation mode (McNally, 2010:3 ; Marquet & Miralles-Guasch, 2016:259) , it allows mobility among lower income groups (Bicycle Federation of America, 1998:6). Households also save more money that would have been spent on transportation costs, that can be re-invested in the local economy (Speck, 2012:16).

A fifth benefit relates to the cost-effectiveness of walkability as a mode of transport that supplies much needed relief from expensive transportation costs.As stated above a strong case can be made for the development of walkable communities, even though it is an expensive attribute, it is beneficial for both the individuals' economic situation as well as on a wider city level.

4.3.1.2 Environmental benefits

Sustainability and environmentally conscious planning are topics within the planning profession that are gaining importance and popularity at a fast rate (McNally, 2010:3). Several authors agree that is the foundation of a sustainable city (Moura, 2014:1 ; Zakaria, 2015:642 ; Forsyth *&* Southworth, 2008:2 ; McNally, 2010:3 ; Southworth, 2005:248). These claims are supported by the several revealed environmental benefits that walkable neighbourhoods have to offer. As the case is with all the previous discussed benefit categories, environmental benefits are linked to- and interrelated with the other benefits (e.g. health); that only further supports the claim that walkability has a complex and interrelated manner.

A first environmental benefit of walkability is concerned with emissions, specifically the reduction of CO2 and the production of O2, this benefit contributes immensely to reducing the effects of global warming. Walking is considered the greenest transportation mode (Forsyth *&* Southworth, 2008:2), this is due to the fact that walking has a low impact on the environment (Anciaes *et al.,* 2017:9 ; Southworth, 2005:248). Walking doesn't require the consumption of resources (Forsyth *&* Soutworth, 2008:2), thereby conserving energy and the use of important fossil fuels (Southworth, 2005:248 ; Sietchiping *et al.,* 2012:185) . As opposed to vehicle transport walking doesn't contribute to dangerous CO2 emissions (McNally, 2010:5), thus reducing air pollution (de Cambra, 2012:1). Reduced CO2 emissions have also been known to have a positive remedial effect on the global warming crisis (Sietchiping *et al.,* 2012:185). Reduced emissions are not the only walkable neighbourhood factor that reduces the impact of global warming (Sietchiping *et al.,*

2012:185), walkable neighbourhoods are often associated with areas that have a dense population of street trees, trees are known for their role in reducing CO2 and producing O2, a process that is vital to human survival.

Secondly, walkable neighbourhoods contribute extensively to the reduction of air pollution (Forsyth & Southworth, 2008:2 ; Sietchiping *et al.,* 2012:185), reduced levels of traffic congestion being the main contributor in this instance. Air pollution is however not the only form of pollution that walkable neighbourhoods reduce, studies reveal that walkable neighbourhoods also have lower levels of noise pollution, the absence of traffic related noises being the primary reason for the reduced noise pollution (de Cambra, 2012:1 ; Forsyth & Southworth, 2008:2 ; Sietchiping *et al.,* 2012:185). A walkable neighbourhood thus performs important environmental services as it reduces traffic congestion, air pollution, noise pollution and the effects of global warming.

There is thus an abundance of benefits related to walkable neighbourhoods, many, if not all, of which are interrelated or caused by one another. The effect of the benefits that walkability offers can be characterised as a chain reaction, one usually causes or enhances another. The case for the design and/or development of walkable neighbourhoods is strong.

4.3.1.3 Social (community) benefits

A walkable neighbourhood/city does not just provide categorised benefits such as health, safety and economic welfare to a community (Tong *et al.,* 2016:131 ; McNally, 2010:5); walkability makes better communities (Forsyth and Southworth 2008). Researchers are in agreement that walkable communities are more liveable (Moura, 2014:1 ; de Cambra, 2012:1) and more enjoyable communities. Walkability is in fact claimed to be essential for the development of said liveable communities (de Cambra, 2012:1). As mentioned in the introductory part of the benefits section the benefits that walkability have to offer are interconnected, that adds a degree of difficulty in categorising the benefits. Community/social benefits are no different. This section will discuss several benefits that a walkable neighbourhood contributes to the community in question.

The first benefit relates to social capital where walkable neighbourhoods provide the opportunity for residents to interact on a regular basis. Walkable neighbourhoods are described as having increased social capital (Dobesova, 2012:180). Walkable neighbourhoods create a space for individuals to interact and get to know one another (de Cambra, 2012:1 ; Tong *et al.,* 2016:131). These socially inclusive neighbourhoods result in more people walking, and more eyes on the street create safer communities (Moura, 2014:1 ; de Cambra, 2012:1). This creates a mutually beneficial chain reaction as more pedestrian result in safer environments and safer environments

attract more pedestrians (McNally, 2010:5). The assumption can thus be made that increased safety can also be associated with decreased crime figures (Gilderbloom *et al.,* 2014:14).

Walkable neighbourhoods are also described as being more civilized (Forsyth and Southworth 2008), decreased crime being an important contributing factor thereto. Civilised communities are also known to be more democratic; studies show that citizens of walkable communities are more likely to vote and declare interest in community matters due to the socially cohesive atmosphere (Southworth, 2005:248).

In addition to the social capital benefits as described in this section, a walkable neighbourhood design is also considered to be more family and people oriented (Bicycle Federation of America, 1998:6) as walkable neighbourhoods are synonymous with mobility, accessibility and equity (Forsyth and Southworth 2008 ; Marquet & Miralles-Guasch, 2016:259). A good walkable neighbourhood is one that is linked to, and in close proximity to a range of public transport modes (Tong *et al.,* 2016:131) that enables large scale mobility (Bicycle Federation of America, 1998:6), thus making transportation more accessible (Tong *et al.,* 2016:131) that is beneficial for the whole community. As mentioned, prior, walkable neighbourhoods are more equitable neighbourhoods as they are age, mobility/ability and socio-economically inclusive (Southworth, 2005:248). In terms of age, walkable neighbourhoods offer parent peace of mind that their children can safely walk to school and play outside walkable neighbourhoods also offer freedom and independence to both old and young (Bicycle Federation of America, 1998:6 ; Forsyth and Southworth 2008; McNally, 2010:5 ; Speck, 2108:8), walking is often the only means of freedom that the elderly still have (Southworth, 2005:248). With reference to the mobile/able inclusiveness of walkable neighbourhoods; walkable neighbourhoods are known to be wheelchair friendly and are easy to navigate for visually impaired individuals. Walkable neighbourhoods thus offer unassisted freedom to some degree to disabled individuals (Forsyth and Southworth 2008 ; Speck, 2018:9). Lastly, walkable neighbourhoods are also inclusive with regard to individuals form different socio-economic classes (Forsyth & Southworth, 2008:2). Walking is free, meaning that it is accessible for rich and poor (Marquet & Miralles-Guasch, 2016:259), walkable neighbourhoods are often well connected to other modes of public transport that offers individuals a choice to pay what they can afford for transport (Moura, 2014:1 ; Forsyth and Southworth 2008 ; Marquet & Miralles-Guasch, 2016:259).

In general, walkability is considered highly beneficial (Tong *et al.,* 2016:131) for the inhabitants of a community as it offers benefits to all age, income and ability groups (Forsyth and Southworth 2008); walkability therefor creates a more socially inclusive community (Speck, 2018:8) that will be of particular relevance for South Africa as we face many social inequality challenges. Walkability encourages a more liveable environment (de Cambra, 2012:1) that is considered safer

and family oriented. Many of the discussed community benefits are also associated with other groups of benefits, such as safety, transportation and economic benefits; this further illustrates the interconnected manner of the benefits of walkability. At its most basic manifestation, the greatest benefit that a walkable neighbourhood can offer is a community

4.3.1.4 Health benefits

The recent new-found interest in walkability as a community attribute was kick started upon the revelations made by studies that linked improved health with walkable communities (Oyeyemi *et al.,* 2017:483). These studies accounted for health benefits whether the walking was for exercise, recreational or utilitarian purposes (Malambo *et al.,* 2018:2). Not only is walking the most common form of physical activity (Choi, 2012:10), it is also the most accessible and affordable means of exercise globally (Stafford & Baldwin, 2017:1). As the fourth leading cause of global deaths is physical inactivity (Oyeyemi *et al.,* 2013:1) built environment research has been focused on how walkability can assist in encouraging physical activity and improving overall long-term health (Choi, 2012:10), in fact Owen et al (2007:387) argues that the encouragement of physical activity by means of a walkable neighbourhood design is a public health priority.

The Bicycle Federation of America (1998:6) states that walkable neighbourhoods have people that are healthier and happier, this statement summarises the two categories of health benefits that walkable neighbourhoods have to offer; physical health and mental health (Maria *et al.,* 2019:229; de Cambra, 2012:13 ; Forsyth & Southworth, 2008:2). As mentioned, walkability benefits are of an inter-connected manner, the first example of which will be displayed by explaining how improved physical health can cause improved mental health.

The first set of benefits to be discussed relates to the physical health of individuals and communities, these range from longer life spans to improved cardio-vascular health, decreased obesity and improved overall health.

Saelens et al (2003:80) states that an important component of long-term health, and the improvement thereof, is regular physical activity, of which walking is the most accessible form (Saelens *et al.,* 2003:80; Marquet & Miralles-Guasch, 2016:159). Regular physical activity has been proven to offer a better quality of life thanks to the numerous physical health benefits; research regarding walkability has gained popularity (Southworth, 2005:248) among health researchers and revealed that walkable neighbourhoods are associated with lower mortality rates (Malambo *et al.,* 2017:1) and longevity (Adkins *et al.,* 2012:499). It can be assumed that lower mortality rates are associated with healthier communities, walkable communities are “slimmer communities” (Speck, 2018:4); as studies reveal that walking is associated with decreased rates

of obesity (de Cambra, 2012:1; Speck, 2018:4) that also includes decreased appearances of obesity related conditions such as heart diseases, strokes, high blood pressure, diabetes, cancer and gallbladder diseases, osteoarthritis, (Gilderbloom *et al.,* 2014:14 ; Malambo *et al.,* 2018:2 ; Speck 2018:5). Residents of walkable communities are proven to manage their weight with more ease (Frank *et al.,* 2006:76) and tend to have stronger bones as a result (Forsyth & Southworth, 2008:2). Studies also revealed that people who live in walkable communities have increased cardio-vascular fitness (Forsyth & Southworth, 2008:2), meaning a decreased appearance of lung and heart diseases, the most formidable of them being asthma. These benefits are thus associated with more physically healthy people, often overlooked are the mental health benefits that walkable communities offer.

The second set of benefits relates to the mental health benefits that walking and walkable communities have to offer including increased creativity and happiness and decreased anxiety and depression. Healthier individuals tend to be happier individuals. There is a direct correlation between individuals who walk regularly and their overall happiness. Studies revealed lower morbidity rates among individuals who walk regularly and/or live in walkable communities (Malambo *et al.,* 2017:1), walking individuals show reduced levels of stress (de Cambra, 2012:13 ; Forsyth & Southworth, 2008:2) and are less prone to depression (Maria, *et al.,* 2019:229) and anxiety. Walkable neighbourhoods are safer neighbourhoods; the sense of safety also contributes to lower levels of anxiety and as well as more cohesive communities (Maria, *et al.,* 2019:229 ; McNally, 2010:5). Other mental health benefits associated with individuals who walk regularly are improved cognitive function (Adkins *et al.,* 2012:499), mental alertness (Southworth, 2005:248) and increased levels of creativity among individuals who walk regularly and/or live-in walkable neighbourhoods (Forsyth & Southworth, 2008:2).

A secondary set of health benefits relating to walkable communities will also be discussed, many that are also related to other categories of benefits discussed in the benefits section. Whilst the primary health benefits of walkable neighbourhoods tend to be of the mental and physical nature, studies have also revealed some “secondary” health benefits of note, which can also be classified under other types of known benefits, hence the interrelated manner of the benefits of walkability. Walkable communities are associated with a decreased appearance of cars that result in lower CO2 emissions (McNally, 2010:5 ; Speck, 2018:5), (environmental benefit), lower emissions cause fewer air pollution (de Cambra, 2012:1 ; Anciaes *et al.,* 2017:9) that contributes to the decrease in appearance of asthma and related lung diseases (Gilderbloom *et al.,* 2014:14). Reduced amounts of cars also mean reduced amounts of car crashes (Speck, 2018:6), (safety benefit), that result in serious injury or death; hence a safer environment for pedestrians (de Cambra, 2012:1) as well as spending less money on expenses such as gas and public transport

(McNally, 2010:5). Lastly, individuals who live in walkable communities have lower health care costs (economic benefit) due to reduced appearance of obesity related diseases that are extremely costly to treat (Speck 2018:5).

Walkable communities can be considered healthier and happier communities (Maria, *et al.,* 2019:229) because they offer both physical health and mental health benefits (Forsyth & Southworth, 2008:2). As walking is the most affordable and accessible (Forsyth & Southworth, 2008:2 ; Marquet & Miralles-Guasch, 2016:259) form of physical movement globally, majorities will benefit from improved walkable neighbourhoods.

4.3.1.5 Transportation benefits

Walking is not only a recognised mode of transport (Oyeyemi, et al.2017:483) but is also ranked as the “greenest” (Forsyth & Southworth, 2008:2), most affordable and most accessible (Bicycle Federation of America, 1998:6) transportation mode. Just as the previously discussed categories of benefits that a walkable neighbourhood has to offer, the transportation benefits are also linked and interrelated with the previously-, and to be discussed benefits. Despite the fact that walking is a transportation mode, walkable communities also offer other benefits that are related to transportation.

A first benefit relates to the fact that walking is considered the most environmentally friendly mode of transportation, this includes reduced traffic congestion that creates a safer and cleaner environment.

Firstly, as mentioned in the introductory part of the transportation related benefits’ section, walking in a “green” or environmentally friendly mode of transportation; walkable neighbourhoods result in decreased car-dependence, less cars have fewer CO2 emissions as a result (McNally, 2010:5). Whilst the ideal situation would be a completely car-free neighbourhood walkable neighbourhoods have been associated with neighbourhoods that show reduced levels of traffic congestion (Forsyth & Southworth, 2008:2), thus also decreasing car-related air pollution. Reduced traffic congestion creates a safer environment for pedestrians of all ages (McNally, 2010:5).

A second benefit relates to walking being a safe mode of transportation, neighbourhoods with less vehicle activity are safer for pedestrians of all ages.

Safer pedestrian environment offers walking as a transportation mode to a wider age group of the population, walkability grants freedom of movement, and access to public transport, to children

and elderly individuals who are normally dependent on others for their travel needs (McNally, 2010:5).

The third benefit relates to walking as being an inclusive mode of transportation, walking is age and income inclusive. Walking is thus considered to be an age inclusive mode of transportation. Walkable neighbourhoods are however not only age inclusive, but income inclusive as well. Walkable neighbourhoods accommodate individuals who don't own/can't afford their own vehicle as it is a cost-free activity (Forsyth and Southworth 2008).

The fourth and final benefit relates to the interconnectedness of walkable communities, individuals can access different activities much easier because they are all connected. Walkable neighbourhoods are also characterised as being connected to several modes of transportation (Bicycle Federation of America, 1998:6) , pedestrians therefor have access to several different options that are no cost or low-cost. Not only is the activity of walking cost-effective, but the basic infrastructure necessary to facilitate a walkable environment is not very cost intensive, a well-designed and well-kept pavement is often the most basic infrastructure needed for walking (Forsyth and Southworth 2008 ; McNally, 2010:5).

In conclusion, even though walking is a recognised transport mode (Oyeyemi, et al.2017:483), it is not the transportation related benefit that walking has to offer. Walkable communities offer low-cost mobility to a much larger group of the population as it is age and income inclusive (Forsyth & Southworth, 2008:2). The above-mentioned benefits are also associated with all the other categorised benefits, thus highlighting the interrelated manner of walkability

4.3.2 Challenges of walkability

Walkability as a neighbourhood attribute does however have disadvantages and limitations as well. This section will discuss the two sets of challenges/limitations relating to walkability and walkable neighbourhoods including the implementation of walkability and the act of walking.

First, the challenges faced with implementation are caused by the cost of implementation (Speck, 2018:2), the limited research on how to implement a walkable community that leads to wrongful implementation (Stafford & Baldwin, 2017:1) that often causes a loss of "sense of place" (de Cambra, 2012:15). As briefly mentioned in the economic benefits section, creating and improving walkable neighbourhoods are expensive (Speck, 2018:2), Municipalities and/or governing bodies do not prioritise the needs of pedestrians and do not make provision for the upgrading or development of pedestrian infrastructure in projected budgets (Speck,2018:2). Not only is the

implementation of walkable neighbourhoods neglected, but the research behind the implementation is also often neglected; in most cases the needs of the more dominant groups are favoured in planning research that has standardised planning and designing for walkable neighbourhoods as a result, ignoring the needs of the minority groups (Stafford & Baldwin, 2017:1).

Standardised research models are not the only problem with walkability related research, as demonstrated in the definitions section walkability is not easily defined that results in confusion when trying to implement walkability (de Cambra, 2012:13 ; Lo, 2009). Wrongful implementation of walkability can lead to a reduced sense of place that will reduce the number of pedestrians on the streets (Stafford & Baldwin, 2017:1). Lost sense of place is not the only contributor to the loss of pedestrian activity, environmental stressors have been known to discourage walking. These stressors include community violence and crime, crowding, noise and traffic congestion (de Cambra, 2012:15). It is thus of extreme importance to understand the needs and circumstances of each individual area before implementing or upgrading walkability as it can discourage pedestrian activity.

The second set of limitations/challenges pertaining to walkability is concerned with the act of walking, implementation often disregard the fitness levels of the pedestrians and leaves them exposed to the elements whilst walking distances that are too great.

A significant limitation or disadvantage of a walkable neighbourhood is the act of walking itself. The stamina of the pedestrian needs to be considered whilst designing a walkable pedestrian network (Allan, 2001). The further an individual must walk, the less likely they are to do so. Walking is also more time consuming than other modes of transportation, meaning that the further an individual must walk their average walking speed will decline throughout the walk (Emery & Crump, 2003). A walker can maintain a steady average speed of 6 kilometres per hour for approximately 20 minutes after which the average speed will drop and the travel time will be extended (Allan, 2001). Distance and fitness levels play a big role when walking is considered as predominant transportation mode.

Another limitation that influences walking, negatively or positively, is the weather. In the case that pedestrians need to walk longer distances adverse weather conditions will discourage walking, whether it be too hot, too cold, very windy or raining (Emery & Crump, 2003). Without the proper planning of pedestrian infrastructure pedestrians are often left exposed the elements of nature that will discourage walking as a preferred transportation method.

In conclusion, the wrongful implementation of walkability contributes heavily to the disadvantages associated with walkability. Creating a walkable environment or upgrading the walkability of a neighbourhood are also often seen as an unnecessary expense. Lastly, the distance and time consumption of walking is also regarded as a disadvantage due to limited stamina and fitness levels of pedestrians.

In conclusion, there are both benefits and limitations to walkability and valid arguments can be made from both sides. It is however clear that the benefits outweigh the limitations/challenges, as displayed in table 4.3 below

Table 4-3: Summary of Benefits and limitations of walkable communities

Benefits of walkability	Economic benefits	**Economic benefits for local governments** • Healthier pedestrians = reduced health care costs • Tourist attraction
		Economic benefits for individuals/pedestrians/communities • Community economic resilience • Increased real estate values • Affordable and inclusive transportation
	Environmental benefits	• Reduced CO^2 emissions (positive effect on global warming) • Reduced air- and noise pollution
	Social (community benefits)	• Increased social capital • Safer communities • Civilised and democratic communities • Family-friendly • Inclusive (age, health, income)
	Health benefits	**Physical health benefits** • Lower mortality rates • Decreased appearance of obesity • Reduced appearance of heart disease, stroke, high blood pressure, diabetes, cancer, gallbladder disease and osteoarthritis • Increased cardio-vascular health
		Mental health benefits • Lower morbidity rates • Reduced stress levels • Reduced appearance of depression and anxiety • Improved cognitive functions • Mental alertness

		• Increased creativity levels
	Transportation benefits	• Environmentally friendly transportation mode • Safe mode of transportation • Inclusive mode of transportation
Limitations of walkability	Implementation	• Expensive to implement • Limited research regarding steps to implement • Wrongful implementation without proper assessment and public participation can cause a loss of sense of place
	Act of walking	• Pedestrian infrastructure doesn't take into account the fitness levels of the pedestrians • Walking distances between points of interest/public transportation/services are too great

(Source: Authors' own construction, 2021)

The planning and design of the spatial environment to optimise the various benefits offered by walkability has been treated differently in different spatial planning models. The next section will discuss the walkability of urban environments of the different spatial planning models as they developed through history.

4.4 Planning and design for walkability: Assessment tools to evaluate

Walkability is defined as "the extent to which the built environment can accommodate a safe, comfortable and pleasant pedestrian experience", the word "extent" implies that walkability is measurable (Abley, 2005:7). Several different methods have been designed to measure walkability (Ewing & Handy, 2009:65 ; Moura *et al.,* 2017:283); these methodologies however measure the opportunity to walk rather than the walking behaviour of the pedestrians (Weinberger & Sweet, 2012:20). The outcomes of walkability measurements can either categorise areas as being more walkable or less walkable, or it provides the number of features that either prohibit or inhibits walking within a specific area.

Different tools to assess walkability have emerged because due to different cultural backgrounds of pedestrians who have different perceptions of walkability. A particular tool might not be applicable or flexible enough to accommodate all neighbourhoods (de Cambro, 2012:23 ; Moura *et al.,* 2017:284). Difference of perception is a limitation of walkability measurement tools, along with the limited available measurement tools that planners have to their disposal (Weinberger & Sweet, 2012:20 ; Abley, 2010:2). Known methods to measure walkability include indexes, questionnaires, surveys, audit tools, inventories and level of service scales (Moura *et al.,* 2017:283). A review of relevant literature revealed the following popular measurement tools: Walkability Index, Neighbourhood Environment Walkability Scale (NEWS), AARP Walk Audit

Toolkit, Pedestrian Environment Review System (PERS), Walkscore, Walkanomics and the Pedestrian Environment Assessment Tool (PEAT) (de Cambro, 2012:23 ; Moura *et al.,* 2017:284), as described in Table 4-4

Table 4-4: Different walkability measurement tools

Measurement Tool	Description
Walkability Index	The Walkability Index is described as the quality of walking in relation to the walking environment and infrastructure with the incorporation of safety, convenience, comfort and security (Wibowo, et al. 2015:1519). A high value Walkability Index presents a particular arrangement of land uses that creates an opportunity for an area to be walkable (Wibowo, et al. 2015:1519. The Walkability Index is a good tool to use during the planning stage of an area. The Walkability Index is calculated as the sum of four partial indexes. The four partial indexes consist of the Connectivity Index, which is a calculation of the intersections per square kilometre of urban units, a high connectivity index indicates a high potential for walkability (Dobesova, 2012:184); the Entropy Index, that is a representation of the diversity of land uses within a planned area, a bigger variety is indicative of a more walkable area (Dobesova, 2012:186); the Floor Area Ratio (FAR) Index that represents the ratio of the area of buildings intended for commercial use to the whole area of laned zoned for commercial uses (Dobesova, 2012:186); and lastly, the Household Density Index, that is a calculation of the amount of households divided by the area intended for residential units, a high index value means that the area will be dense which creates the potential for walkability (Dobesova, 2012:187).
Neighbourhood Environment Walkability Scale	The Neighbourhood Environment Walkability Scale (NEWS) is a self-report questionnaire used to assess the perceived attributes/elements of the environment for physical activity such as walking. NEWS is a comprehensive and widely used measurement tool that is described as a valid and reliable walkability measurement tool (Oyeyemi, et al. 2013:2). The tool does however have some limitations, as it is developed in the

	USA it may not be applicable to all cultures and environments (Oyeyemi, et al. 2013:2).
AARP Walk Audit Toolkit	The AARP Walk Audit Toolkit assesses the walkability of sidewalks and streets by utilising seven different checklists where the pathways, intersections, street furniture, signage, safety, driver behaviour as well as the overall impression (Labuschagne, 2014:5) are all assessed. The Walk Audit Toolkit is easy to use and doesn't require prior training as it offers step-by-step instructions as well as an instruction booklet to the individual looking to lead such an audit (MDP SmartGrowth Manager, 2017).
Pedestrian Environment Review System (PERS)	The Pedestrian Environment Review System (PERS) is another waking audit tool that is used at street level for the assessment of sidewalks, intersections, public spaces and public transport waiting platforms (de Cambro, 2012:23). The audit is conducted in two parts, firstly the auditor conducts a scoring of the pedestrian environment with field check sheets, the second part involves software data analysis and the production of the assessment (de Cambro, 2012:23). The software awards weights to the audit scores that allows for a flexible analysis as it adapts to the factors which are considered to be more relevant. This audit tool can however only be utilised by a trained auditor, which is viewed as a limitation thereof (de Cambro, 2012:23).
Walkscore	One of the more, if not most, popular walkability measurement tools is a web-based application named Walkscore (Weinberger & Sweet, 2012:22). The application is user-friendly and offers users a raster map output, utilising different colours to represent different intensities of walkability (Talen & Koschinsky, 2013:45). The application also gives areas a rating between zero and one hundred, one hundred being the most walkable and zero being the least walkable (Gilderbloom*et al.,* 2014:16). The measurement is performed by an algorithm that takes into account the distribution of different land uses (Weinberger & Sweet, 2012:22). Walkscore is considered to be very reliable as it correlates well with the subjective and objective comprehension of walkability. Walkscore does however have some limitations; the application is reliant on Google Maps, as such there might be outstanding information, the application also

	doesn't incorporate street connectivity, safety, terrain and street quality characteristics (Gilderbloom *et al.,* 2014:16).
Walkanomics	Another web-based measurement application/tool is Walkanomics. The application rates streets on a scale from zero to five through user feedback and automated responses (de Cambra, 2012:23). Walkanomics also offers map data output that allows the user to view the individual street scores. Eight different categories are utilised while streets are being assessed, these include road safety, road crossing, pavements and sidewalks, slope, navigation, fear of crime, "smart and beautiful", "fun and relaxing" (de Cambra, 2012:23).
Pedestrian Environment Assessment Tool (PEAT)	The Pedestrian Environment Assessment Tool (PEAT) is not among the most popular measurement tools, but it is a measurement too; designed specifically for South African walkability assessment as it takes into account environmental factors that are influenced by local conditions such as the presence of taxi stops, hawkers, beggars, surveillance cameras and security guards (de Cambro, 2012:23). The assessment tool was designed specifically for pedestrian safety (de Cambro, 2012:23).

(Author's own construction, 2020)

From the discussion above the assumption can be made that most walkability measurement tools are ideally suited for quantitative studies. The only measurement tool that is applicable to the Macro study context (South Africa), PEAT, has not been thoroughly tested or used in similar studies. The AARP walk audit toolkit is ideal as it is easy to use and offers clear instructions on how to conduct a walk audit.

4.5 Planning for walkability: Principles for spatial planning and design

A review of literature addressing the built environment attributes revealed that the following attributes are known contributors to enhanced walkability; safety, density, mixed land uses, proximity, convenience, connectivity, street layout, imageability, attractiveness, enclosure, human scale, transparency, complexity, coherence, continuity, sociability, accessibility, efficiency, pathway quality, pleasure-ability, convivial, legibility and conspicuousness (Southworth, 2005:249 ; Labuschagne, 2014:5 ; Tiwari, 2015:2 ; Ewing & Handy, 2009:66). This section will aim to discuss these attributes and explain the physical manifestation thereof within the built environment.

As the popularity of walkability as research topic in health-related studies increased, researchers started to question whether the built environment contributes to making a place more walkable or less walkable. Walkability related research then shifted from being primarily health focused (Choi, 2012:12) to more urban planning and design oriented. Research revealed that the built environment does influence the walking behaviour and frequency of walking of individuals (Choi, 2012:12) . As urban planning and design principles where incorporated in walkability research studies revealed that there is a correlation between specific built environment attributes and the walkability of the study area (Choi, 2012:12 ; Abley, 2005:7).

The importance of establishing a correlation between walkability and built environment attributes is that it provides policymakers and decision-makers with all the necessary tools and information that they need to make informed decisions that will benefit a community with regard to the development or upgrading of walkability (Malambo *et al.,* 2017:2). While research regarding walkability and urban planning and design have received considerable attention in recent years there remains a gap in research of this sort within the African context (Malambo *et al.,* 2017:2).

4.5.1 Safety

Of all the known built environment attributes, safety or perceived safety seem to be the most important elements in a walkable environment (Wibowo, et al. 2015:1519 ; Abdulla *et al.,* 2017:164; Southworth, 2005:249)). Studies have revealed that the need for safety is a basic need of every pedestrian, and if that need should go unmet individuals would not choose walking as their transportation mode (Tiwari, 2015:2 ; Abdulla *et al.,* 2017:165). Safety is considered to be the most important attribute that an environment has to offer in order for that environment to be considered walkable as it allows pedestrians to walk without the fear of crime or accident (Zakaria, 2015:645).

A sense of safety is caused by the presence of basic urban design features, that include, but are not limited to signalised intersections, marked crosswalks, protection and physical separation from vehicles and bicycles (Bicycle Federation of America, 1998:4 ; Zakaria, 2015:645). A high intensity presence of pedestrian activity is also known to encourage a sense of safety, as there are more “eyes” on the street (Zakaria, 2015:645); surveillance contributes to the sense of safety along with good path lighting (Gilderbloom *et al.,* 2014:13). Neighbourhoods designed to be transparent and visible tend to be safer (Zakaria, 2015:645 ; Southworth, 2005:249) and more walking friendly than neighbourhoods with obscure and hidden niches and alleyways

4.5.2 Density

Density is rated among the most important attributes or characteristics in the built environment that encourage walkability (Labuschagne, 2014:5 ; Malambo *et al.,* 2017:1-2 ; McNally, 2010:6 ; Gilderbloom *et al.,* 2014:14). Density is associated with more traditional planning and design methods (Choi, 2012:11) and studies have revealed that higher residential density is associated with increased levels of walking and biking (Choi, 2012:11) and the utilisation of public transport instead of private vehicles (McNally, 2010:6). Density does not only relate to residential density, but also population and employment density (Anciaes *et al.,* 2017:9).

The reason why density results in walkability is due to the fact that denser areas are also associated with mixed land uses (Choi, 2012:11; Gilderbloom *et al.,* 2014:14), denser neighbourhoods mean that pedestrians are much closer to services therefore pedestrians are more willing to walk to these services as they are in close proximity to their homes (McNally, 2010:6). Density is however a planning attribute that cannot be transformed easily as areas are planned to be high-, medium-, or low density. The addition of housing units is often the only way the density of a community can be altered (McNally, 2010:6).

4.5.3 Mixed land uses

Just as density is related to a traditional neighbourhood design, which inhibits walking, mixed land uses are also associate with a more traditional design that studies have revealed to consistently reveal increased levels of pedestrian and bicycle activity (Choi, 2012:11 ; Labuschagne, 2014:5; Gilderbloom *et al.,* 2014:14). Neighbourhoods that are dense usually have mixed land uses as well. The benefit that mixed land uses have to offer is that the different land uses, such as residential and commercial, are within a close proximity to one another (McNally, 2010:7). The assumption can therefore be made that “proximity” and “mixed land use” fall within the same built environment attribute category (Owen *et al.,* 2007:388). Proximity has been revealed to be one of two primary influences on the choice between walking and motorised transport (Choi, 2012:11).

Not only does mixed land uses and close proximities provide shorter traveling times and distances (Owen *et al.,* 2007:388), but it also creates destinations to travel too (Labuschagne, 2014:5 ; McNally, 2010:7). Apart from walking for leisure or exercise individuals will walk to basic services or work if it is within walking distances and their walking environment is favourable (Owen *et al.,* 2007:388). The traditional neighbourhood design seems to create favourable conditions for walkability with mixed land uses being a key indicator of neighbourhood walkability (Choi, 2012:11 ; Anciaes *et al.,* 2017:9 ; McNally, 2010:7).

4.5.4 Connectivity

The traditional neighbourhood design is linked to a trio of attributes being density, mixed land use, and the last being connectivity (Choi, 2012:11; Labuschagne, 2014:5), just as neighbourhoods with high residential density and mixed land uses revealed a higher presence of walking and biking, so does connected neighbourhoods as well (Abley, 2005:7 ; Choi, 2012:11). The element of connectivity is associated with the grid layout pattern, shorter block lengths and the presence of interconnected streets (Choi, 2012:11 ; Malambo *et al.,* 2017:1-2 ; Owen *et al.,* 2007:388), this allows pedestrians to travel with ease (Zakaria, 2015:644), and offers either a direct travel route from point A to point B, as well as the option of other routes that lead to the same destination (Owen *et al.,* 2007:388). Connectivity thus offers ease of access as well as freedom of choice to pedestrians (Owen *et al.,* 2007:388).

Connectivity doesn't only refer to connected streets; walkable neighbourhoods are usually connected/linked to the greater city and offer greater access to public transport (Southworth, 2005:250). Walkable neighbourhoods are known to be linked to a wide variety of public transportation modes; studies have revealed that connectivity is one of the primary influences on the choice of transportation, whether it be close enough to walk to the destination or walk to public transportation (Southworth, 2005:250). Connectivity can thus be described as a people-oriented street design. These streets are not only inter-connected but have fewer barriers that restrict walking (Southworth, 2005:249) and have well-designed sidewalks (Choi, 2012:11 ; Zakaria, 2015:644).

4.5.5 Imageability

It is however not only built environment attributes that are of a spatial planning manner that encourages walking among individuals. Many urban design and aesthetic qualities are also proven to inhibit and encourage walking for leisure, exercise and convenience (Malambo *et al.,* 2017:1). The most apparent urban design attribute is imageability (Abdulla *et al.,* 2017:164). Imageability is described as quality of a place that arouses strong feelings within the observer (Ameli *et al.,* 2015:397). Strong imageability is associated with aesthetic environments that create a lasting impression and strong sense of place within the observer (Ewing & Handy, 2009:70).

Studies have not only revealed that imageability enhances walkability, but also revealed which physical features enhance imageability and promote walkability (Handy 2005). According to the extensive research done regarding this topic imageability is enhanced by distinct, recognisable and presentable shapes (Choi, 2012:11 ; Ameli *et al.,* 2015:397), colours and arrangements that are capable of structuring powerful mental images, capture attention and evoke feelings that

create a lasting impression (Choi, 2012:11 ; Ameli *et al.,* 2015:397). Imageability is thus an environmental attribute that has aesthetic appeal (Bicycle Federation of America, 1998:4 ; Malambo *et al.,* 2017:1) and creates a destination that individuals would opt to walk to at their leisure.

4.5.6 Enclosure

Enclosure has been identified amongst the seven most important built environment attributes that encourages walking within a neighbourhood. Enclosure, just like imageability, contributes to the sense of place. Ewing and Handy (2009:73) describes enclosure as a physical attribute that allows the pedestrian to identify with their surroundings, enclosure instils a sense of position and manifests the idea of “hereness”, at its most basic form enclosure is described as having a room-like quality that offers a sense of comfort to the pedestrian (Choi, 2012:11). People are more likely to walk in environments that they can relate with and in which they are comfortable. Enclosure can be defined as the degree to which outdoor environments are defined by vertical elements that create this room-like quality (Choi, 2012:11 ; Ewing & Handy, 2009:73; Ameli *et al.,* 2015:397).

A sense of enclosure is usually created when an outdoor space is visually defined by vertical elements (Ameli *et al.,* 2015:397); these vertical elements act as interruptions to the viewers line of sight, thus defining the visual; decisively blocking the “outdoors” to create the feeling of an indoor room (Ewing & Handy, 2009:73), as illustrated in figure 4-1. Known vertical elements that act as these interruptions are buildings, walls and trees (Ameli *et al.,* 2015:397). However, the presence of the vertical elements is not the only important factor regarding enclosure; the room-like quality is only created when the height of the vertical elements and the width of the space between vertical elements are proportionally related to one another (Choi, 2012:11 ; Ameli *et al.,* 2015:397 ; Ewing & Handy, 2009:73).

Figure 4-1: Enclosure example

(Source: Bloomberg, 2014)

4.5.7 Human scale

As mentioned above, pedestrian comfort is one of the main contributors to walkability, and, as studies have revealed, human-scale built environment attributes is one of the main contributors to pedestrian comfort, therefore the physical attribute of human-scale planning and designing can be seen as a main determinant to walkability (Zakaria, 2015:643). Human scale refers physical elements that match the size and proportions of individuals, as well as the speeds at which they walk (Choi, 2012:26 ; Ameli *et al.,* 2015:397 ; Ewing & Handy, 2009:77). Human scale is not only influenced by the size of the buildings or physical elements present in the built environment, but also the articulation and texture thereof (Choi, 2012:26 ; Ewing & Handy, 2009:77).

Human scale is a physical attribute that responds and correlates to the pedestrians, as opposed to large, cold and intimidating physical elements that make the individual uncomfortable with the environment (Ameli *et al.,* 2015:397 ; Ewing & Handy, 2009:77). Physical elements, other than building size, that contribute to the human scale of a neighbourhood are the details of buildings,

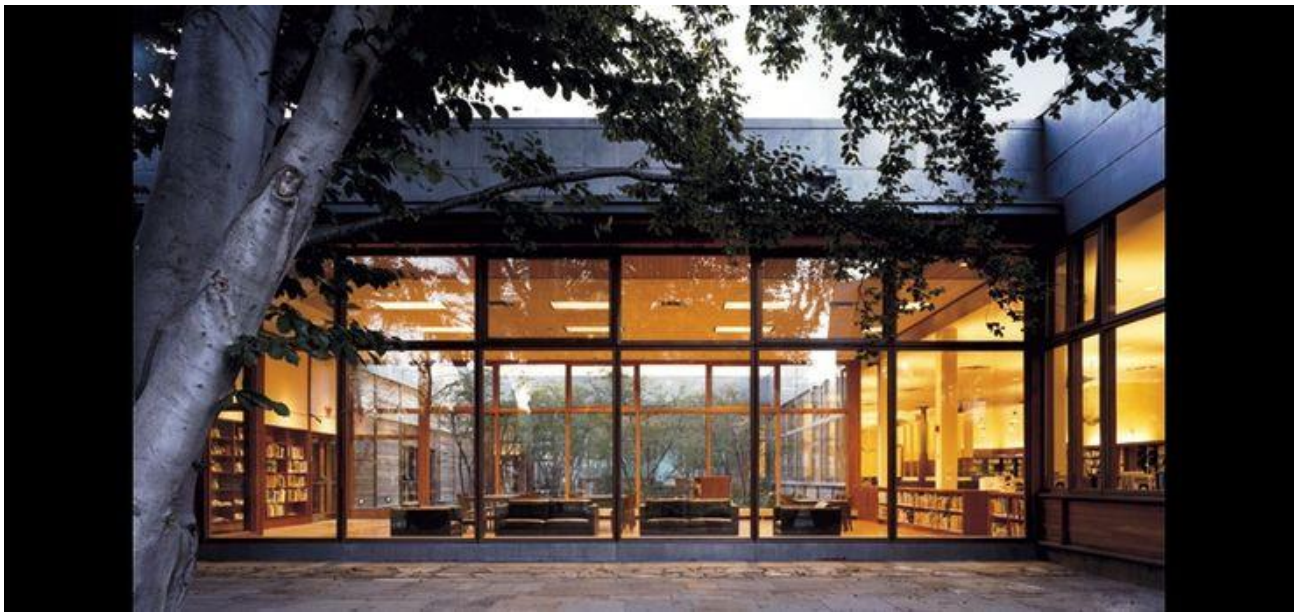
texture of the pavement or walkways, the presence and frequency of street trees, and the use of street furniture (Ewing & Handy, 2009:77 ; Choi, 2012:26 ; Ameli *et al.,* 2015:397). Human scale also forms part of physical elements that can be enhanced with the use of smart urban design principles, alongside enclosure and imageability (Zakaria, 2015:643).

4.5.8 Transparency

Another built environment attribute that affect the degree of walkability is the element of transparency (Labuschagne, 2014:5). Transparency within this context can be defined as the degree to which pedestrians can observe what lies beyond the edge of a street, and more specifically perceive pedestrian activity beyond the edge of a building or a street (Choi, 2012:26 ; Ameli *et al.,* 2015:397 ; Ewing & Handy, 2009:79) as illustrated in figure 4-2. Transparency allows the pedestrian/observer to see what is happening, which makes the environment legible, comfortable and creates a sense of perceived safety, all of which encourage neighbourhood walkability (Ameli *et al.,* 2015:397 ; Ewing & Handy, 2009:79).

The transparency of a neighbourhood is affected by several factors that include walls, that can either help or hurt the degree of transparency; windows, the presence of large windows on street corners is highly beneficial for improved transparency (Labuschagne, 2014:5 ; Ameli *et al.,* 2015:397); doors, with reference to the material used, heavy wooden doors have a negative influence on transparency as opposed to doors with glass windows (Labuschagne, 2014:5 ; Ewing & Handy, 2009:79); fences, high fences interrupt the observers' line of sight, which can negatively influence the transparency, the same applies to landscaping; lastly, openings into mid-block spaces can also enhance the transparency of a neighbourhood (Choi, 2012:26 ; Ewing & Handy, 2009:79).

Figure 4-2: Transparency example



(Source: Archinet, 2017)

4.5.9 Complexity

As mentioned in the imageability section, neighbourhoods that are aesthetically pleasing and create a lasting impression are more walkable than others. Many urban design elements contributes to the aesthetic value of an environment, complexity being one of them (Ameli *et al.,* 2015:397 ; Labuschagne, 2014:5 ; Choi, 2012:26). Complexity as an attribute to the physical environment implies that the area or neighbourhood is visually rich, with a wide variety of landscape elements, street furniture and ornamentation, different types of buildings and a larger architectural diversity also contributes to the complexity of a neighbourhood (Ewing & Handy, 2009). Another element that contributes to the complexity of a neighbourhood is the presence of human activity (Ameli *et al.,* 2015:397 ; Choi, 2012:26).

Studies revealed that complexity is a known contributor to neighbourhood walkability (Labuschagne, 2014:5) as visually rich environments are associated with high levels of pedestrian activity (Ewing & Handy, 2009). Issues regarding complexity can be addressed through basic urban design oriented solutions, such as the addition of street furniture, landscaping and ornament or local street art (Ameli *et al.,* 2015:397 ; Choi, 2012:26 ; Ewing & Handy, 2009). Once again walkability is encouraged when destinations are created, and the environment is appealing and creates a sense of place (Labuschagne, 2014:5 ; Ewing & Handy, 2009).

4.5.10 Sociability

Studies revealed that neighbourhoods that are designed to facilitate walking among individuals are neighbourhoods that offer the opportunity for pedestrians to have social interactions (Abdulla *et al.,* 2017:164), in fact, a known influence on travel behaviour is the socioeconomic characteristics that neighbourhoods have to offer (de Cambra, 2012:15). Neighbourhoods that have social capital can be assumed to be neighbourhoods that are walkable (Abdulla *et al.,* 2017:164 ; Gilderbloom *et al.,* 2014:13). As sociability is a social concept, there must be a physical manifestation in which the social transactions can take place (Gilderbloom *et al.,* 2014:13). Sociability is created when there is a sense of hospitality, and when conditions are suitable for individual of group interactions (Bicycle Federation of America, 1998:4), therefor an area needs to be appropriate for social interactions to take place (de Cambra, 2012:15 ; Gilderbloom *et al.,* 2014:13). Sidewalks have proven to be the ideal built environment attribute for these social interactions (Bicycle Federation of America, 1998:4 ; Gilderbloom *et al.,* 2014:13). Sociability can thus be created or enhanced when pedestrians are offered an environment that encourages these social interactions (Abdulla *et al.,* 2017:164

4.5.11 Accessibility

Accessibility is one of the most indicative factors of walkability (Gilderbloom *et al.,* 2014:14) as accessible neighbourhoods provide the opportunity for pedestrians to use the environment, however accessibility does not only imply that pedestrians can use the public space with ease (Bicycle Federation of America, 1998:4), it also implies equal opportunities for all people to use the public space, that includes disabled and visually impaired individuals(Zakaria, 2015:644 ; Anciaes *et al.,* 2017:9). Accessibility can thus be linked to walkability and social equity (Anciaes *et al.,* 2017:9). Apart from the social public spaces, accessibility also implies that the neighbourhood contains several activities and services within a close proximity of each other, it is therefore easier to reach these basic local services on foot (Southworth, 2005:250). Accessible neighbourhoods are thus ones that serve the publics' social and basic needs (Zakaria, 2015:644).

Studies have revealed that accessibility contributes to the element of comfort (Zakaria, 2015:644) as the pedestrians are more acquainted with an accessible environment, and comfort is directly linked to increased levels of walkability (Malambo *et al.,* 2017:1). The physical manifestation of accessibility appears in the form of wide and accessible sidewalks and walkways and a pattern of activities and services to meet daily needs (Southworth, 2005:250). Accessibility is said to be inhibited by the presence of large frontage parking areas in front of buildings (Zakaria, 2015:644).

4.5.12 Convenience

Convenience/ the ease to walk is one of the most, if not the most important factors to contribute when a choice between transport modes is being made (Abley, 2005:7 ; Malambo *et al.,* 2017:1). Convenience, within this context, is defined as being the degree to which walking is accessible to all capabilities and skill levels, as well as the degree to which walking can efficiently compete with other transportation modes with reference to travel time, distance and travel cost (de Cambra, 2012:16 ; Cervero, Sarmiento, Jacoby, Gomez, & Neiman, 2009; Frank et al., 2005). Considering the cost factor, walking will always be the appealing option as it is a free activity, thus also being convenient; studies have revealed that comfort and convenience are more relevant than cost and distance when considering transportation modes (de Cambra, 2012:16).

A convenient neighbourhood is one that accommodates all capabilities and skill levels (Rahaman,Lourenc¸ o, & Viegas, 2012; Saelens & Handy, 2008), as discussed above, it is thus an accessible neighbourhood; convenience is also dependant on the presence of a variety of land uses, that results in less travel time and distance between destinations (de Cambra, 2012:16). Convenient neighbourhoods also have attributes that ease the walking experience, such as sidewalks, signalised crossings and street trees and street furniture (Wibowo, et al. 2015:1507). Convenience is identified as an indicator of a walkable neighbourhood and can easily be implemented through smart spatial planning (Wibowo, et al. 2015:1519 ; Abley, 2005:7 ; Malambo *et al.,* 2017:1).

4.5.13 Path context

The physical act of walking is not always possible without an actual path to utilise, one can assume that the quality of the path will influence the frequency of walking, in fact Southworth (2005:251) states that the quality of the path is essential to the walkability thereof. Studies have shown that the presence and quality of the pedestrian pathways has a direct influence on the walkability of the neighbourhood in question (Labuschagne, 2014:5). It is thus established that pathways have an effect on walkability; higher quality pathways are shown to have a higher intensity of pedestrian activity Zakaria, 2015:649 ; Southworth, 2005:249).

The quality of pathways is influenced by the presence or absence of certain attributes. Firstly, pathways that are paved or offer a good walking surface are assumed to be more walkable than the contrary (Zakaria, 2015:643); pathways that offer signage and signalised crossings are assumed to be safer and are more likely to be utilised as well (de Cambra, 2012:16 ; Southworth, 2005:249). The quality of the pathway is also judged on the space allowed for walking, pavements or sidewalks that are wider can accommodate more pedestrians and allows for unobstructed

passage (Zakaria, 2015:645). A pathway that offers visual interests such as landscaping will also attract more pedestrians (Southworth, 2005:249), lastly, pathways that follow a good street design (Southworth, 2005:249) and are unobstructed creates the ideal environment for pedestrians (Bicycle Federation of America, 1998:4), as illustrated by figure 4-3. In conclusion, the actual condition of the pathway is just as important as the existence of such a pathway (de Cambra, 2012:16).

Figure 4-3: Good pathway example

(Source: World Resource Institute, 2014)

4.6 Conclusion

This chapter adequately explored and conceptualised walkability as a multi-dimensional phenomenon that is highly beneficial as a community attribute. Walkability has been an important factor in cities from as early as the 18th century, abolished during the industrial revolution and re-advocated for during both the modern and post-modern and contemporary movements. The degree of walkability of a city was also connected to specific elements within the spatial environment, that served as assessment criteria during the empirical phase of this study.

CHAPTER 5 PRESENTING THE CASE STUDY CONTEXT: MARABASTAD, KROONSTAD

5.1 Introduction

Spatial planning is essentially spatial in nature (Agbola and Oladoja, 2001:3). Therefore, physical (geographical) space is the context for and the product of spatial planning. However, spatial planning is influenced by the broader context comprising of different factors e.g. the history, social and economic aspects. Chapter four serves as a description of the context against which the case study of walkability in Marabastad, Kroonstad was investigated. The context will be discussed from a macro (South African) and micro scale (Marabastad, Kroonstad) perspective including multiple aspects that relate to walkability and pedestrian information while the follow-up sections will deal with the broader contextual factors that shape walkability in South Africa (macro context) and Marabastad, Kroonstad (micro context). The structure of the chapter is illustrated in table 5-1 below.

Table 5-1: Structure of the chapter

Introduction (5.1)		
Spatial context (5.2)		
Macro spatial context (5.2.1)	Micro spatial context (5.2.2)	Interpretation of spatial context in terms of walkability (5.2.3)
Historical context (5.3)		
Macro historical context (5.3.1)	Micro historical context (5.3.2)	Interpretation of historical context in terms of walkability (5.3.3)
Social context (5.4)		
Macro social context (5.4.1)	Micro social context (5.4.2)	Interpretation of social context in terms of walkability (5.4.3)
Economic context (5.5)		

Macro economic context (5.5.1)	Micro economic context (5.5.2)	Interpretation of economic context in terms of walkability (5.5.3)
Policy/legislative context (5.6)		
Macro legislative context (5.6.1)	Micro legislative context (5.6.2)	Interpretation of policy/legislative context in terms of walkability (5.6.3)
Transport modes & travel behaviour (5.7)		
Macro transport modes/travel behaviour context (5.7.1)	Micro transport modes/travel behaviour context (5.7.2)	Interpretation of transportation/travel behaviour context in terms of walkability (5.7.3)
Conclusion (5.8)		

(Source: Author's own construction, 2020)

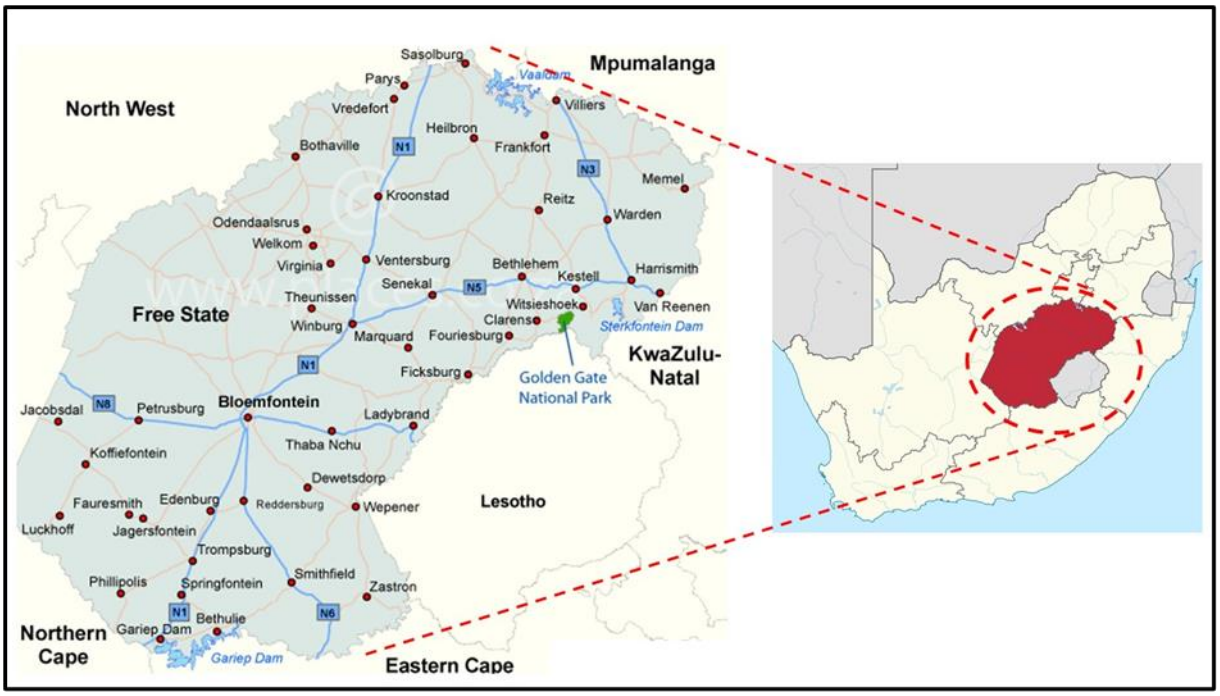
5.2 Spatial context

The spatial context relates to the geographical setting of the case study. This section will introduce the geographical location as well as the spatial model of the case study from the macro scale and the micro scale perspective.

5.2.1 Macro spatial context

In terms of the macro perspective, the study area of Marabastad is located in the Free State Province in the South Africa as illustrated in figure 5-1 below. The spatial model of South African cities and towns was shaped by the Apartheid city, as a result of segregative legislature that caused a spatially dispersed model according to different racial groups (Maylam, 1995:21) Apartheid cities and towns typically consist of "white area" that contained residential areas and the economic centre of the town or city, an industrial area on the outskirts of the city or town and locations or townships outside the periphery of the "white town" (Maylam, 1995:21).

Figure 5-1: Macro spatial context

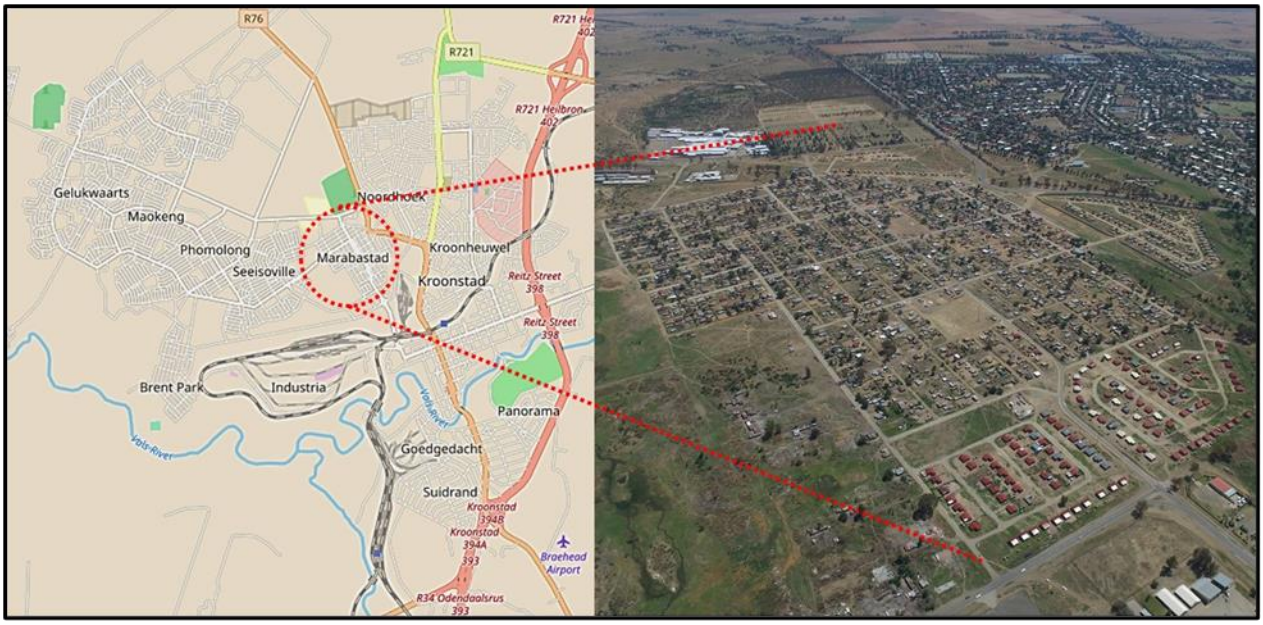


(Source: Constructed from Google images https://en.wikipedia.org/wiki/Free_State_(province))

5.2.2 Micro spatial context

Marabastad, is a residential neighbourhood located in the town of Kroonstad, situated in the Fezile Dabi District and Moqhaka Local Municipality (MLM), as illustrated in Figure 5-2 below. Marabastad is part of several townships (including Seisoville, Brentpark and Moakeng) that are all connected to Kroonstad. Kroonstad is one of many other medium sized cities that similar to metropolitan South African cities that represents the Apartheid City spatial model dictated by urban segregation legislation such as the Natives Land Act, Act 27 of 1913 The cluster of townships (Seisoville, Brentpark and Moakeng) several residential locations and townships are disconnected from the main city Kroonstad where the central business district (CBD) is located.

Figure 5-2: Micro spatial context: South Africa, Free State Province.



(Source: Constructed from Google images)

5.2.3 Interpretation of spatial context in terms of walkability

As indicated in the spatial context, Kroonstad is a fragmented city divided into the original Kroonstad town surrounded by various neighbourhoods including Marabastad, Brentpark, Seisoville and Moakeng. Marabastad is located on the Western side and form part of the township areas that are connected to Kroonstad but separated from the main city of Kroonstad due to Apartheid legislation. The main impact of the segregated Marabastad in terms of walkability is the fact that this type of model supports car-oriented spatial planning instead of pedestrian-oriented planning – thus, not conducive for walking between the CBD and neighbourhoods e.g. Marabastad

5.3 Historical context

The applicable historical context relates to history regarding the location and relocation of groups of people in South Africa. The macro physical context illustrates the impact of the Apartheid's regime and the accompanying legislation on the settlement location and patterns in South Africa. Forced removals of black South Africans are inherently part of South Africa's history, from as early as the 1950's (Botha, 2018:118). The micro historical context will focus on the history of the Marabastad, Kroonstad and the consequences for the community of Marabastad.

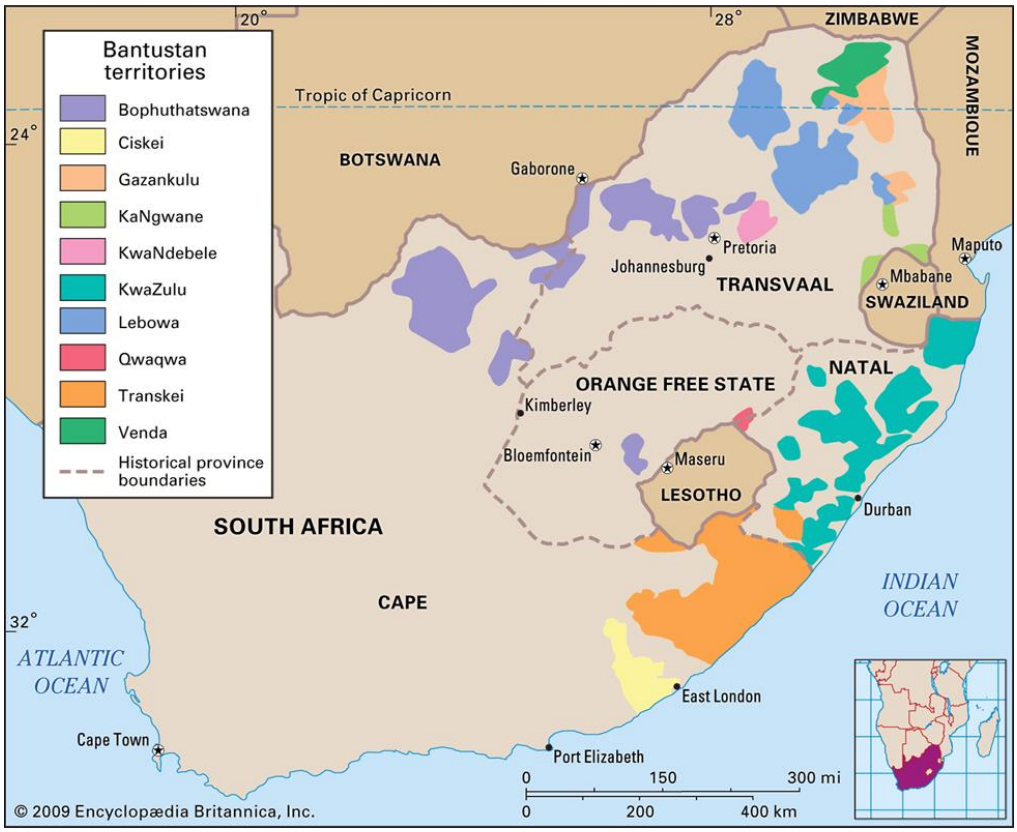
5.3.1 Macro historical context

South Africa's historical context is dominated by its history of Apartheid and is if significance for this case study, as it had a big impact on the settlement and re-settlement of many South Africans, including the residents of Marabastad. In 1948 the National Party, South Arfrica's governing party at that stage, established the Apartheid system (Abel, 2015:1) as a means of control over black South Africans regarding economic and political power (Henrard, 1996:491). Several mechanisms were used to pursue white supremacy, one of which was a panoply of forced removals with the pure intention to divide and segregate the people of South Africa (Henrard, 1996:492).

According to Abel (2015:3) the forced removals were supported by legislation that was passed by the government of the time, the most prominent legislation regarding the relocation of whole communities were:

- The Group Areas Act of 1950 which was responsible for township establishment outside of cities based on racial ethnicity.
- The Population Registration Act of 1950 which was responsible for racially classifying individuals.
- The Bantu Authorities Act of 1951.
- The Bantu Resettlement Act of 1954 which, together with the Bantu Authorities Act of 1951 was responsible for the creation of designated homelands, as illustrated by Figure 5-3 below.

Figure 5-3: Distribution of South African homelands

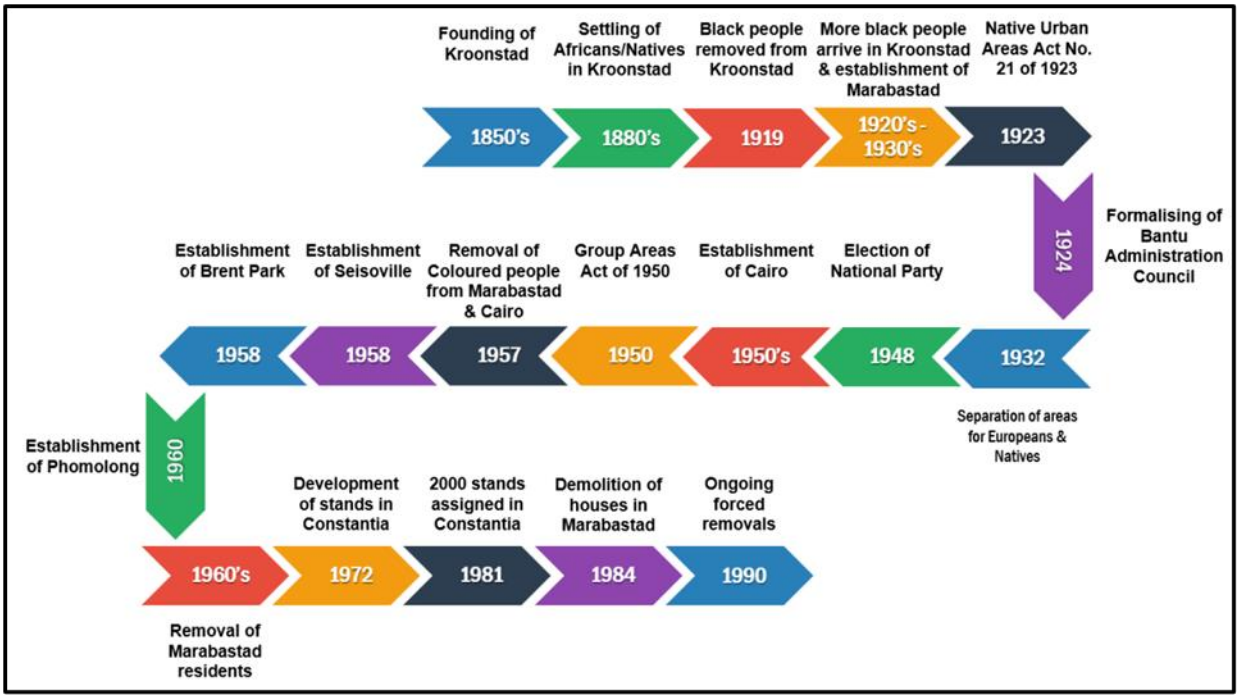


(Source: Britannica, 2020)

5.3.2 Micro historical context

The micro historical context of Marabastad echoes the broader South African history of Apartheid. Marabastad is a former township that has been part of Kroonstad since 1950 (Botha, 2018: 199) while Kroonstad itself was first founded in the 1850's (Moloi, 2012:49). Kroonstad's history regarding the Apartheid regime and accompanying forced removals is illustrated by Figure 5-4 below and elaborated upon in Table 5-2.

Figure 5-4: Marabastad historical development.



(Source: Botha, 2018:132)

Table 5-2: Marabastad historical development

Year(s)	Relevance
1850's	• Kroonstad founded • Establishment of a Municipality
1880's	• Africans (natives) settled in Kroonstad
1919	• White community members called for the removal of the black community members • Black individuals were removed and settled in "A" location
1920's-1930's	• Influx of Black individuals in Kroonstad
1923	• The Native Urban Areas Act, Act No. 21 of 1923stated that provision for housing should be made for the influx. • Housing provision led to the establishment of "B" location (Marabastad)
1924	• Establishment of the Bantu Administration Council
1932	• Techniques to segregate Europeans and Natives were being implemented.
1948	• The National Party won the election

1950's	• The Group Areas Act, Act 41 of 1950 led to the establishment of location "C" which is also known as Cairo
1957	• Establishment of Brent Park for coloured residents • Removal of coloured residents from Cairo and Marabastad
1958	• Establishment of Seisoville
1960's	• Establishment of Phomolong • Marabastad residents were forcibly removed • Many houses/buildings were demolished during the forced removals
1972	• Development of serviced erven in Constantia • Former Marabastad residents occupied the serviced erven in Constantia
1981	
1984	• The Municipality calls for the demolition of the Marabastad built environment
1990 – present	• Many of the original residents of Marabastad returned to Marabastad • Planned re-blocking of Marabastad was set in motion • Community members of Marabastad strongly opposed the replanned layout and demanded that the original layout of Marabastad be restored. • Marabastad was formalised with the establishment of 1 248 residential erven

(Source: Botha, 2018:119-128 ; Moqhaka SDF, 2018:108)

5.3.3 Interpretation of historical context in terms of walkability

Consistent disruption and re-building had an impact on continuity of built environment, impacts on aesthetics and an impact on the walkable environment from aesthetic perspective. Second impact is social of nature – social disruption of communities that impacts on orientation and familiarity of an environment. Forced removals and the accompanying demolition of many homes and prominent buildings in Marabastad destroyed the vibrant social culture that was found in Marabastad. Removing the sociability and complexity elements, that are known elements that contribute positively towards the walkability of a city, from Marabastad.

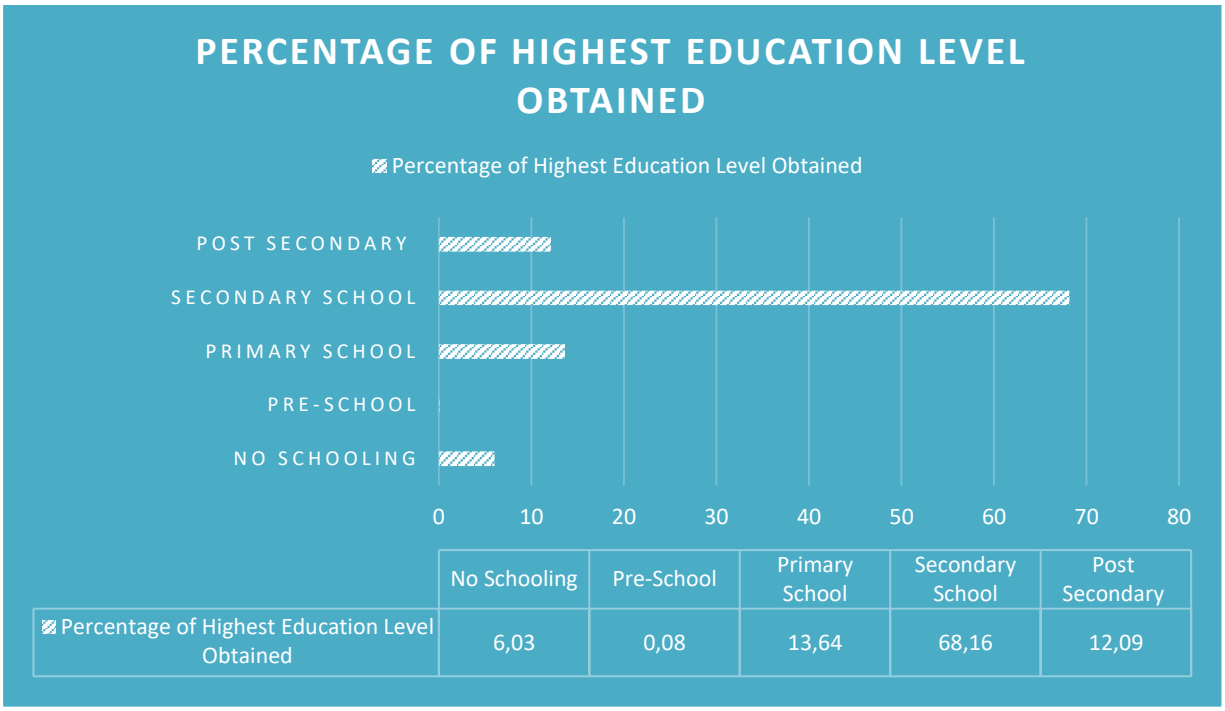
5.4 Social context

The social context relates to the social environment of the case study area that is described in terms of the population size, the education levels as well as the safety of the case study area as these variables impact on the walkability and/or the choice of transportation.

5.4.1 Macro social context

South Africa has an estimated population of 59,62 million people (2020 mid-year estimate) of which 2 745 590 individuals reside in the Free State province (StatsSA, 2016) meaning that 4,6% of the South African population resides in the Free State province. Since Apartheid South Africa has faced an education problem among different racial groups, the Community Survey (2016:14) conducted in 2016 among individuals between the ages of 25 to 64 revealed the following statistics regarding their highest education level, as illustrated in the graph of figure 5-5 below. On a positive note, more than half of the population group finished secondary schooling, meaning that matriculated, thus increasing their chances for employment.

Figure 5-5: Highest education levels amongst South Africans



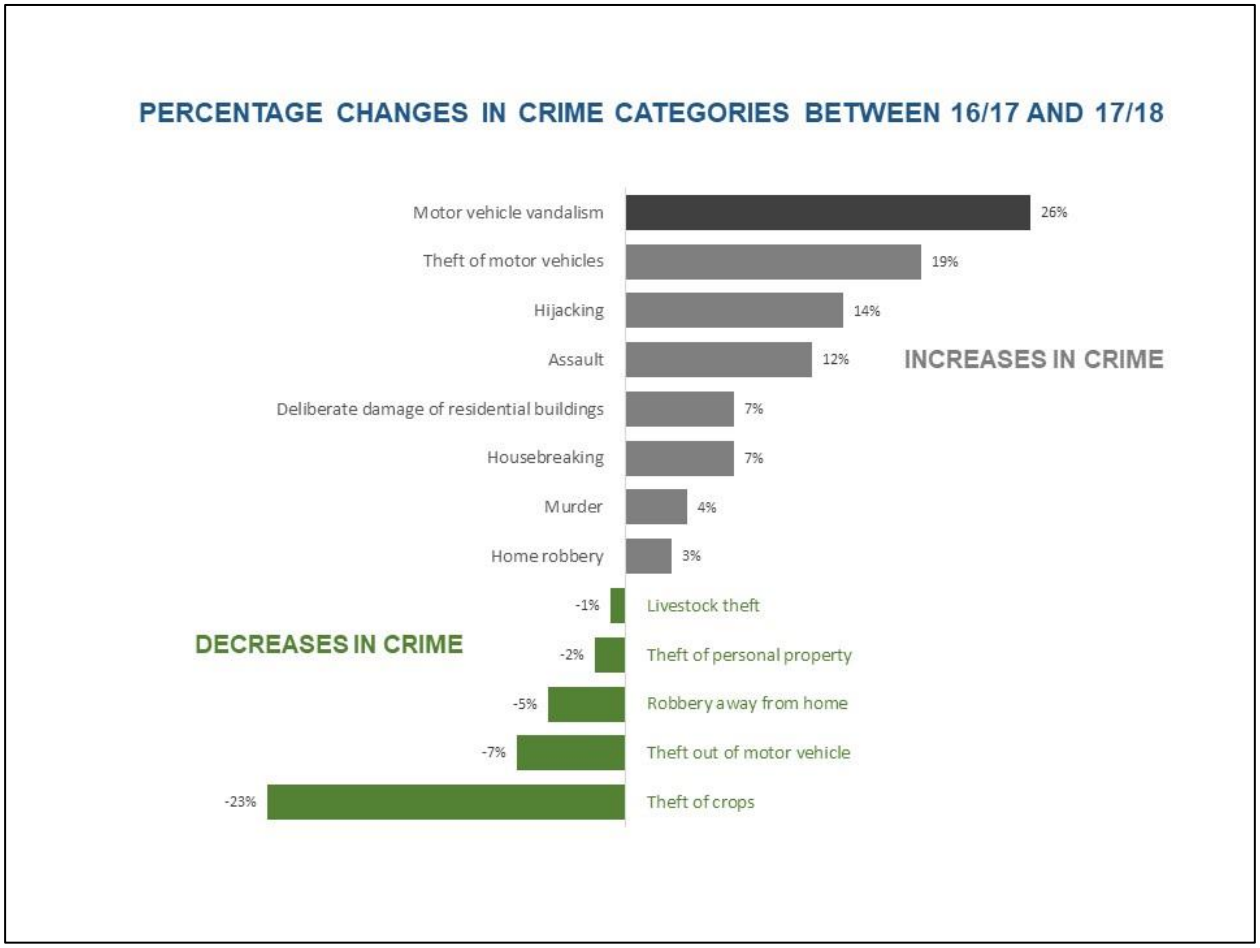
	No Schooling	Pre-School	Primary School	Secondary School	Post Secondary
Percentage of Highest Education Level Obtained	6,03	0,08	13,64	68,16	12,09

(Source: Author's own construction, 2020)

With regards to safety, South Africa has the third largest crime rating of all countries in the world (Numbeo, 2020), calling into question the general safety of South Africa. StatsSa (2017) released the following crime trends between 2016 and 2018, as illustrated by figure 5-6 below. It should be

noted that more physical and aggressive crimes, such as assault, hijacking and murder increased, the conclusion can be drawn that increased occurrence of such violent crimes influences the safety and perceived safety of South Africa. Contributing to the safety statistics with regard to walkability is the fact that only 31,8% of households felt safe whilst walking in the dark.

Figure 5-6: Percentage change in crime statistics



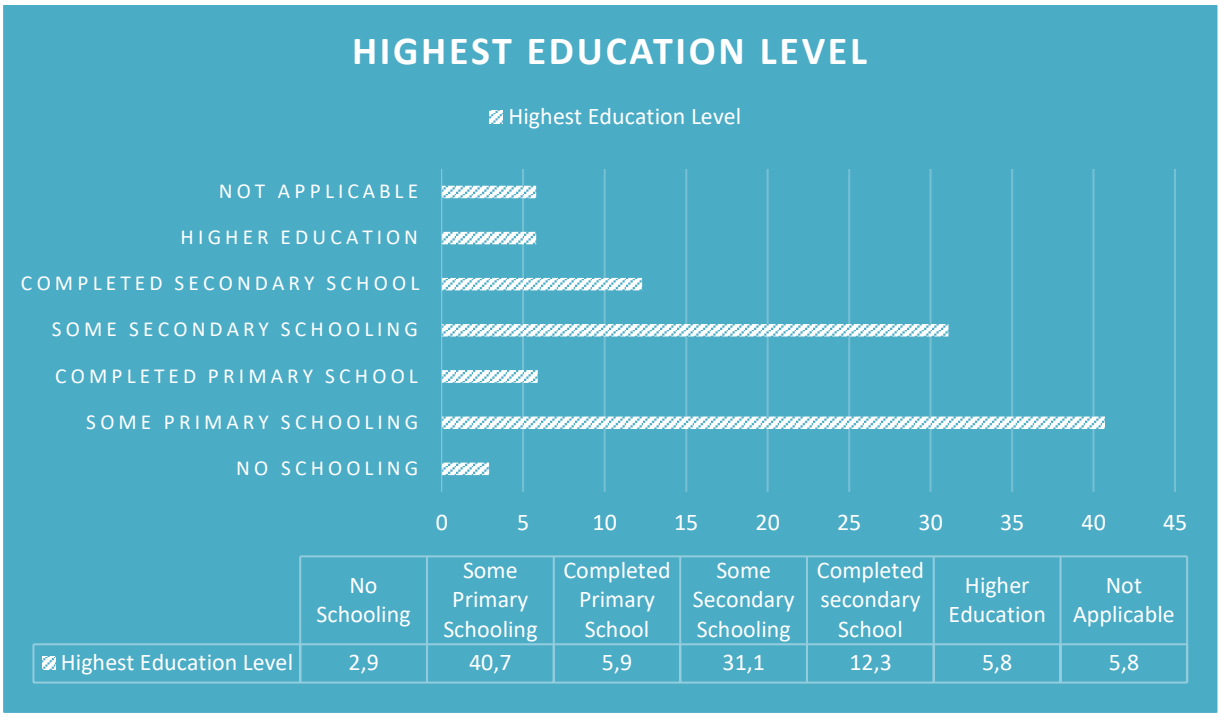
(Source: StatsSA, 2018)

5.4.2 Micro social context

The micro-socio-economic context will focus on the Moqhaka Local Municipality (MLM), Kroonstad, Maokeng, Marabastad and Brentpark all fall under the jurisdiction of the Moqhaka Local Municipality (MLM) (Moqhaka SDF, 2016:2). MLM has a population of approximately 160 532 people and is the third largest Municipality in the Free State Province (StatsSa, 2016). In terms of education, the MLM has the following education statistics, as revealed by the 2011 Census data and illustrated in figure 5-7. Noteworthy is the fact that many individuals received some primary and secondary schooling, but less than 50% of those who received schooling finished grade 7 and/or matric, that influences the economic status (poverty and unemployment

specifically) that will be elaborated on in the following section. Unfortunately, no statistics regarding the crime and safety of the MLM is available.

Figure 5-7: Highest education in the Moqhaka Local Municipality



	No Schooling	Some Primary Schooling	Completed Primary School	Some Secondary Schooling	Completed secondary School	Higher Education	Not Applicable
Highest Education Level	2,9	40,7	5,9	31,1	12,3	5,8	5,8

(Source: Author's own construction, 2020)

5.4.3 Interpretation of social context in terms of walkability

In terms of the social context the variable that most influences the walkability is the safety element. Unsafe environments and fear of violent crime will directly influence individual's transportation choice. Education however is influenced by the distance between schools and residential area, as many individuals reported that they left school due to the great distances between educational institutions and residential neighbourhoods (StatsSa, 2016).

5.5 Economic context

Economic variables also influence the walkability of individuals. The following section will analyse economic variables, such as income levels, employment status and poverty levels surrounding the case study area.

5.5.1 Macro economic context

The crippling state of the South African economy can be observed in the living conditions of the average South African. A total of 56,8% of South Africans live in poverty. A concerning 61,9% of the residents of the Free State Province live in poverty (StatsSa, 2016). The main contributing factor to the poverty status is the South African unemployment figures, 30,8% of all South Africans are unemployed according to the National unemployment rate (StatsSA, 2016), that increased by more than 7% from 2011 to 2016. The average South African income level, at R 33 034,00 (Statista, 2019), supports the fact that more than 50% of South Africans live in poverty.

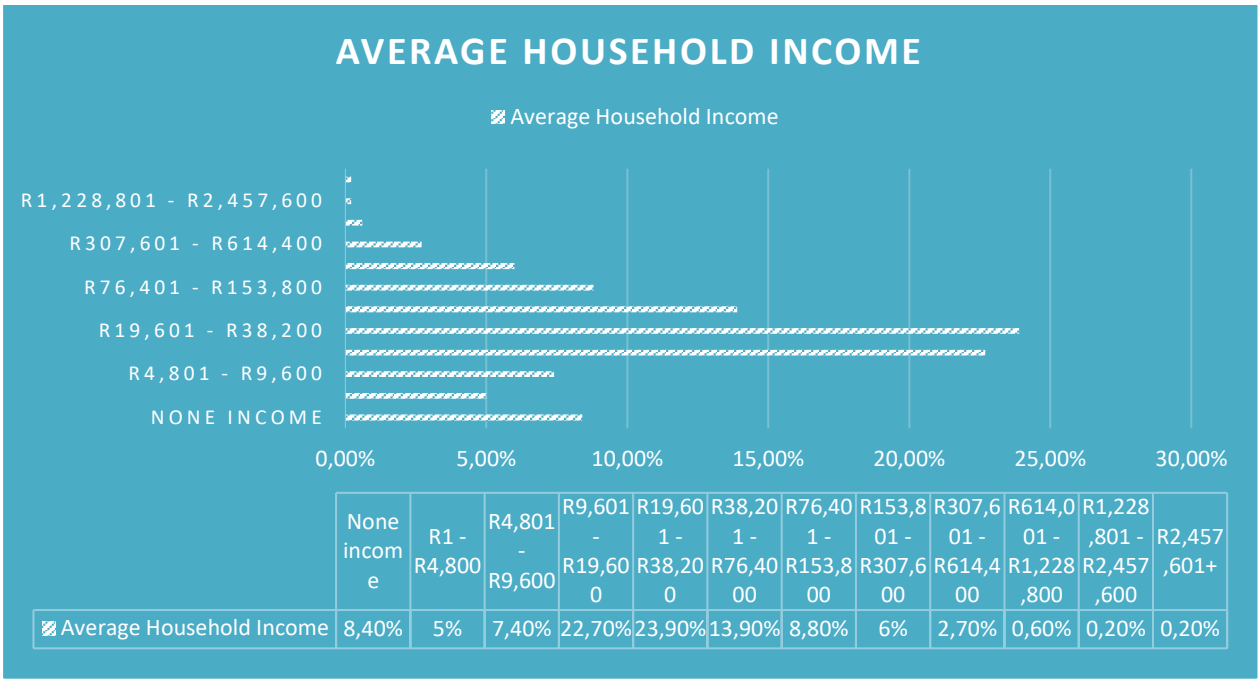
5.5.2 Micro economic context

The MLM has the following employment statistics for individuals aged between 15 and 64, as recorded during the 2011 Census:

- 36 040 individuals employed
- 19 554 individuals unemployed
- 47 141 individuals claim to not be economically active

The individuals who fall under the economically inactive category can also be classified as unemployed, making the actual unemployment figure for individuals aged 15 to 64 a total of 66 695. The census data of 2011 also offered an insight regarding the average household income of the MLM residents, as illustrated in figure 5-8 , the mean average household income falls between R19 601,00 and R 38 200,00 that correlates with the South African average household income of R33 034,00.

Figure 5-8: Average household income of MLM residents



	None income	R1 - R4,800	R4,801 - R9,600	R9,601 - R19,600	R19,601 - R38,200	R38,201 - R76,400	R76,401 - R153,800	R153,801 - R307,600	R307,601 - R614,400	R614,001 - R1,228,800	R1,228,801 - R2,457,600	R2,457,601+
Average Household Income	8,40%	5%	7,40%	22,70%	23,90%	13,90%	8,80%	6%	2,70%	0,60%	0,20%	0,20%

(Source: Author's own construction, 2020)

5.5.3 Interpretation of economic context in terms of walkability

The economic context is of importance because it highlights the importance of neighbourhood walkability. More than half of the population lives in poverty and earn less than R3 000,00 per month and cannot afford to own a private vehicle, meaning that residents are subject to expensive public transport or not working at all, as such people get caught in the poverty trap. A more walkable city will provide more opportunities to access destinations or cheaper public transportation.

5.6 Policy/legislative context

The following section evaluates policies and legislation, at both macro scale and micro scale, that influences or guides development with regards to transportation and pedestrian planning and development.

5.6.1 Macro policy/legislative context

The National Development Plan (NDP) mentions the word "pedestrian" twice throughout the whole 489-page document; providing pedestrian walkways due to its essentiality towards health

is listed as a priority to achieve the 2030 vision (NDP, 2012:335), however no further mention or implementation plan is offered. The provision of more accessible and affordable public transport is however listed as a priority throughout the NDP that will improve the mobility of individuals living in poverty (NDP, 2012:28). The National Spatial Development Framework of 2018 (NSDF) calls for more people-focussed infrastructure investment with specific mention of pedestrian walkaways (NSDF, 2018:97) but also fails to mention how this is to be implemented. The purpose of these national policy documents is however to refer to principles, it is the responsibility of local government to implement such principles.

The Spatial Planning and Land Use Management Act, Act 16 of 2013 (SPLUMA) does not mention or dictate the development and/or planning of pedestrian-oriented infrastructure in any way. SPLUMA does however make it compulsory for cities to be more sustainable and efficient, improved walkability fits in with the context of efficiency and sustainability. The National Transport Master Plan 2050 also fails to consider the upgrading or development of pedestrian infrastructure.

5.6.2 Micro policy legislative context

The MLM has three different policy documents that guides the future development concerning the area, these are the Integrated Development Plan, the Spatial Development Framework, and the Land Use Management Scheme. The Moqhaka Integrated development Plan (IDP) mentions the need for the development and upgrading of several pedestrian bridges, however none of them are situated in Marabastad, the IDP marked the addition of speed bumps, to improve pedestrian safety, as an urgent priority however no funds have been allocated towards the project (MLM IDP, 2020:297).

The Moqhaka Spatial Development Framework (SDF) 2019/2020 notes that specific measure need to be taken in order to ensure pedestrian safety along Piet de Vries Road in Marabastad (MLM SDF, 2019:90) but fails to mention what exactly these “specific measures” are. The SDF also provides for the completion of the rehabilitation of the wetland between Marabastad and Seisoville as flooding causes an unsafe environment for pedestrians (MLM SDF, 2019:114). The SDF provides no further development guidelines to accommodate pedestrians.

The Moqhaka Land Use Scheme (LUS) makes provision for pedestrian infrastructure in the following manner:

- All zoning regulations has an additional provision stating that pavements in front of erven may not be obstructed or used for any other purpose than pedestrian traffic.
- Vegetation such as plants and trees may in no way obstruct the visibility or pathway of pedestrians.

- The safety of pedestrians in car parks should be enhanced by the appropriate lighting.
- The Municipality may prohibit any development that will cause danger to the pedestrians (MLM LUS, 2018)

The MLM LUS also does not mention any plans improve the pedestrian environment, it does however aim to protect the existing pedestrian spaces and the safety of pedestrians

5.6.3 Interpretation of the policy/legislative context in terms of walkability

From the discussions above it is clear that the incentive to create pedestrian infrastructure exists but is very weak as it is not even mentioned in the NATMAP 2050. South African policies and legislations have failed to include the development of pedestrian infrastructure as a planning priority and the little incentive that does exist is not implemented adequately.

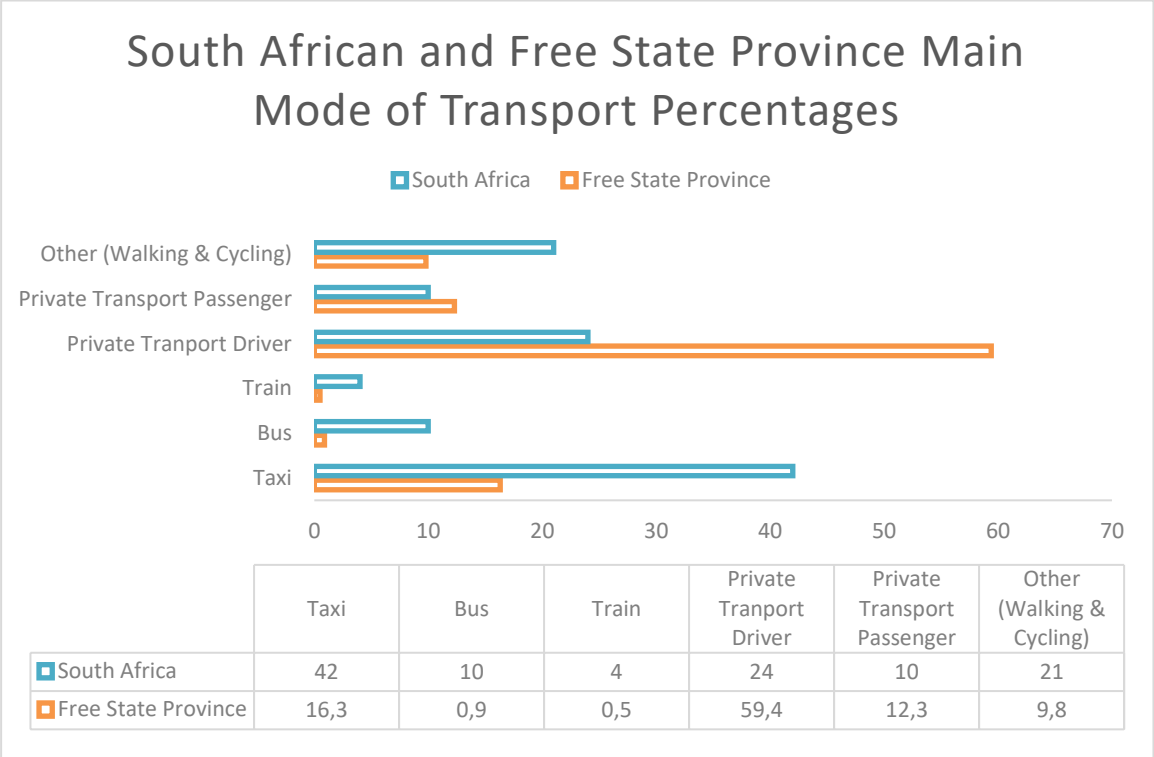
5.7 Transport modes/travel behaviour

The following section will explore the different trends in transportation at a national, provincial, and municipal scale. The section will give insight regarding the most popular modes of transportation and the frequency of use.

5.7.1 Macro transportation context

Of particular importance regarding the case study and the nature of the research is statistics pertaining to the travel behaviour of individuals. Figure 5-9 is a graph depicting the travel mode percentages of the Free State Province out of the South African percentages, as identified by the National Household Travel Survey of 2013. An analysis of the figures shows that the majority of South Africans utilise public transport modes, in the Free State however the majority individuals make use of private transport modes whether it be a car, bakkie or truck (StatsSA, 2016 ; NHTS, 2013).

Figure 5-9: South African vs Free State main modes of transport



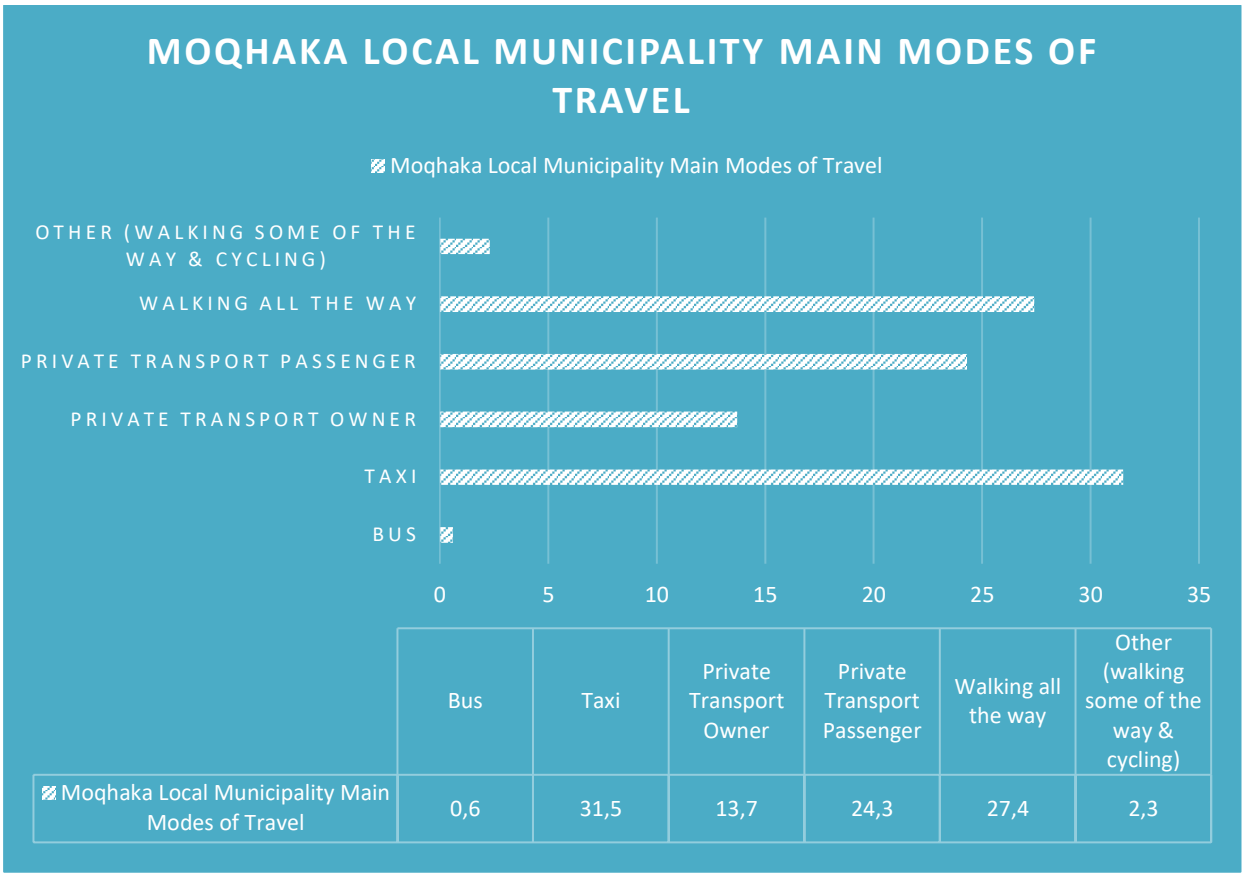
	Taxi	Bus	Train	Private Tranport Driver	Private Transport Passenger	Other (Walking & Cycling)
South Africa	42	10	4	24	10	21
Free State Province	16,3	0,9	0,5	59,4	12,3	9,8

(Source: Author's own construction, 2020)

5.7.2 Micro transportation context

As discussed in the macro context the travel and transport statistics is of significant importance given the manner of the research topic. Census data revealed that only 25,7% of the Moqhaka population own a private vehicle/motorcar (StatsSA, 2016). The National Household Travel Survey offers a more in-depth look at the utilisation of different transport modes, as illustrated by the graph depicted in Figure 5-10. The graph reveals that the most prominent travel modes are travelling via taxi, walking, and travelling as a passenger in private transport (car, bakkie or truck) (NTHS, 2013) which makes sense as only 25,7% of the MLM residents own a private vehicle.

Figure 5-10: Moqhaka Local Municipality Main modes of transport



	Bus	Taxi	Private Transport Owner	Private Transport Passenger	Walking all the way	Other (walking some of the way & cycling)
Moqhaka Local Municipality Main Modes of Travel	0,6	31,5	13,7	24,3	27,4	2,3

(Source: Author's own construction, 2020)

5.7.3 Interpretation of transportation context in terms of walkability

The transportation context offers direct insight into the transportation trends of the MLM's residents. The fact that 27,4% of the residents walk all the way to places of employments, education and/or service justifies the area chosen for the case study as the respective locations under the governance of the MLM are walking cities but not necessarily walkable cities.

5.8 Conclusion

The contextualisation of the case study area illuminated several variables that directly and indirectly influence the walkability of the case study area. The Apartheid city spatial model, paired with the history of segregation and forced removals resulted in racial segregation, meaning that the residents of Marabastad are far from the economic opportunities of Kroonstad, as well as

services such as education and healthcare. The education safety context also directly influences the walkability as people feel unsafe to walk, specially during night times. Income, employment and poverty statistics directly correlate with each other as the unemployment and poverty numbers are quite high, resulting in people being subject to walking as it is the only transportation mode that they can afford. A high number of pedestrians however does not inspire policy makers to include pedestrian infrastructure plans in policies and legislation.

CHAPTER 6 EMPIRICAL FINDINGS

6.1 Introduction

The aim of this chapter is to present an analysis of the data that was generated about the walkability in Marabastad. As described in chapter two of this dissertation two phases of data were generated and analysed, including secondary data from a primary study conducted in 2018 and survey data that was collected under the guidance of the prescriptions of the AARP's walk audit toolkit. This chapter will present the themes about walkability that have emerged from the content analysis of the secondary data (interview transcriptions). Phase two will present a spatial analysis of different aspects of a neighbourhood that are also influential in the degree of walkability of the neighbourhood. The data sets used for phase one and phase two have been generated within Marabastad. Table 6-1 offers a summary of the structure of this chapter

Table 6-1: Structure of the chapter

Introduction (6.1)					
Phase one: Secondary data content analysis (6.2)					
Coding (6.2.1)			Emerging themes (6.2.2)		
Phase two: Survey spatial analysis (6.3)					
Crossing streets and intersections (6.3.1)	Sidewalks (6.3.2)	Driver behaviour (6.3.3)	Safety (6.3.4)	Comfort and appeal (6.3.5)	Overall ratings (6.3.6)
Conclusion (6.4)					

(Source: Authors' own construction, 2020)

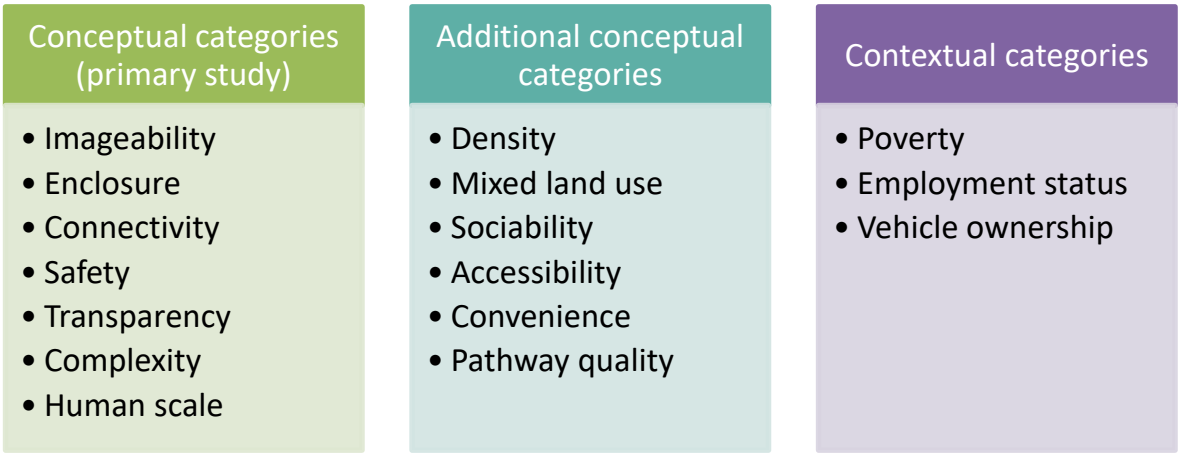
6.2 Phase one: Secondary data analysis

As discussed, the data generation for this study consisted of two phases, as will the data analysis. The secondary data sets that have been used for this dissertation included transcriptions from 153 semi-structured interviews that were conducted in 2018 (referred to as a pilot study in this case) with similar aims and objectives of but with new research questions. The secondary data has been analysed according to six prescribed steps for content analysis, as discussed in Chapter two of this study. The steps include:

- Step1: Read and reread interview transcriptions
- Step 2: Divide texts into meaning units;
- Step 3: Condense meaning units further
- Step 4: Label condensed meaning units by forming codes
- Step 5: Group codes into different categories
- Step 6: Create themes

As this is a secondary data set, that was used by the researcher in a primary study, step one has already been completed. As for step two, the primary study used the following as the coding categories: the element of -imageability, -enclosure, -connectivity, -safety, -transparency, -complexity, and the element of human scale. For this study, a new coding process was followed and new codes have been developed. In some instances codes from the primary study were reselected while other codes were identified that were specifically relevant for the secondary study. The complete codes are displayed in Figure 6-1 including the following codes: safety, density, mixed land use, connectivity, imageability, enclosure, human scale, transparency, complexity, sociability, accessibility, convenience, pathway quality (sidewalks), poverty, employment and vehicle ownership.

Figure 6-1: Conceptual and contextual categories



(Source: Author's own construction, 2020)

6.2.1 Coding

The next step involved the coding of the transcriptions. The responses from the interviews were analysed to confirm whether these categories were relevant to the pedestrians, a category was deemed irrelevant if there was no mention thereof at all. The next indication was whether these

categories where present or absent in the spatial environment. Table 6-2 below offers a summary of the coding of the secondary data set.

Table 6-2: Coding the secondary data set.

Category	Relevant/ irrelevant	Present/ absent	Supporting quotes
Imageability	Relevant	Present	*"Let us not destroy everything and bring new things"* *"ja, it's decay"* *"dis baie skoon ook, vir n lokasie"* *"one of the neglected and poor of the poorest locations"* *"This place was nice and clean"* *"Hulle maak ons plek gemors, hy lyk vuil"* *"die huisies is vervalle"* *"this environment must be clean"* *"What I need the most, the environment must be clean"* *"Well, I love this place, ne. I just don't feel good about it"*
Enclosure	Irrelevant	Absent	N/A
Connectivity	Relevant	Present	*"You can walk all of Marabastad"* *"..nie vêr daarvan af nie,in loopafstand"* *"dis n tipiese grid wat maar net daar neergesit is"*
Safety	Relevant	Absent	*"You can hardly sleep during the night because there are a lot of thugs"* *"Mense se huise word ingebreek, mense se kinders gemolesteer en al daai"* *"Daar is straatligte in jou straat,dit is veilig omin die straat af te stap want dis belig, dis nie altyd die geval hier nie"* *"There are so many old ladies that are being killed, eh raped and killed by small children"* *"the drugs is the big problem"* *"when you walk at night, its's very dangerous at night"*

Category	Relevant/ irrelevant	Present/ absent	Supporting quotes
			"Hayi, it's not safe at all"
Transparency	Irrelevant	Present	N/A
Complexity	Relevant	Present	*"There were buildings there, they were beautiful"* *"die huisies is vervalle"* *"die natuurlike ongewing in die dorp bestaan letterlik nie"* *"We don't have the gardens"*
Human scale	Irrelevant	Present	N/A
Density	Irrelevant	Present	N/A
Mixed land use	Relevant	Absent	*"there was many shops here"* *"Hierdie mense het nie daai fasiliteite nie"* *"Dis nie n tipiese woondbuurt met sterk sosiale strukture, skole,daar is eintlik niks nie"* *"And the clinic, it's far away from here. We don't have a clinic, we don't have a crèche, we don't have nothing here"* *"people who're living here don't have a clinic, don't have a ground"*
Sociability	Relevant	Absent	*"Socially here, it is a hell of a problem now"* *"when people socialise, it's how people live, how the people come together"* *"Daars n behoefte dat die mense wil bymekaarkom"* *"..kultuur van deelnemendheid"* *"Dis nie n tipiese woondbuurt met sterk sosiale strukture, skole,daar is eintlik niks nie"*
Accessibility	Relevant	Present	*"You can walk all of Marabastad"*
Convenience	Relevant	Absent	*"And the clinic, it's far away from here. We don't have a clinic, we don't have a crèche, we don't have nothing here"* *"Everything is far from the area"* *"schools are farm from here"* *"Because everything is far from the area"*

Category	Relevant/ irrelevant	Present/ absent	Supporting quotes
Pathway quality	Relevant	Absent	*"Marabastad het meer gepave-de paaie as wat daar voertuie is*
Poverty	Relevant	Present	*"daars nie ekonomie nie"* *"Mense in Marabastad lewe van hand tot mond"* *"one of the neglected and poor of the poorest locations"*
Employment/ unemployment	Relevant	Present	*"..you can find most of the people are not working"* *"unemployment is very high"* *"And most of the things we need, unemployment is very high"* *"No job."* *"Ons kan nie werk kry nie, ons sukkel om te werk"*
Vehicle ownership	Relevant	Absent	"*Marabastad het meer gepave-de paaie as wat daar voertuie is"* *"We don't have the motor vehicle, the motors*"

(Source: Author's own construction, 2020)

Table 6-2 indicates that seven of the identified elements were absent from the spatial environment, these were enclosure, safety, mixed-land uses, sociability, convenience, pathway context and vehicle ownership.

- Enclosure element plays a significant role in the walkability of a neighbourhood as it provides a feeling of perceived comfort, as well as shade; Marabastad has very few street trees and no large buildings that would have contributed to the enclosure aspect.
- Safety, and specifically perceived safety is listed as one of the most important elements of walkable neighbourhood; safety is however lacking in Marabastad as it came forward as one of the biggest concerns that the interview participants mentioned.
- Sociability is absent due to the fact that Marabastad does not offer its residents many social activities to take part in other than the local shebeen; the sociability element, or lack thereof, links up with the absence of mixed land uses, these two aspects are relevant to walkability as it creates destination for pedestrians to walk to.

- The pathway quality was also noted as absent due to the state of the available pathways, that are extremely narrow, very close to the road and only limited to parts of two streets.
- Vehicle ownership is an indicator of the economic status of the residents, a large number of pedestrians would either indicate that the neighbourhood is highly walkable or that the residents have no other form of transportation; the lack of vehicles indicated the latter. The following section will discuss the emerging themes from the transcriptions

6.2.2 Theme and sub-theme generation

Altogether three themes emerged from the data, with their respective sub-themes, these were:

Main theme 1: The importance of the spatial and built environment character to create a walkable neighbourhood. Characteristics that emerged as important in the context of walkability include the following sub-themes: Imageability (sub-theme 1.1); enclosure (sub-theme 1.2); connectivity (sub-theme 1.3); complexity (sub-theme 1.4); density (sub-theme 1.5); and mixed land use types (sub-theme 1.6).

Main theme 2: The experience of the social environment as unsafe and not sociable. Characteristics that emerged as important in the context of walkability include the following sub-themes: Safety (sub-theme 2.1); and sociability (sub-theme 2.2)

Main theme 3: Economic indicators that force Marabastad residents to walk. Characterisitcs that emerged as important in the context of walkability include the following sub-themes: Employment status (3.1); poverty (3.2); and vehicle ownership (3.3)

From the findings presented in table 6-2 all but four categories were deemed relevant to the walkability of Marabastad as they were directly and/or indirectly addressed during the semi-structured interviews. The secondary data findings can mainly be categorised as positive and negative themes that were either present or absent inMarabastad. On a positive note Marabastad is viewed as highly connected and accessible, most participants reported that they walk every day and that they walk daily and are able to navigate Marabastad with ease. While the participants of Marabastad used to have a very positive mental image of Marabastad before forced removals took place, they were still attached to the memories of a previous Marabastad and they desire for Marabastad to be “returned to its former glory”.

- **Theme 1**: The importance of the spatial and built environment character to create a walkable neighbourhood

The imageability of Marabastad emerged as an important theme from the transcriptions. Many participants expressed their discontent with the image of Marabastad, by stating that Marabastad is *"one of the neglected and poor of the poorest locations"* , the discontent attributed to the fact that the streets and open areas are treated like dumping sites. A few participants commented on the cleanliness of Marabastad as well; the erven are very well kept, neat and clean however the same cannot be said for all that lies beyond the erf border. Many roads and road reserves are reported to have open manholes and sewage running down the road, this creates a negative experience as it causes foul sights and smells. Although erven are kept neat and clean most of the buildings situated in these erven are dilapidated, further contributing to the negative image that Marabastad portrays**.** As a highly walkable area is one that is inviting, visually appealing and comfortable for the pedestrian the imageability of Marabastad does not contribute toward a positive walkable environment.

Marabastad is reported to be very accessible and connected,as participants stated that : *"You can walk all of Marabastad,"* these functions are however not very useful as residents still have to travel to access basic services and shops. Even though the grid pattern contributes to an easy-to-navigate walkable environment, Marabastad mostly consist of residential areas The issue of convenience and mixed land uses was thus another emerging theme, more specifically the lack of convenience and mixed land uses. Many participants expressed a need for clinics and schools in their immediate surroundings.

- **Theme 2:** Experiences of the social environment as unsafe and not sociable

Despite the positive aspects, several negative themes emerged from the coding, the strongest theme being safety. When asked about the safety of Marabastad, almost all the participants indicated the environment as being unsafe. Their safety concerns were mainly due to drug abuse in the neighbourhood, criminal activities such as robbery, rape, assault and murder and the lack of adequate lighting. The criminal activity is amplified by the extreme poverty and unemployment levels that force individuals into a life of crime. As discussed in Chapter four, safety is one of the most important attributes of a walkable environment; the reported safety, or lack thereof, speaks volumes to the degree to which Marabastad is walking friendly.

Another emerging theme form the transcriptions is concerned with the sociability of Marabastad; many participants shared stories regarding the vibrant social life that was experienced in Marabastad before the forced removals and demolitions. The lack of community centred facilities contributes to the lack of sociability and lost sense of community as was once present in Marabastad. Many participants expressed a desire for community facilities and sports fields in

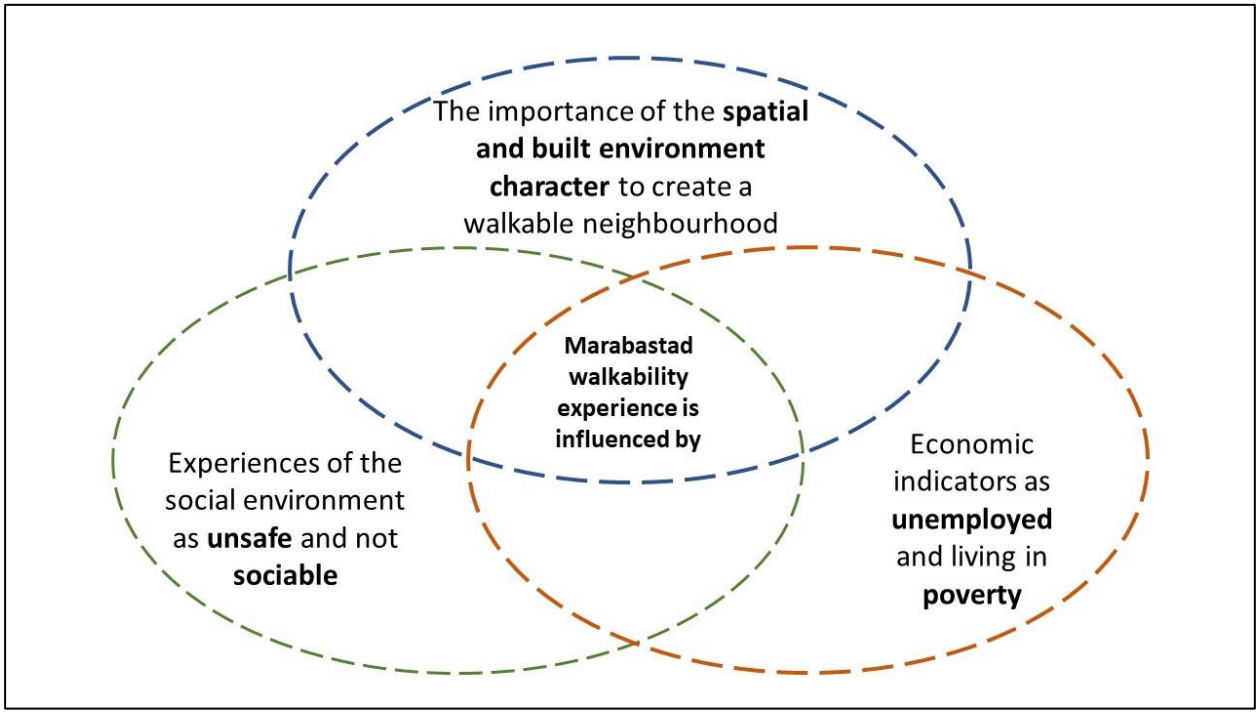
Marabastad as they are currently hosting community meetings under a tree and children are forced to play in the streets

- **Theme 3:** Economic indicators as poverty and unemployment

Participants also expressed the hardship they experience when needing to travel out of Marabastad to access basic services and shops, a participant stated that: "*Everything is far from the area".* Due to the high levels of poverty and unemployment it is not always possible to afford public transport resulting in participants having to walk great distances to their desired destinations. The need for employment was also expressed as participants claimed that: *"you can find most of the people are not working".* The extreme poverty is a direct result of the unemployment rates in Marabastad

Figure 6-2 offers a summary of the most important themes that emerged from the secondary data analysis.

Figure 6-2: Emerging themes



(Source: Author's own construction, 2020)

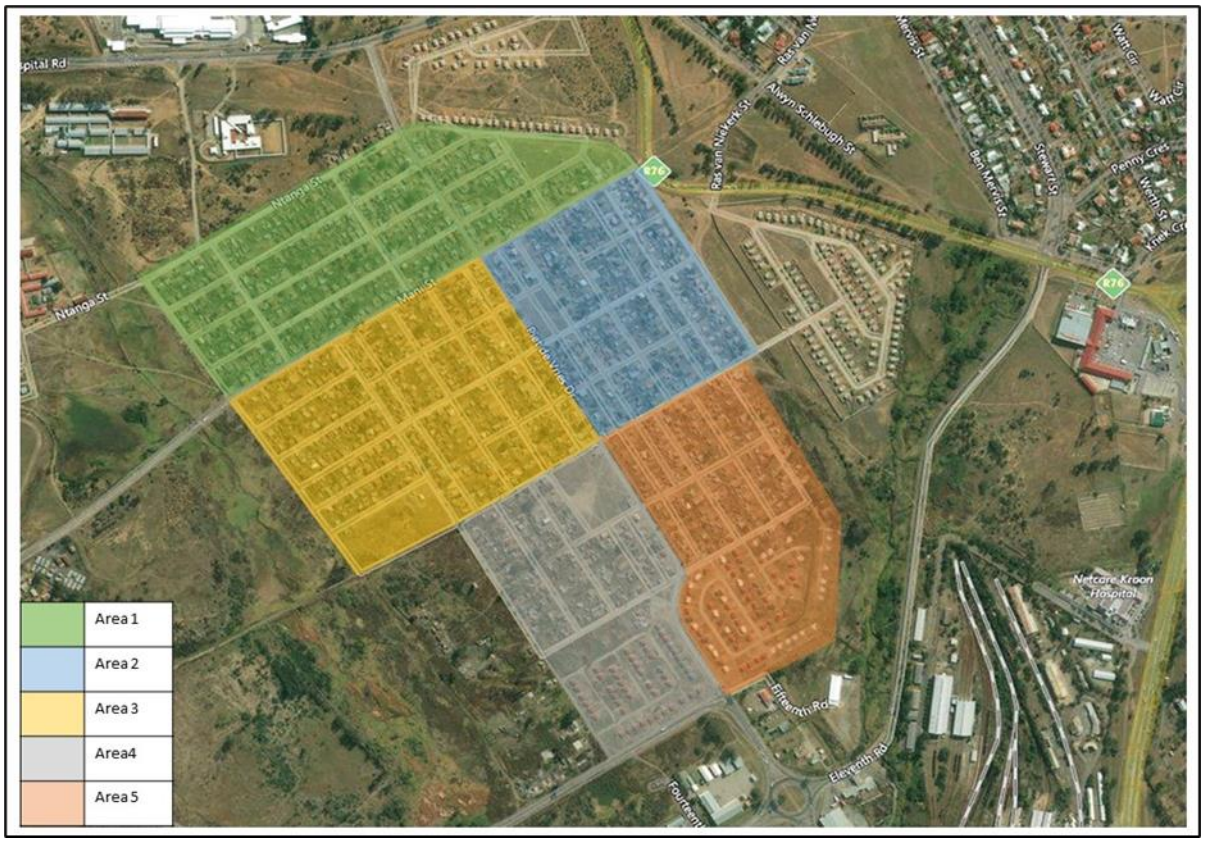
6.3 Phase two: Survey spatial analysis

The second phase of data generation consisted of the analysis of the spatial environment by using the AARP Walk Audit Toolkit (refer to section 2.5 in Chapter 2, as well as Annexure B) .As explained in Chapter 2 the audit tool was used to assess the following aspects of walkability:

- Crossing streets and intersections
- Sidewalks
- Driver behaviour
- Safety
- Comfort and appeal
- Ratings and observations

Each of these parts assesses a different aspect that relates to walkability within the neighbourhood that is being audited. The audit was conducted throughout the neighbourhood of Marabastad; Marabastad was divided into 5 different areas as illustrated in Figure 6-3. in order to assign a small workable area to each group of fieldworkers who has assisted with the audit tool The following sections each explains the finding of the audited part relation to theory regarding walkability as well as an analysis and discussion of the results of the survey.

Figure 6-3: Walk audit demarcated areas



(Source: Author's own construction, 2020)

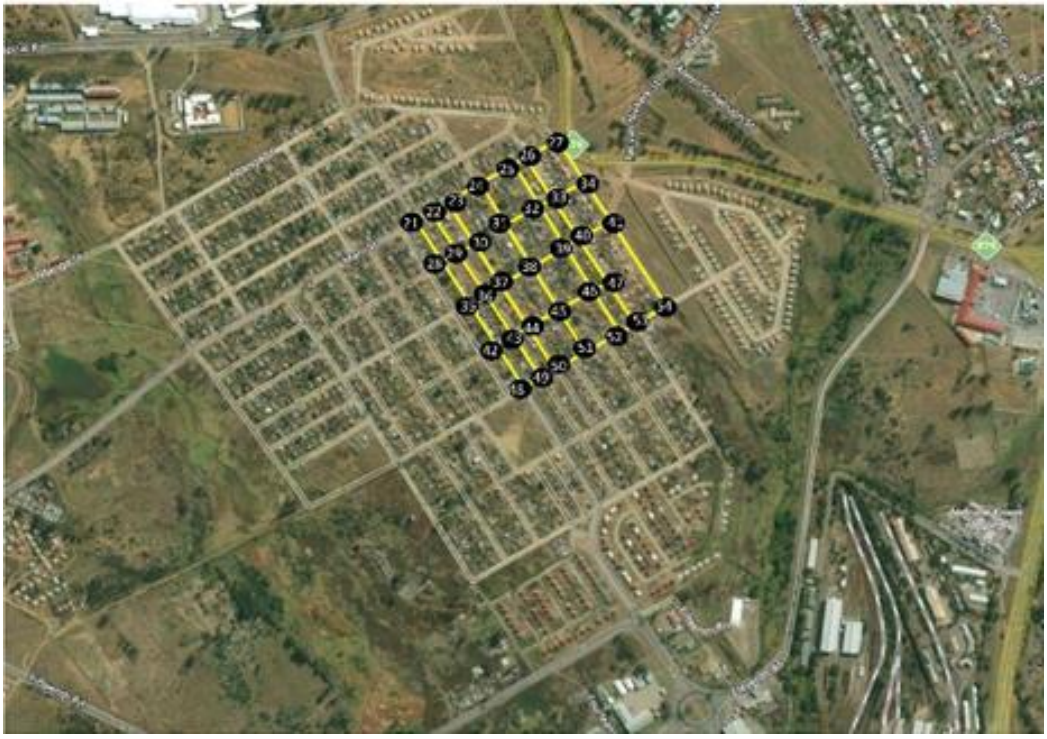
6.3.1 Crossing streets and intersections

The first part of the AARP walk audit toolkit was divided in two separate activities, an observation of the crossing streets and intersections, and a profile analysis on who and how many people made use of crosswalk, respectively. As mentioned Marabastad was divided into five observations areas, the intersections of each area were assigned numbers and judged according to the assignment sheet. In total five number of observation areas and 140 observations points were surveyed in terms of walkability. A detail intersection analysis that formed part of the first field survey is included as Annexure E. ; as Marabastad identifies as a low-income area there is a lack of pedestrian signals, audible signals, push to walk signals and any form of automated traffic signal, therefore the table is simplified to accommodate the real-life situation in Marabastad. Figures 6-4 to 6-8 illustrates the intersections that were observed by each respective walk audit fieldworkers' group. Several intersections were observed twice as a means of proving the reliability of the data. The intersections that were observed twice were on the main streets of Marabastad that carry the largest volume of pedestrian and vehicle traffic.

Figure 6-4: Area 1: Observation points 1-20

(Source: Author's own construction, 2020)

Figure 6-5: Area 2: Observation points 21-54



(Source: Author's own construction, 2020)

Figure 6-6: Area 3: Observation points 55-96

(Source: Author's own construction, 2020)

Figure 6-7: Area 4: Observation points 97-120

(Source: Author's own construction, 2020)

Figure 6-8: Area 5: Observation points 121-140

(Source: Author's own construction, 2020)

The data gathered in part one has provided insight about the conditions that pedestrians have to face at crossings and intersections. The number of intersections along with the grid pattern layout of Marabastad indicates a well-connected neighbourhood that encourages walkability, however no intersection observed in Marabastad had a pedestrian push to walk signal or pedestrian crossing thereby removing the element of convenience and pedestrian safety. The streets are relatively narrow, the widest having to accommodate two lanes, therefore making the streets safer to cross as pedestrians do not have to walk a huge distance to reach the other side. As mentioned, while there is a lack of pedestrian signs and signals, traffic signals indicating a vehicle-oriented environment are found. Stop signs and stop sign indications on the road are present as well as traffic calming measures in the form of speed bump signals and speed bumps, driver behaviour and safety are however evaluated in assignment three and four, respectively.

The second part of assignment one included a pedestrian count, upon a spatial analysis fifteen different observation points were chosen, as illustrated by the observation point map in figure 6-9; table 6-3 offers a summary of the number and profile of the pedestrians observed at each respective observation point. Each observation point has been chosen due to it's location, as they are associated with major transportation routes in Marabastad.

Table 6-3: Summary of pedestrian count

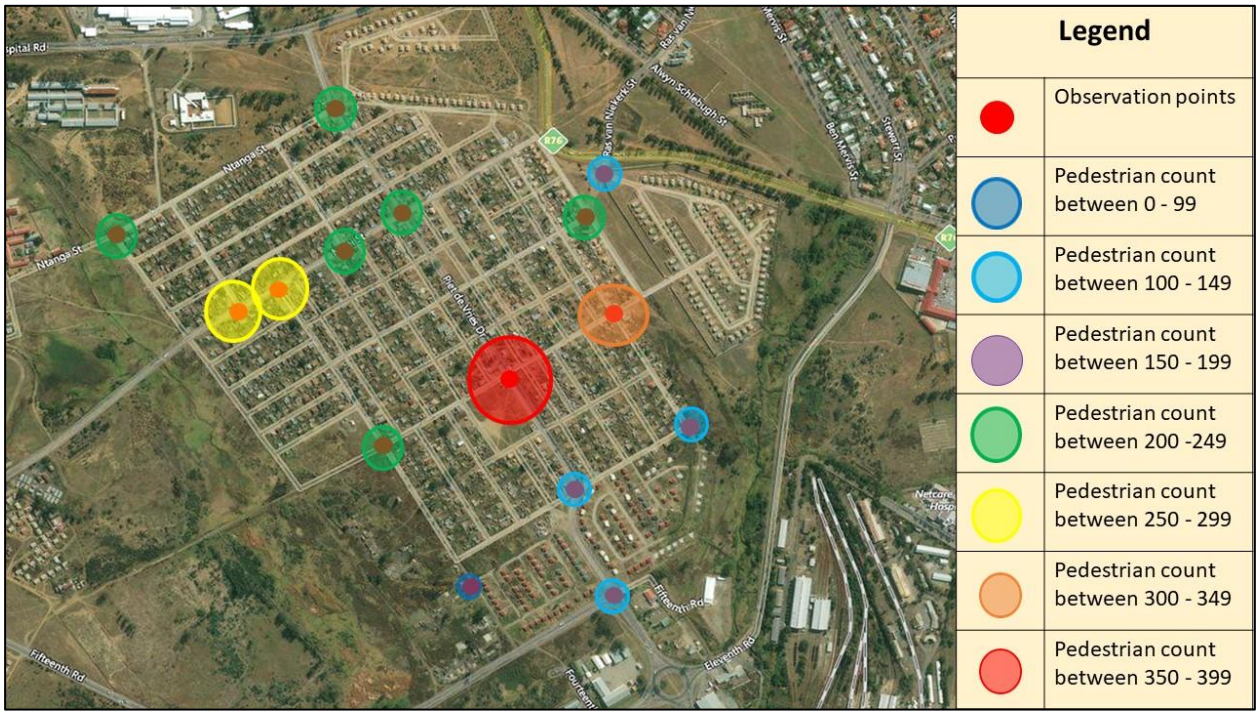
Pedestrian activity audit	Elderly	Adults	Children	Disabled individuals	Total	Bicyclists observed
Observation point 1	30	54	69	0	153	2
Observation point 2	20	57	85	1	163	4
Observation point 3	17	123	120	2	262	3
Observation point 4	17	115	130	1	263	3
Observation point 5	9	50	112	1	172	6
Observation point 6	16	74	91	1	182	6
Observation point 7	14	64	62	0	140	2
Observation point 8	16	83	73	0	172	4
Observation point 9	17	172	140	1	330	4
Observation point 10	13	192	148	1	354	9

Pedestrian activity audit	Elderly	Adults	Children	Disabled individuals	Total	Bicyclists observed
Observation point 11	4	54	100	3	161	6
Observation point 12	4	32	58	0	94	3
Observation point 13	12	87	24	1	124	15
Observation point 14	11	31	50	1	93	8
Observation point 15	21	57	53	1	132	0

(Source: Author's own construction, 2020)

The map in figure 6-9 is produced from the data gathered during the pedestrian count and illustrates the different volumes of pedestrian activity in the different areas of Marabastad. The map indicates that Piet de Vries Drive and Manis Street carry the most pedestrian activity, they are also the two main roads that lead out of Marabastad to Kroonstad and Sinoville. The map also indicates the movement patterns of the pedestrians; pedestrians seem to take the shortest route as possible that leads to either Piet de Vries Drive or Manis Street. The centre of Marabastad seems to be the most popular pedestrian destination

Figure 6-9: Pedestrian activity map



(Source: Author's own construction, 2020)

Crossing streets and intersections interpretation in terms of walkability: The analysis of the intersections revealed that Marabastad has little pedestrian infrastructure e.gcrosswalks, This contributes to the overall experience of participants of the area as unsafe especially for children,. The streets are narrow enough to cross safely, but the overall lack of signage and signalling to indicate exactly where pedestrians should cross is a potential area for intervention.

6.3.2 Sidewalks

Assignment two is an analysis of the sidewalks in Marabastad. The task of the fieldworkers was to assess the sidewalks within their designated area according to the assignment sheet, the assignment sheet contained the following statements:

- There are no sidewalks, paths, or shoulders.
- The sidewalks are not continuous.
- The sidewalk is not wide enough for two people to walk together side-by-side.
- The sidewalk is broken or cracked.
- There is no buffer between traffic and the sidewalk.
- The sidewalks are interrupted by driveways.
- There are no ramps, or they are misplaced.
- The curb cuts are not textured or marked for people with visual impairments.
- The sidewalk is blocked or interrupted by poles, signs, shrubs, dumpsters, low-hanging trees, etc
- Cars, trucks, vendors are blocking the sidewalk
- Other issues and observations

Sidewalks are associated with the element of convenience and the path context element that are known to be influential in the walkability of a neighbourhood, therefore the presence and state of the sidewalks are an important factor regarding walkability. The only designated paved sidewalk in Marabastad is situated in Piet de Vries Drive, as illustrated in figure 6-10. The sidewalk is only on one side of the road and is very narrow.

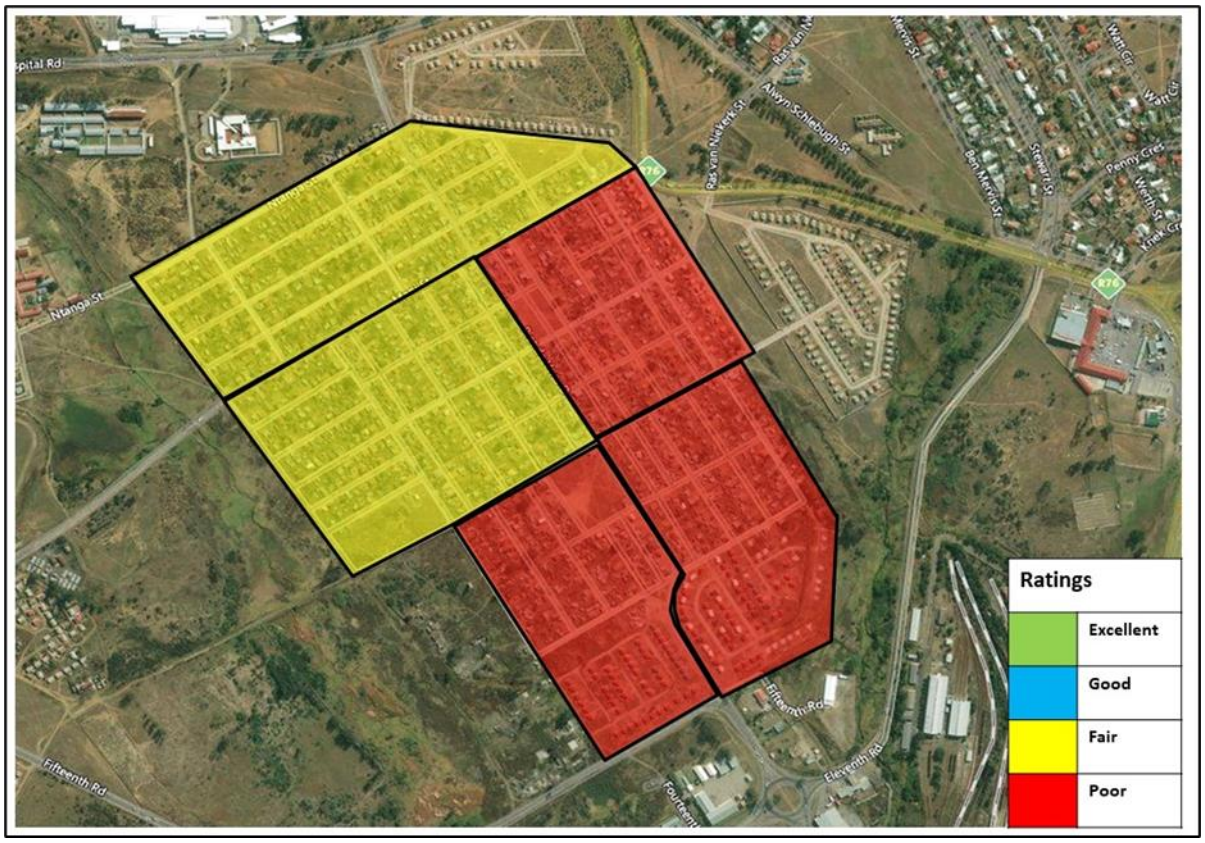
Figure 6-10: Sidewalk analysis

(Source: Author's own construction, 2020)

The narrow manner of the sidewalk paired with the absence of a buffer between the sidewalk and the road creates an unsafe environment for pedestrians as they are not shielded from the moving vehicles. Apart from the one allocated sidewalk pedestrians are forced to walk in the area between the road and the front yards of the erven. These informal paths are described as being narrow, broken, cracked, not-continuous, uneven, blocked by rubble and not pedestrian friendly. The informal paths are directly adjacent to the road and do not offer pedestrians protection from the traffic. In the areas where there are not sidewalks or informal paths pedestrians are forced to walk in the road, creating a potentially dangerous situation for pedestrians.

The assignment sheet also requires that an overall rating of the sidewalks be awarded to the survey area, the evaluation of the areas was rated either excellent, good, fair or poor, figure 6- 11 is a map illustrating the ratings that each area was rewarded. Noticeably the areas with the "poor" rating are also the areas with the most gravel and informal roads. Regarding sidewalks and pedestrian oriented design features Marabastad fails to offer pedestrians a safe or convenient area to walk. Area 4 and 5 both received a "poor" rating even though they are divided by Piet de Vries Drive that has the only paved sidewalk in Marabastad; indicating that the sidewalk does not meet the needs of the pedestrians.

Figure 6-11: Assignment 2 sidewalk ratings



(Source: Author's own construction, 2020)

Sidewalks interpretation in terms of walkability: Figure 6-12 clearly indicates that the sidewalk evaluations only received fair and poor ratings, this can be attributed to the fact that there are only sidewalks on the streets as illustrated in figure 6-11. The limited number of sidewalks are also very narrow and close to the road. In terms of sidewalk provisions Marabastad is underserviced, resulting in a less than ideal walkable environment

6.3.3 Driver behaviour

Assignment three consisted of a survey of the driver behaviour in Marabastad, driver behaviour is of importance as it contributes to the safety element that is influential in the walkability of a neighbourhood. The assignment sheet contained the following evaluation statements:

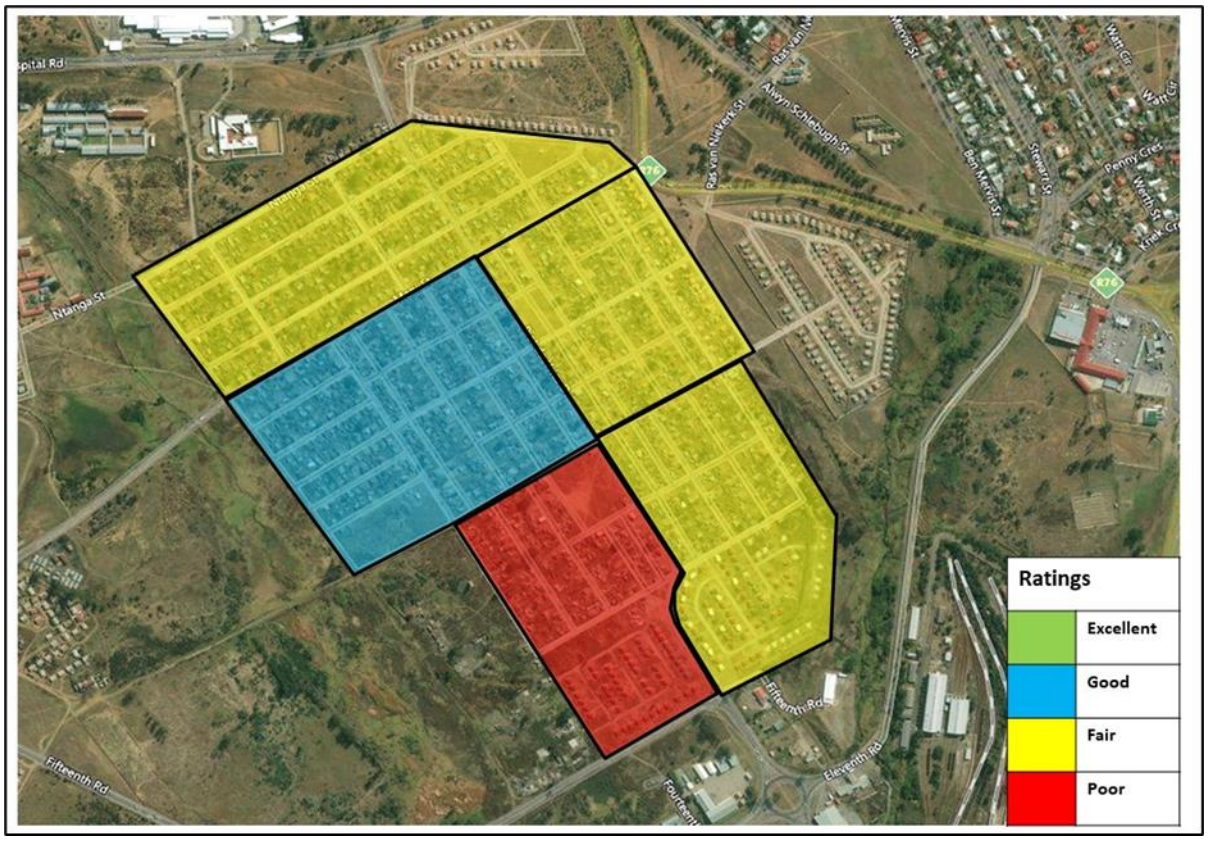
- Drivers do not stop at stop signs
- Drivers do not obey traffic signals

- Drivers appear to be speeding
- Drivers do not yield to pedestrians, especially at right turns
- Drivers do not stop behind crosswalks
- Drivers do not look when leaving or backing out of driveways
- Drivers make unexpected turns/manoeuvres
- Other issues and observations

As mentioned in Annexure E Marabastad only has stop signs, speed bump signs and speedbumps in terms of traffic signa representation. There is a fair amount of stop sign present, however the walk audit reveals that most drivers fail to stop at the stop signs, they do not obey traffic signs, yield to pedestrians or drive at acceptable speeds. The speed bumps are sped over or avoided by manner of driving on the side of the road, defeating the purpose and functionality of the traffic calming measure. All survey areas reported that drivers make unexpected stops, turns and manoeuvres. Irresponsible driver behaviour paired with narrow streets, a lack of sidewalks and the absence of a buffer zone between cars and pedestrians creates an environment that is unsafe and not conducive to the walkability of the neighbourhood. Apart from the behaviour of the drivers the areas are also reported to lack the necessary traffic signals, the signs and signals that are present are described as being unclear and/or faded.

Piet de Vries Drive carries the highest volume of pedestrian as well as vehicular traffic, the long and straight manner of the road causes that drivers tend to speed down the road. Figure 6-12 offers the individual ratings of the areas with respect to the driver behaviour; area four reports the worst driver behaviour as the motorists tend to speed and make unexpected stops in that specific area of Piet de Vries Drive, on the other hand area three reports good driver behaviour, it is also worth mentioning that area three has the best traffic sign representation.

Figure 6-12: Assignment 3 driver behaviour ratings



(Source: Author's own construction, 2020)

Driver behaviour interpretation in terms of walkability: The driver behaviour at the entrance of Marabastad was rated the worst, and received a rating of poor, due to the larger traffic volumes connected areas 4 and 5, bad driver behaviour negatively impacts the walkability of Marabastad as it creates a dangerous environment for pedestrians., figure 6-10 illustrates that area 4 and 5 carries the lowest amount of pedestrian traffic, thus supporting the statement that bad driver behaviour reduces walkability, the opposite is also proven as area 3 received a good rating that correlates with the high amount of pedestrian traffic illustrates in figure 6-10

6.3.4 Safety

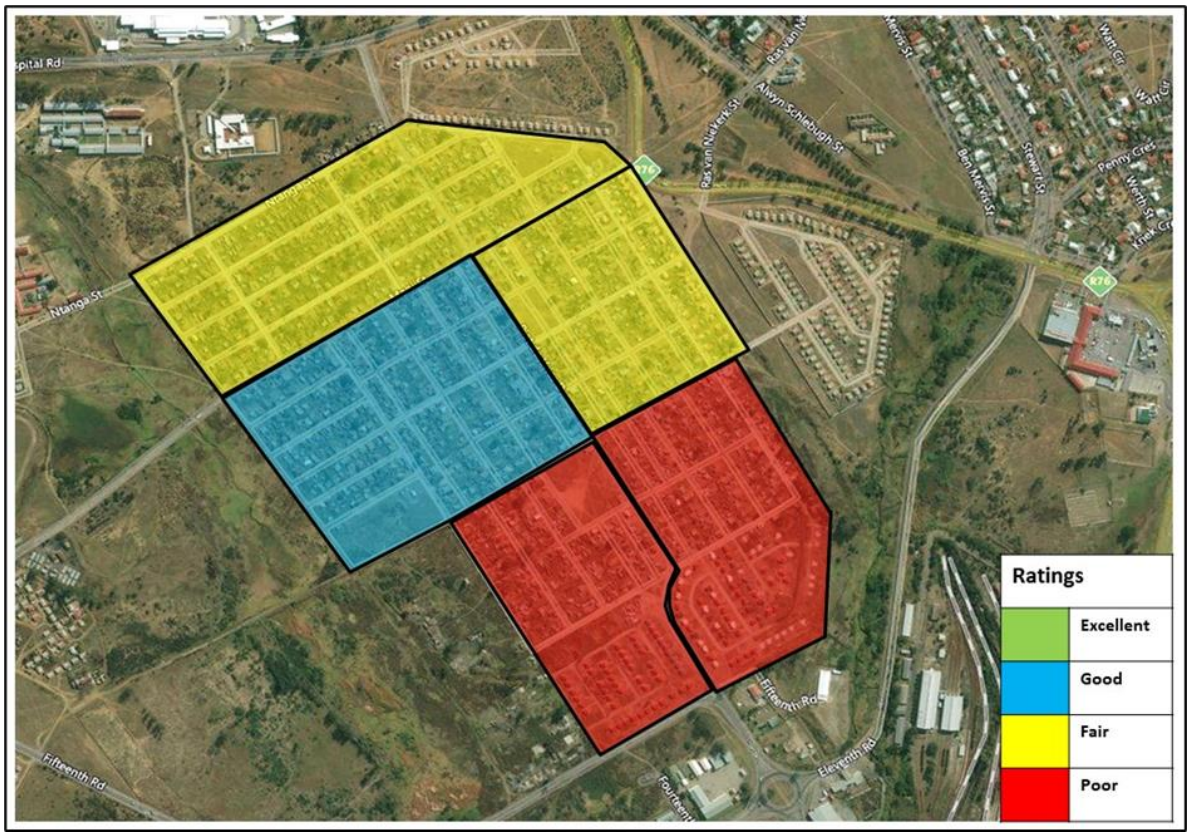
Assignment four consisted of survey of the general safety of Marabastad. Chapter three of this study discussed the importance of the element of safety in terms of walkability, safety can be described as the most important element that contributes to whether a person decides to walk or not. The safety of the different areas in Marabastad was evaluated according to the following statements from the assignment sheet:

- Car speeds are too fast
- There is too much traffic
- Divers are distracted
- There is loitering or suspicious/criminal activity
- There are unleashed dogs
- The signage or directions for drivers/pedestrians are confusing

Once again, each area reported problems regarding vehicles, the vehicles do not drive at acceptable speeds and the drivers are described as being distracted. Apart from the vehicles the pedestrian activity in the roads is also reported as problematic, due to the lack of sidewalks. There are no reports regarding the driver behaviour at crosswalks as there are no crosswalks in Marabastad. The pedestrian-vehicle interactions are thus a safety concern.

Other safety concerns such as loitering, and suspicious activity is also reported, especially near the shebeens that are in Marabastad. There are also reports of unleashed dogs in the streets, that, according to theory can negatively influence a pedestrians' walking experience, the dogs however do not appear to be a threat or safety concern to the pedestrians. Figure 6-13 offers a map illustrating the individual area safety ratings. Area 4 and 5 received the "poor" ratings, these two areas are noticeably less dense than the other three areas, that specific part of Piet de Vries Drive is also reported to have the worst driver behaviour. Decreased density paired with dangerous driver behaviour creates a very unsafe environment.

Figure 6-13: Assignment 4 safety ratings



(Source: Author's own construction, 2020)

Safety interpretation in terms of walkability: Theory has established that safety, and perceived safety is a very important attribute of a walkable environment. Accordingly, the areas rated with the poorest safety are the areas with the least amount of pedestrian traffic as indicated by Figure 6-10. With more eyes on the street and better driver behaviour area 2 received a good safety rating, this supports the theoretical findings that claim that safe environments are walkable environments.

6.3.5 Comfort and appeal

Assignment 5 was an overall survey of the comfort and appeal of Marabastad. Comfort and appeal can be linked to several elements that are connected to the degree of walkability of a neighbourhood; these include imageability, complexity, convenience, and safety. The assignment sheet contained the following statements with regards to the comfort and appeal of the survey areas:

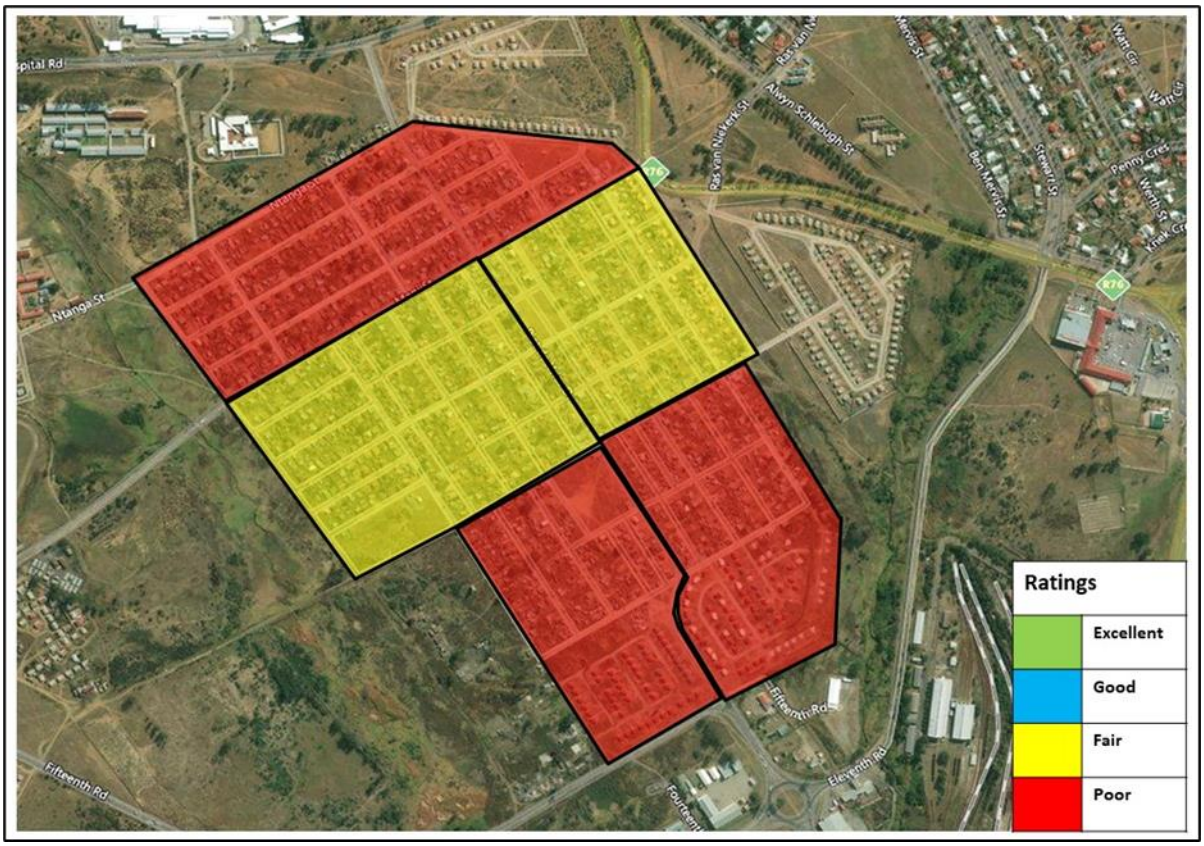
- The street needs shade trees
- The street needs grass, flowers, and landscaping
- The street needs benches and places to rest
- The grass and/or landscaping needs maintenance
- There are no water fountains and/or bathrooms
- A sidewalk is needed to the bus stop
- The bus stop does not provide shelter
- The bus stop does not have adequate lighting
- There is graffiti or vacant or rundown buildings
- There is too much trash or litter

The comfort and appeal Marabastad received overall poor ratings in each area that was surveyed. Areas one to five reported a need for street trees and/or shade, according to theory the lack of street trees would also indicate the absence of the element of enclosure and convenience as the pedestrians are forced to walk without any protection from the sun. The absence of street furniture, public restroom and a bus stop further strengthens the suggestion that the element of convenience is not present.

Marabastad also lacks the element of positive imageability and complexity due to the indication that the neighbourhood requires gardens, landscaping, and basic maintenance. Reports of abandoned buildings, the presence of graffiti, sewerage running down the road and areas scattered with rubble and trash strengthens the negative imageability elements, that is not appealing for pedestrians. Although the areas, according to the responses and the map in figure 6-14 , does not offer much comfort or appeal to the pedestrians the observation was made that the pedestrians seem comfortable and “at home” in their surroundings.

Comfort and appeal interpretation in terms of walkability: The comfort and appeal section relate to elements such as human-scale, enclosure, imageability and complexity, all elements associated with a high-quality walkable environment. The survey revealed that Marabastad has a negative imageability, receiving ratings that are only fair and poor. Pedestrians favour environments in which they feel comfortable and environments that are visually appealing

Figure 6-14: Assignment 5 comfort and appeal ratings



(Source: Author's own construction, 2020)

6.3.6 Composite of ratings and observations

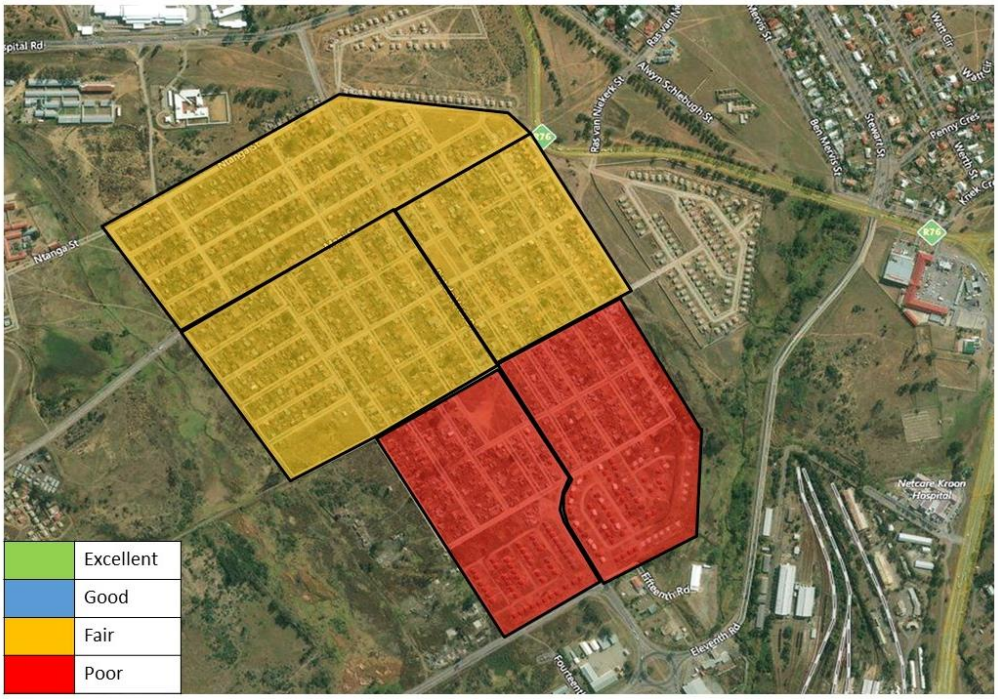
Assignment six is the summarising and concluding part of the walk audit, the assignment sheet requires an overall evaluation of the study area, in order to give a final rating regarding the different assignments and an overall rating of the entire walk audit area. Table 6-4 offers a summary of the individual ratings that were given to each assignment in the respective areas, and figures 6-15 to 6-19 offers the visual illustration of the data summarised by Table 6-4. In terms of the individual assignment ratings area three appears to have conditions more favourable for pedestrians, the pedestrian count in assignment one also revealed that area three has the highest volume pedestrian activity. Area four received the worst individual ratings and is deemed as the area that is least favourable for pedestrians, once again correlating with the pedestrian count findings as area four revealed the lowest pedestrian activity in Marabastad.

Table 6-4: Overall ratings per area

Assignment	Rating of each area (excellent, good, fair, and poor)				
	Area 1	Area 2	Area 3	Area 4	Area 5
1.Crossing Streets and Intersections	Fair	Fair	Fair	Poor	Poor
2. Sidewalks	Poor	Poor	Fair	Poor	Poor
3. Driver Behaviour	Fair	Fair	Good	Poor	Fair
4. Safety	Poor	Fair	Good	Poor	Poor
5. Comfort and Appeal	Poor	Fair	Fair	Poor	Poor

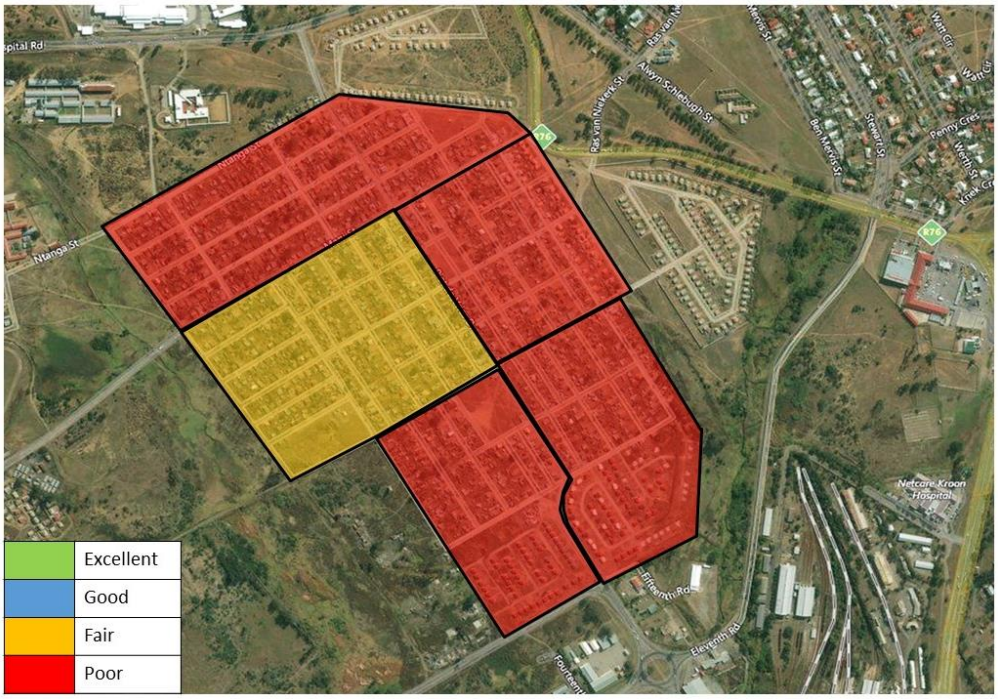
(Source: Author's own construction, 2020)

Figure 6-15: Crossing streets and intersections overall ratings



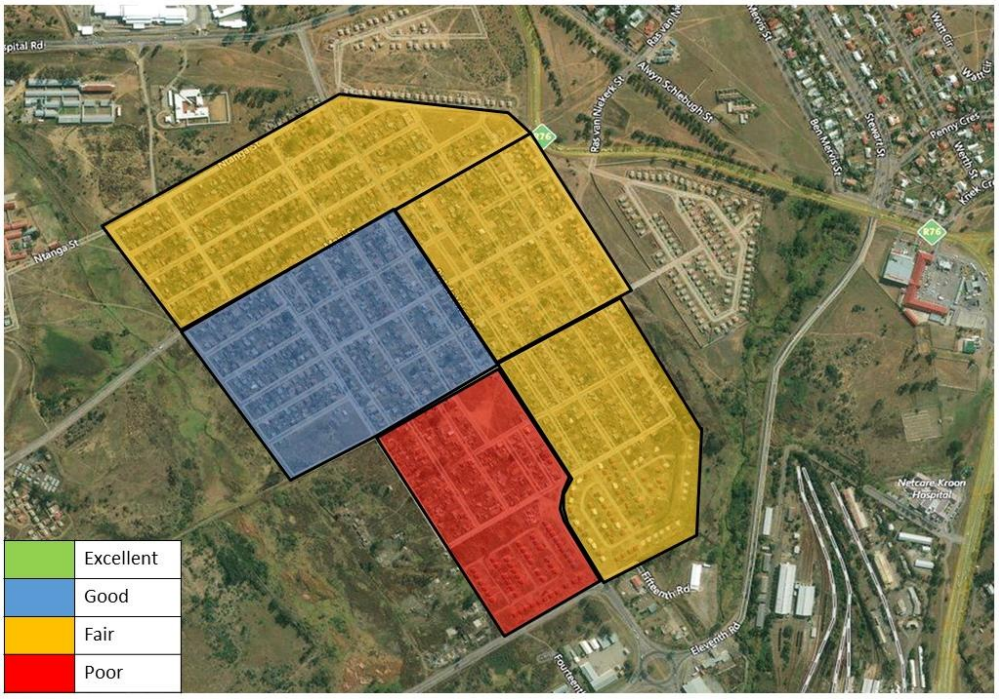
(Source: Author's own construction, 2020)

Figure 6-16: Sidewalks overall ratings



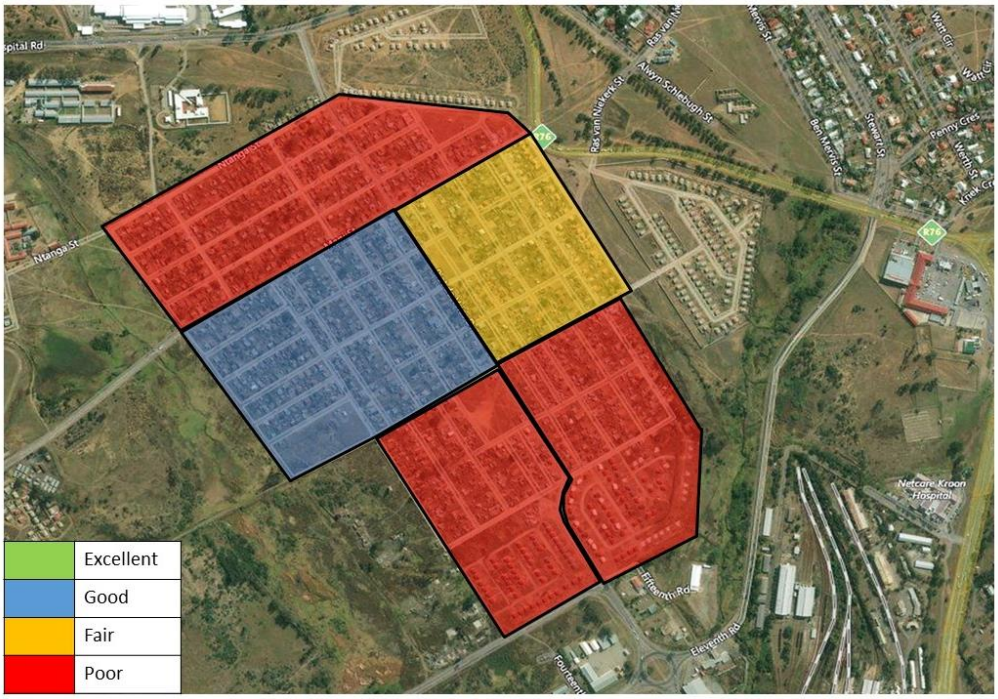
(Source: Author's own construction, 2020)

Figure 6-17: Driver behaviour overall ratings



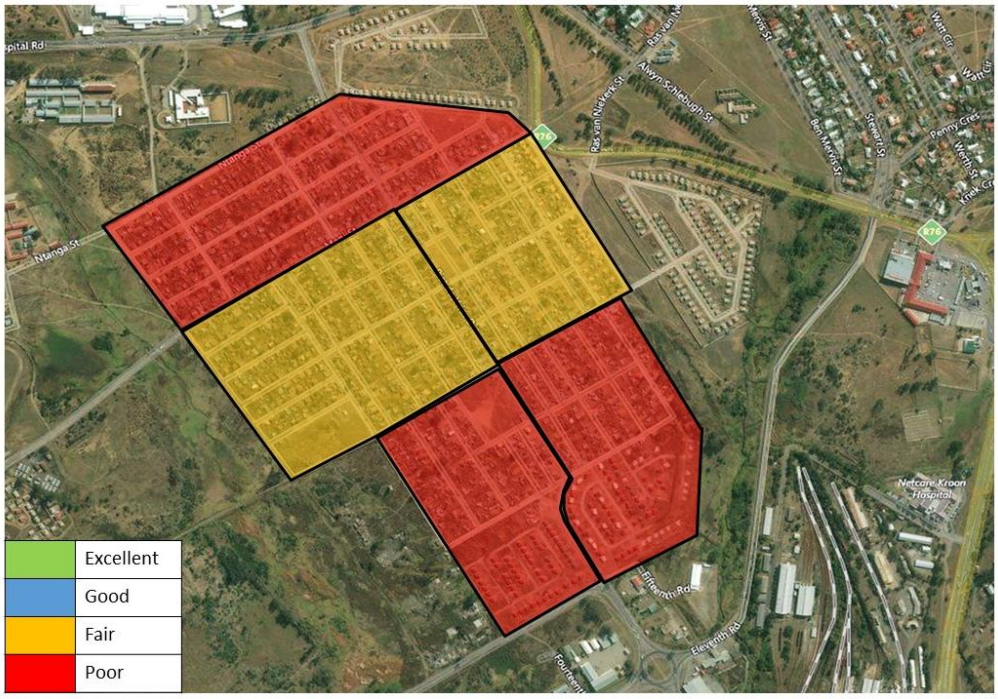
(Source: Author's own construction, 2020)

Figure 6-18: Safety overall ratings



(Source: Author's own construction, 2020)

Figure 6-19: Comfort and appeal overall ratings



(Source: Author's own construction, 2020)

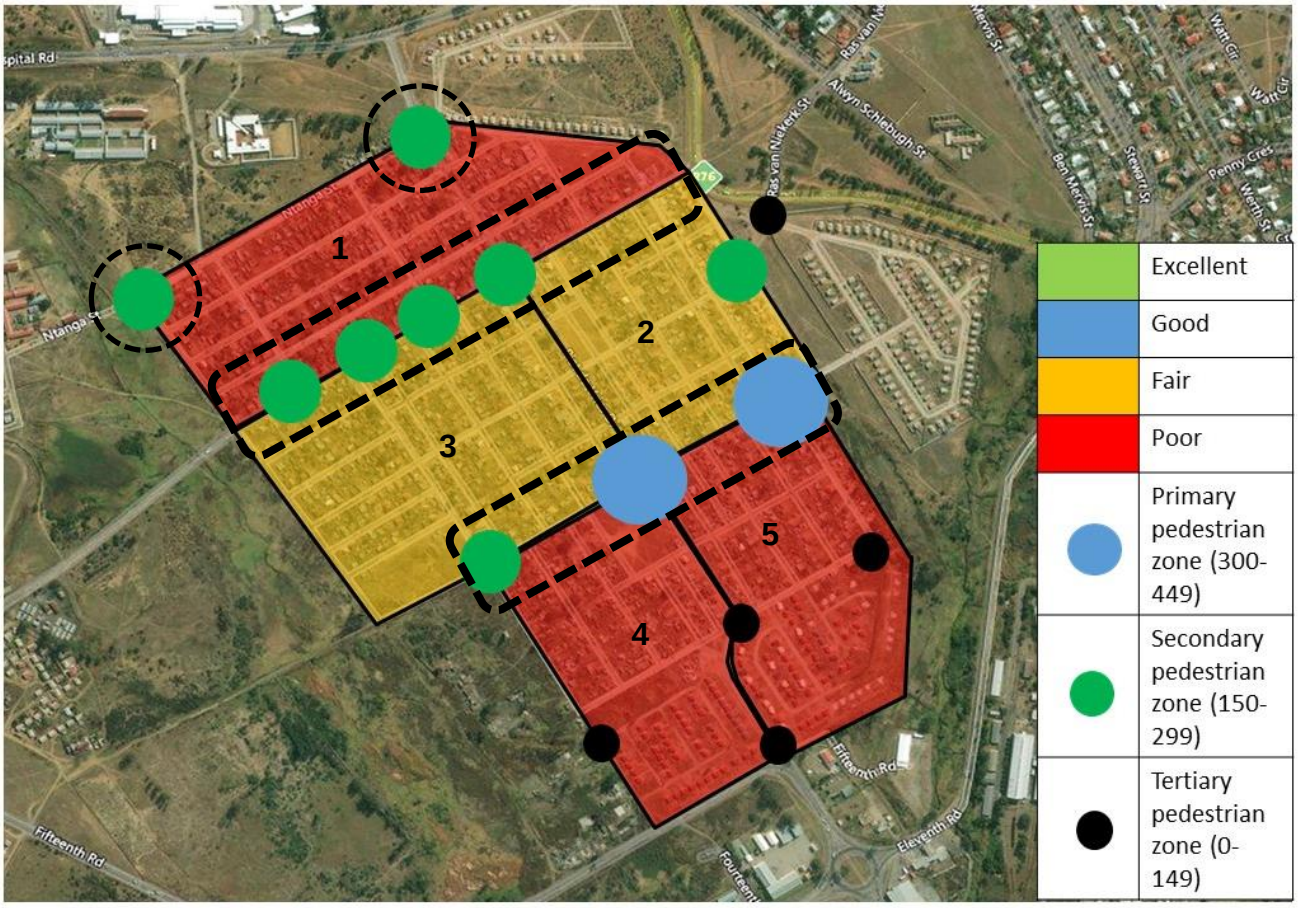
Composite findings of spatial analysis: Figure 6-20 offers an illustration of the overall walkability of areas 1-5 surveyed in Marabastad. Area 1 was reported to have poor walkability overall, areas 2 and 3 obtained a walkability rating of fair, and areas 4 and 5 also received a poor walkability rating. When cross-referenced with the pedestrian activity that was recorded it was noticeable that the areas with the most pedestrian activity also received higher overall walkability ratings, as illustrated in figure 6-21. Area 2 and 3 consistently received good or fair ratings throughout the walk audit and each of the assignments, areas 2 and 3 also had the highest recorded number of pedestrians, insinuating that area 2 and 3 are more walkable than areas 1, 4 and 5.

The ratings recorded, cross-referenced with the pedestrian activity underlines theoretical statements from Chapter 4 that the presence of certain elements improves the walkability of a neighbourhood, such as safety (driver behaviour, safety, crossing street and intersection and sidewalk assignment); path context (sidewalk, comfort and appeal assignment), imageability (comfort and appeal assignment), complexity (comfort and appeal assignment), enclosure (comfort and appeal assignment). The areas where these elements were reported on positively had a higher number of pedestrian activity, the assumption can thus be made that these areas are more favoured by pedestrians and more walkable than the other areas due to the presence of these elements.

Areas 4 and 5 consistently received poor overall ratings for all the assignments, with the exception of the fair driver behaviour rating that area 5 received. Area 4 and 5 also reported the lowest amount of pedestrians. The assumption can once again be made that the presence or absence of certain spatial elements influences the walkability of a neighbourhood as there was reported negatively on the elements discussed above in area 4 and 5.

The AARP walk audit tool thus proved to be an adequate toolkit to successfully analyse the walkability of Marabastad as the findings do not contradict one another.

Figure 6-20: Walkability and pedestrian activity overlay



(Source: Author's own construction, 2021)

6.4 Conclusion

The findings from the secondary data along with the walk audit survey data offers an in-depth look at the Walkability of Marabastad. The secondary data transcriptions and the pedestrian count from assignment one of the walk audit revealed that Marabastad has a high volume of pedestrian activity daily, unemployment and poverty are however the main reasons why walking is a daily occurrence as the resident's struggle to afford public or private transportation.

Safety appears to be the biggest problem in Marabastad as pedestrians are not only threatened by bad driver behaviour, but criminal activity such as robbery and assault. Although Marabastad is considered walkable from a connectivity and accessibility perspective Marabastad does not offer the residents any of the basic services that they require. The lack of mixed land uses cause additional travel time and costs to be borne by the residents of Marabastad. The lack of mixed land uses includes the lack of community facilities, resulting in poor sociability as the residents

do not have any designated areas to utilise for social occasions. The image of Marabastad is also a problem for the residents as the environment is not visually appealing or maintained regularly.

The walk audit offered area-specific feedback that will allow the identification of area-specific problems and creates the opportunity for targeted interventions. The secondary data set offered the opinions and desires of the Marabastad residents that will allow the researcher to make more informed recommendations that will suit the needs of the neighbourhood.

CHAPTER 7 RECOMMENDATIONS AND CONCLUSION

7.1 Introduction

Chapter Seven will be the final concluding chapter of this dissertation. The purpose of this chapter is to address the main research question by manner of suggesting spatial planning recommendations that will improve the walkability of Marabastad. The chapter will also suggest generic spatial planning recommendations that are not area specific and can be applied to similar low-income settlements of South Africa. Apart from the recommendations the chapter will also address how the primary-, and secondary research aims have been met and answer the primary- and secondary research questions that were stated in Chapter One of this study. The chapter will be rounded off by discussing the limitations associated with this study and suggest the possibility of further study regarding the topic of walkability. Table 7-1 below illustrates the basic structure of chapter Chapter 7.

Table 7-1: Structure of the chapter

Introduction (7.1)	
Synthesis (7.2)	
Recommendations (7.3)	
Generic Recommendations (7.3.1)	Specific Recommendations (7.3.2)
Answering the Research Questions (7.4)	
Primary Research Question (7.4.1)	Secondary Research Questions (7.4.2)
Meeting the Aims of The Study (7.5)	
Primary Aim of the study (7.5.1)	Secondary Aims of the study (7.5.2)
Recommendations for Further Study (7.6)	
Limitations of The Study (7.7)	
Conclusion (7.8)	

(Source: Author's own construction, 2020)

7.2 Synthesis

This section will offer a summary of the conclusions that were reached in each chapter of this study. Chapter One served as the introduction to the study, providing a background and problem statement. The chapter also stated the primary and secondary research questions as well as the primary and secondary aims of the research. The chapter concluded by providing the basic structure for the rest of the study.

Chapter two was dedicated to the research methodology utilised to answer the research questions stated in chapter one. Upon an extensive exploration of different research approaches the decision was made to follow the qualitative research approach due to the contextual manner thereof. Within the qualitative research approach several research designs are available and it was decided that the case study research design will be best suited to cater to the needs of this study. Within the case study design two different data gathering methods were utilised being secondary data and a survey by manner of a walk audit. It was also concluded that the Secondary data be analysed by manner of content analysis and the survey data be analysed by manner of spatial analysis.

The third and fourth chapters consisted of an extensive review of the literature regarding walkability including history and evolution of walkability as a concept. The chapter discusses several theories that are associated with walkability as well as walkability specific theories. A critical discussion of the advantages and disadvantages of walkability is provided. From the literature key elements were identified that are known to contribute to the walkability of a neighbourhood; these elements were taken in consideration when selecting the walkability audit instrument as well as during the analysis of the secondary data transcriptions. It was concluded that the following elements are important for neighbourhood walkability:

- Safety
- Density
- Mixed land uses
- Connectivity
- Imageability
- Enclosure
- Human scale
- Transparency
- Complexity
- Sociability
- Accessibility

- Convenience
- Quality of the pathway

Chapter Five was an attempt at contextualising Marabastad in terms of the history, socio-economic climate and policies and legislations that has or had an impact on the living conditions and walkability of Marabastad. In conclusion, the average Marabastad resident is unemployed and lives in poverty. Although several policies exist to benefit pedestrians throughout South Africa the situation has not been improved due to implementation failure in that regard.

The penultimate chapter offered the analysis of two sets of data being transcriptions of semi-structured interviews from a secondary data set and the data gathered from the walk audit that was performed in Marabastad. The two data sets offered the perspective of the residents as well as an analysis of the built environment. While Marabastad is considered connected, accessible and a “walking” city due to the high volumes of pedestrian activity there is however much to be done to improve the walkability of Marabastad, mostly consisting of improving the safety, imageability and sociability of Marabastad.

The need and importance of this study is supported by Chapter One, that contains the introduction and problem statement, and is the strengthened by Chapter Four where different spatial models are analysed. These two chapters respectively represent the importance of walkability throughout the years as walkability has always been an important factor in spatial models and not just a trend or passing craze amongst city planners. The literature review contained in Chapter Four then offered an extensive insight into creating walkable environments as well as measuring the walkability of a neighbourhood that acted as the foundation of the empirical study of this dissertation and also serves as a source for informed recommendations to improve the walkability of neighbourhoods.

7.3 Recommendations

The extensive literature review of Chapter Three allows for informed spatial planning recommendations to be made to plan for a walkable neighbourhood and enhance the walkability of an existing neighbourhood. The following section will offer generic spatial planning recommendations, as well as specific recommendations to address the walkability of Marabastad.

7.3.1 Generic recommendations

Given the nature of spatial planning and development an area is either being planned or re-planned/upgraded, three categories of recommendations can thus be made, being recommendations for planning a walkable neighbourhood, recommendations for upgrading the

walkability of an existing neighbourhood, and recommendations regarding policy, legislation and guidelines.

The first point that needs to be considered when planning a new neighbourhood is the layout, planners should refrain from a cul-de-sac design with dead-end streets and narrow alleyways. Instead opt for a grid like pattern that allows for connectivity and ease of navigation. The size of the layout is also of importance as smaller, denser neighbourhoods are reported to be more beneficial to walking, this ensures more eyes on the street (safety precaution) and that distances are not too great between destinations. The physical size of the streets is also of importance; narrower streets are considered to contribute more to walkability as narrower streets encourage slower vehicle speeds and result in shorter crossing distances from one side of the street to the other.

Sidewalks are the next important consideration for the planning of a walkable neighbourhood. As demonstrated in Marabastad, merely providing a 1 metre wide sidewalk is not enough. Sidewalks should be wide enough for two pedestrians to be walking alongside one another. There should also be a buffer zone between vehicles and pedestrians, this is best achieved by providing on-street parking, street trees and bike lanes. Street trees also create a more comfortable environment to walk in as it provides shade.

The safety of a walkable environment is also an important element to plan for in respect of a walkable neighbourhood. Adequate provisions should be made for street lighting to improve visibility during the night. Narrow and hidden alleyways should be avoided, as well as big open parking lots as both are suggested as unsafe situations. Pedestrian safety should also be improved by adding traffic signs, pedestrian crosswalks, and traffic calming measures at the very least. With reference to the convenience of a neighbourhood mixed land use zonings should be permitted to densify the neighbourhood and offer the residents the services that they require in their immediate surroundings.

In terms of imageability and complexity historical buildings should be preserved and restored, architectural features such as building facades should be considered and gardening or landscaping of some sort, as this contributes to the visual richness of the neighbourhood. Municipalities should also be urged to do routine maintenance as to preserve the image and integrity of the neighbourhood. Negative images and odours create a negative impression and discourages walking.

The Spatial Planning and Land Use Management Act, Act 16 of 2013 calls for sustainability and developments that is supported by principles of spatial justice, spatial sustainability and efficiency,

all that are, in principle, in support of the development of walkable neighbourhoods. The principle of efficiency is particularly applicable in this case as it calls for land development that optimises the use of existing resources and infrastructure. These are however guiding principles, as each Municipality is granted the freedom to interpret SPLUMA as they wish, they have the freedom to write their own by-laws, formulate Spatial Development Frameworks and Integrated Development Plans as they deem fit. Recommendations, supported by the principles of SPLUMA, can thus be,made to Municipalities to motivate the development of walkable neighbourhoods and/or upgrading of pedestrian infrastructure in the SDF, it can also be used as a motivation to allocate a budget for these developments in the IDP.

Due to the costly manner of implementing high quality walkability in a neighbourhood a case can be made for further research into the walkability implementation topic with specific focus on solutions that are affordable, thus applicable to low income settlements.

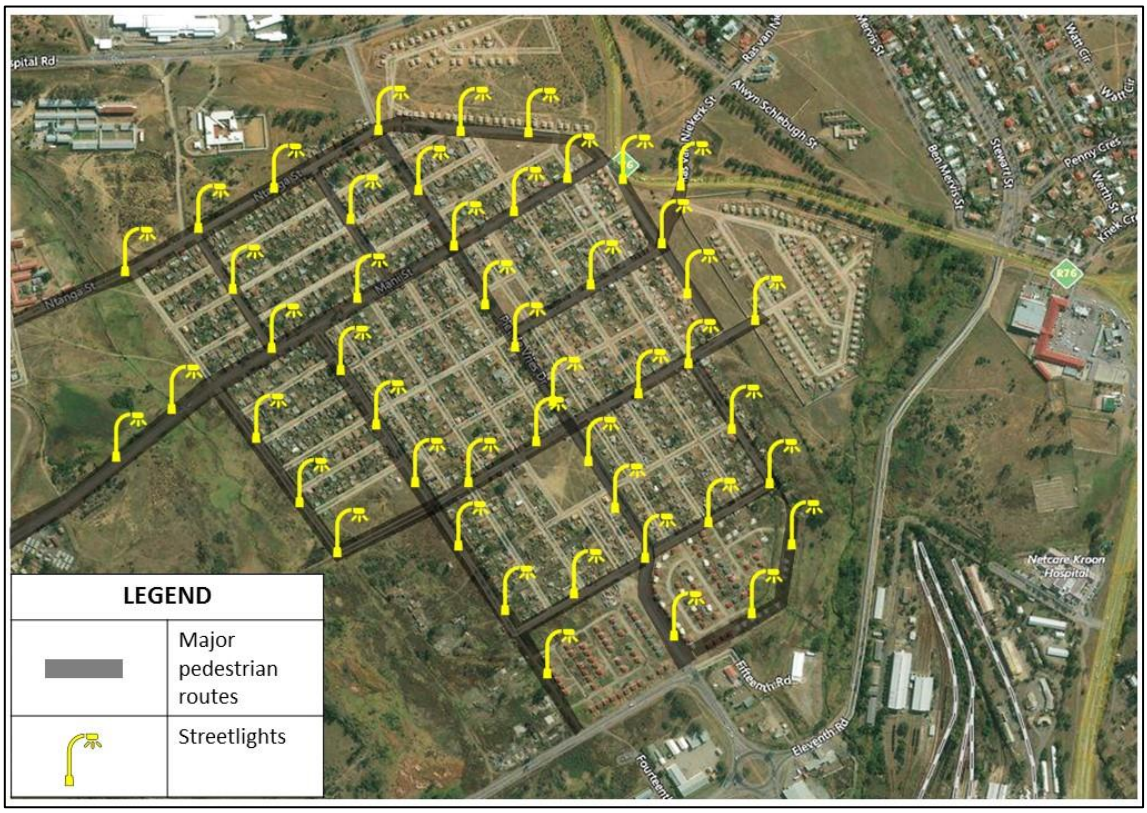
7.3.2 Specific recommendations

Marabastad already has a lot of pedestrian traffic. The goal of the recommendations is thus to improve the environment that they are already walking in. The datasets that were gathered and used for this study enabled the identification of problems and needs that directly relate to the walkability of Marabastad. The main problems that were identified consisted of the safety-, image-, convenience-, and lack of social facilities of Marabastad. The following recommendations are being made to practically address these issues to ultimately improve the walking environment of the pedestrians in Marabastad.

(a) Marabastad safety optimisation plan

The safety of Marabastad was identified as a main theme from the findings. Three major underlying problems were also identified, being insufficient lighting, bad driver behaviour and criminal activity. The lighting issue can be addressed by supplying streetlights along all major pedestrian walkways, as illustrated below by Figure 7-1. It would be ideal to supply each street with streetlights however the areas to be serviced first should be the areas that currently carry the highest volume pedestrian traffic.

Figure 7-1: Marabastad streetlight plan



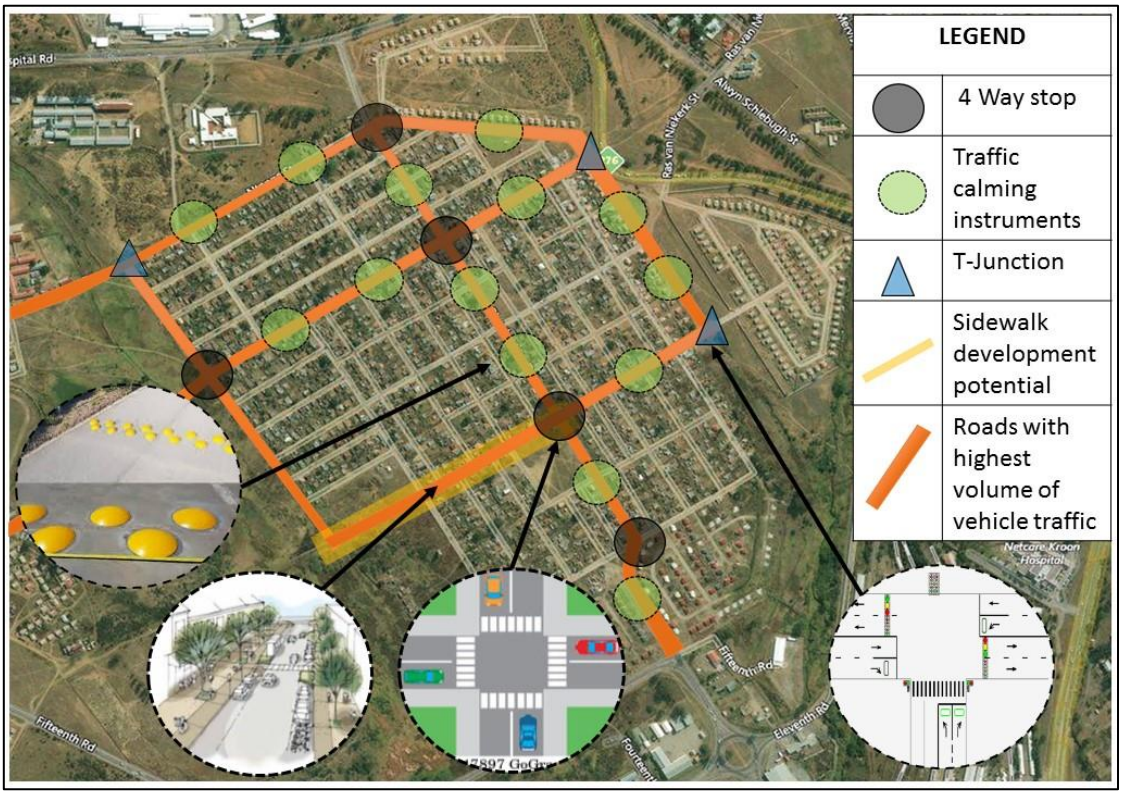
(Source: Author's own construction, 2020)

The second recommendation for the improvement of pedestrian safety is aimed at traffic control. As reported and analysed by the walk audit Marabastad has a limited amount of traffic signals, and no pedestrian signals. The reports also revealed that area 2 and 3, with the most traffic signals, had the best driver behaviour. The Marabastad traffic safety plan thus recommends the implementation and maintenance of traffic and pedestrian signals and traffic calming devices along the "major" traffic roadways. Figure 7-2 illustrates recommends several intervention measures to be taken.

Firstly, the big intersections, represented as the black circles, require the addition of pedestrian crosswalks and visible stop signs. Secondly, provisions should also be made for crosswalks and stop signs at the T-junctions, as illustrated by the blue triangle. Thirdly, the green circles indicate positions for traffic calming devices, the straight and long manner of the selected roads tend to encourage speeding. The traffic calming measures to be taken include speed bumps, traffic signs and speed restrictions. Lastly, due to physical constraints not much can be done regarding the provision and state of sidewalks in Marabastad, a portion is however identified that can accommodate a sidewalk on one of the busiest roads of Marabastad. The provision of a sidewalk

will reduce the contact between pedestrians and vehicles and create a safer environment for pedestrians.

Figure 7-2: Marabastad Traffic Safety Implementation Plan



(Source: Author's own construction, 2020)

The final recommendation made in terms of safety improvement in Marabastad is to liaise with the local law enforcement and traffic enforcement agencies and request regular patrol of the area to ensure that the traffic laws are being abided to and that the community are being protected against the criminal elements. Alternatively, the community of Marabastad can establish a Community Policing Forum that will work with local law enforcement, the CPF will conduct nightly patrols and prioritise community safety. The manner of this recommendation is not of spatial planning manner, but it will contribute greatly to the perceived safety of the pedestrian and directly improve the walkability of Marabastad.

(b) Marabastad formalisation plan

The data from the semi-structured interview transcriptions revealed that many residents were unhappy with the appearance of Marabastad, the observational reports from the walk audit further substantiates the negative and unappealing image of Marabastad. The element of imageability, complexity as well as the context of the pathway are all matters to be addressed to improve the

image of Marabastad as well as the feeling that Marabastad conveys to the observer. The Marabastad formalisation plan, as illustrated by Figure 7-3, suggests location specific recommendations that will improve the image and experience of Marabastad.

Figure 7-3: Marabastad formalisation plan

(Source: Author's own construction, 2020)

The orange strip on figure 6-3 represents Manis Street that is illegible for the development of sidewalks as the road reserves are wide enough to accommodate a sidewalk and terrain is flat enough for the development of a pedestrian friendly walkway. The green areas represent the natural environments and open spaces in Marabastad that are neglected and used as dumping grounds, the plan recommends the clean-up and rehabilitation of these open spaces as this will contribute to the imageability and complexity of Marabastad. The red areas represent streets that have not been paved yet, these are uneven, narrow gravel roads that are not ideal conditions for pedestrians. The areas illustrated by the blue strips are areas associated with water and sewage run-off in the streets and exposed manholes; with the cooperation of the Municipality and Civil Engineers improvements should be made to the reticulation networks and provision should be made for a stormwater drainage system where possible. Improving the existing reticulation networks will however have a big financial implication, these upgrades can this be motivated not only with the walkability benefit, but the fact that clean running water and basic sewerage services are a human right and will greatly improve the quality of life of the Marabastad residents. Decent stormwater drainage will also dramatically reduce the risk of flooding and infrastructure damage.

These recommendations will improve the overall pedestrian experience in Marabastad as the walkways will not be obstructed by water, sewage or waste, they will also be even and paved, thus being more accessible for individuals with disabilities as well.

(c) Marabastad city centre development

The final recommendation to improve the walkability of Marabastad is the development of the open space that is located in the centre of Marabastad. The participants of the semi-structured interviews expressed the need for Marabastad to be as socially vibrant as it was before the forced removals and subsequent demolitions. The need for certain community facilities, such as churches, clinics and crèches. Walkable neighbourhoods are often characterised as areas with mixed land uses that are in close proximity to one another, in contrast Marabastad is a residential neighbourhood that is far from most services. Therefore, the recommendation to develop the open space in the centre of Marabastad as it is highly accessible to most Marabastad residents.

The concept plan for the development of the open space is illustrated by Figure 7-4. Firstly, the recommendation is made for the addition of a bus/taxi stop and waiting area, as it is adjacent to the busiest road in Marabastad. The existing sidewalk is to be re-directed around the taxi stop for optimum safety of the pedestrians. The second recommendation consists of the development of a multi-functional sport field, thus creating a designated play area for the children in an attempt to discourage them from playing in the road as they currently are. A church and accompanying community facility are also recommended as the participants expressed great need for a place where the community can gather.

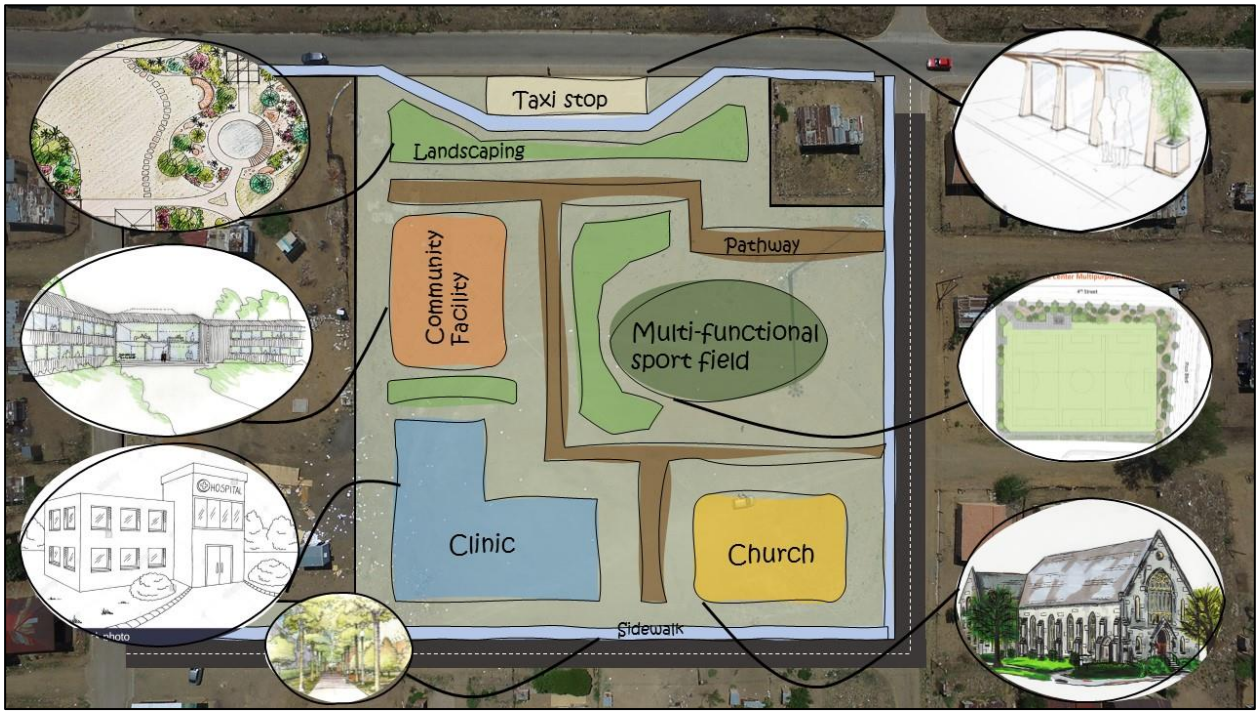
The desire for a clinic or medical facility that is easily accessible was also expressed during the semi-structured interviews. The location of the city centre is ideal for a proposed clinic as it is easily accessible to the community. It is also recommended to upgrade and formalise the road around the allocated space to make the clinic accessible to ambulances without interrupting the traffic flow of Piet de Vries Drive. The final recommendation for the city centre is landscaping with an adequate number of trees for shade, street furniture and a designated pathway.

The development of the city centre contributes to the walkability of Marabastad in that it creates and enhances several elements that are associated with walkable neighbourhoods, these elements are:

- Mixed land uses:
- Convenience
- Sociability
- Imageability

- Complexity
- Safety
- Accessibility

Figure 7-4: City centre development



(Source: Author's own construction, 2020)

(d) Moqhaka Local Municipality SDF and IDP recommendations

The findings of this study, motivated by the possible benefits that can be gained from a walkable neighbourhood, supported by the SPLUMA principles of sustainability, efficiency and spatial justice can be used to present a convincing case to the Moghaka Local Municipality to include the suggested improvements mentioned from (a) to (c) in the Moghaka SDF. The findings also forms the foundation of a proposal to the Moqhaka Local Municipality to allocate funds for the suggested improvements, and for the suggestions to be added to the Moghaka Local Municipality IDP.

7.4 Answering the research questions

Chapter One stated a primary research question, as well as five secondary research question to be answered by the study. The aim of the following section is to answer the research questions.

7.4.1 Primary research question

How can spatial planning be utilised as a tool to improve the walkability of cities in low-income environments?

From a spatial planning perspective walkability should be regarded as a necessity in a low-income environment and should be considered during the planning of any neighbourhood as the majority of residents in low-income neighbourhoods are indigent. A paradigm shift should be made in terms of walkability being a luxury to walkability being a bare necessity.

Before any spatial planning takes place, the area should be audited, and the proper public participation should take place to identify the problems and the needs of the community. The multidimensional nature of walkability indicated that there are multiple elements that influence the walkability of a neighbourhood and as such there are multiple plans to be implemented to address the walkability of a specific area. A spatial analysis should be done of the area in question to identify the elements that are present or absent from the neighbourhood that could potentially influence the walkability of the neighbourhood positively. Once the necessary due diligence has been done targeted spatial planning can commence to improve the walkability of the said neighbourhood.

Improving the walkability of a city does not have a “one size fits all” solution as such the recommendations and solutions for one location might not be applicable to another location as the needs, problems and physical environments will differ. The importance of an environmental analysis, such as a walk audit, cannot be stressed enough, as implementation without proper planning may worsen the situation. Improving the walkability of a city or neighbourhood is done in terms of the bottom-up approach as planning is done to enhance elements that are associated with walkability.

7.4.2 Secondary research question

Secondary research questions concerned with this study include:

I. *What does the concept walkability entail from a spatial planning perspective?*

This research question was answered in chapter three and four of this study. Walkability is described as a highly beneficial and desirable quality of a neighbourhood that encourages residents to walk rather than make use of motorised transport. Walkability is created by the presence of certain elements that creates the optimum environment for pedestrians to walk in. A

universal definition of walkability is offered by Southworth (2005:248) stating that walkability refers to the degree that the built environment supports walking and encourages walking by manner of offering safe and comfortable surroundings, that are connected to different destinations, that can be reached with minimal time and effort, that is aesthetically pleasing.

The conceptualisation of walkability in chapter fouridentified several elements that are usually present in a walkable neighbourhood, or contribute to the walkability of a neighbourhood, these elements include, but are not limited to:

- Safety
- Density
- Mixed land uses
- Connectivity
- Imageability
- Enclosure
- Human scale
- Transparency
- Complexity
- Sociability
- Accessibility
- Convenience
- Quality of the pathway

II. What is the role of spatial planning in terms of walkable cities?

Spatial planning plays an important role in the walkability of cities as the layout of the city directly influences the walkability thereof. In terms of macro scale spatial planning layout patterns that are easy to navigate and connects different land uses, such as the grid pattern, are associated with highly walkable neighbourhoods whereas irregular patterns with cul-de-sac's and dead-end streets are not supportive of walkability. The size and density of a neighbourhood also influences the walkability of a neighbourhood as shorter block lengths and higher density neighbourhoods are proven to be more walkable. Areas with mixed land uses are also known to encourage walkability as travel distances are shorter and destinations can be reached with ease.

Micro spatial planning also contributes to the walkability of cities, the presence of sidewalks as well as the width and location of sidewalks influences the walkability of a neighbourhood; broader sidewalks that are protected from the oncoming traffic are more walkable than narrow sidewalks right next to the road. The placement of parking spaces also influences the walkability as it

contributes to pedestrian safety, on-street parking creates a buffer zone that protects pedestrians from traffic, but large parking lots in front of buildings creates a big open dead space that is perceived as an unsafe environment, especially at night.

Spatial planning can either create the perfect pedestrian environment or the worst pedestrian environment, the assumption can thus be made that spatial planning plays a significant role in neighbourhood walkability.

III. How can the spatial environment contribute to the walkability of a city?

The spatial environment influences the walkability of a city in that it relates to the following elements that are associated with the walkability of a city:

- Human scale: The size of the buildings can either be large and intimidating, resulting in the pedestrian feeling alienated and unwelcome, or it could be a size that humans relate to and feel comfortable being surrounded by.
- Enclosure: Vertical elements, such as street trees can create a room like quality that is known to be advantageous for walking
- Imageability: The physical appearance of the environment that is being walked in can either be encouraging or discouraging of walking. How the environments' appearance makes the observer feel is an important aspect of walkability
- Complexity: Complexity refers to a variety of buildings and land uses that are available along the pathway, as Speck (2018:3) states that for a walk to be successful the walk should be interesting and offer visual interests along the way.
- Transparency: If the spatial environment does not allow the pedestrian to observe human activity beyond the edge of the street, they do not have a sense of perceived safety. The less that the viewers line of sight is obstructed the safer they feel, perceived safety is a known contributor to the walkability of a city.

IV. How walkable is Marabastad?

Chapter Five and Six analysed the walkability of Marabastad, while Marabastad can be described as a walking city it is not necessarily walkable. The large volume of pedestrian activity is contributed to the fact that walking is the only means of transportation that is accessible and

affordable to the residents of Marabastad. Marabastad is positively classified as a connected neighbourhood, however it is reported to be unsafe, unmaintained and lacks basic community services. From the perspective of connectivity Marabastad is very walkable as it is an easy neighbourhood to navigate, but the environment is not supportive of pedestrians as it is uninviting and unappealing with a limited number of narrow sidewalks and offers pedestrians no protection from the oncoming traffic or comforts against the elements of nature

V. How can walkability in Marabastad be optimised?

The recommendations section of this chapter illustrated three different recommendations for the improvement of Marabastads' walkability these are:

- The Marabastad safety optimisation plan
- The Marabastad formalisation plan
- The Marabastad city centre development
- Moqhaka Local Municipality SDF and IDP proposals

7.5 Meeting the aims of the research

Along with research questions chapter one also mentioned a primary research aim and five secondary research aims of this study. The following section will summarise how those research aims were met.

7.5.1 Primary research aim

The primary aim of the study is to illustrate how spatial planning can be utilised as a tool to plan for walkable cities in low-income environments by using Marabastad in Kroonstad, South Africa as a case study.

The primary research aim was met by utilising the information obtained from the literature review of chapter three to conduct research guided by the methodological approach and design identified by chapter two. Chapter two also identified the analysis techniques that were utilised in chapter five in order to make recommendations with regard to planning for walkable cities in low-income environments.

7.5.2 Secondary research aims

I. To conceptualise the meaning of walkability from a spatial planning perspective.

This aim was met in Chapter three and four where an extensive literature review was conducted. The literature review covered the history and background pf walkability as spatial planning concept and the evolution of walkability throughout the years. The different meanings and definitions of walkability was explored from the perspective of different principles and professions to illustrate the multi-dimensionality of walkability. Different elements that are associated with walkable communities, and how they spatially manifest, were identified

II. To describe the role of spatial planning in the creation of walkable cities

This aim was met in the literature review of chapter three and tfour. The chapter explored how certain spatial planning practices, e.g., layout planning, functional zoning, urban design contributes to the existence of certain elements that are associated with walkability.

III. To spatially analyse the walkability in Marabastad

This aim was met in chapter two, five and six by manner of identifying the correct research approach and design to conduct the research with, providing a background of the Marabastad community and the socio-economic circumstances, and conducting the research via secondary data analysis as well as the conduction of a walk audit.

IV. To evaluate the current walkability of Marabstad

The fourth secondary research aim was met in chapter six of this study. The data gathered in Marabastad was evaluated in terms of the presence or absence of the elements that are associated with walkable neighbourhoods, as identified in chapter three.

V. To develop suggestions for spatial planning intervention to optimise walkability in Marabastad

This aim was met by the recommendations section in this chapter; the recommendation for the Marabastad safety optimisation plan, the Marabastad formalisation plan and the Marabastad City Centre development plan. All for the improvement of the walkability of Marabastad.

7.6 Recommendations for further study

Walkability in developed is a thoroughly researched topic, it has however been established that there is a gap in the literature regarding walkability in developing countries with specific reference

to South Africa. The topic of walkability in South Africa has a lot of research potential as a large number of the population is subject to walking to and from school and/or work. Pedestrians are uncatered for in spatial planning and the problem is intensified by the fragmented nature of South African cities. Considering the statements above it is clear that the following topics have immense research potential in the South African context:

- The development and testing of a walkability assessment tool specified to the needs and circumstances of South African low-income settlements.
- Integration of pedestrian-oriented design strategies as a means of addressing the issue of fragmented South African cities.
- How spatial planning interventions can improve the safety of pedestrians.
- Affordable solutions for creating a walkable neighbourhood in low-income settings.

7.7 Limitations of the study

The nature of the literature available regarding walkability was mostly conducted from a developed country perspective where walkability is considered a luxury as opposed to the South African reality where walking is the only option in certain circumstances, the limitation being that the literature available might not be applicable to the South African context as there is limited information available. Just as there are limited studies regarding walkability in the South African context, there are also a limited number of instruments to accurately measure and/or audit the walkability of South African neighbourhoods, specifically low-income settlements.

Even though literature regarding walkability offers multiple suggestions that creates walkable neighbourhoods or upgrades the existing pedestrian environment these suggestions are of a costly manner. The lack of affordable solutions to creating walkable neighbourhoods is a limitation of this study as the focus falls on low-income settlements and the recommendations rely on Municipal funding, in a country where corruption and capital mismanagement occur daily.

Another limitation of the study was the inexperienced fieldworkers used to conduct the semi-structured interview, during some interviews leading questions were asked, the data from those interviews were not used as the answers given where not authentic. The final limitation of the study was the time constraints surrounding the pedestrian count as part of the walk audit. The pedestrians were only observed for a portion of the day, and not a full day to provide a true depiction of the pedestrian activity.

7.8 Conclusion

In conclusion, this study has adequately highlighted the lack of walkability related research within the African context, as well as the lack of pedestrian-considered spatial planning even though a large majority of the South African population walk daily as their only means of transport. This study also demonstrated the importance of walkability by discussing the many benefits associated therewith. Several elements were identified that contribute to- or enhance the walkability of neighbourhoods and how they spatially manifest. The study also demonstrated how these identified elements can be planned for in order to create or improve the walkability of a specific neighbourhood.

The research- methodology, -approach, -design and data generation and analysis methods that was selected, equipped the researcher to conduct the research in order to analyse the walkability of Marabastad and identify areas in need of intervention. The physical and socio-economic analysis of Marabastad revealed that Marabastad is an indigent community and that Marabastad is a walking neighbourhood rather than a walkable neighbourhood.

Chapter four of this study adequately motivated the importance of walkability by discussing all the benefits that walkability has to offer. The knowledge about the benefits of walkability can be used as a tool to motivate the implementation of the recommendations made in this chapter (generic and specific) to optimise the walkability of Marabastad, Kroonstad and other South African cities.

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ANNEXURES (TOC_HEADING)

ANNEXURE A :

CODED TRANSCRIPTION

Interviewer: Oh, okay, even for the locals here at night, not safe?

Participant 1: Hayi, it's not safe at all. Safety

Interviewer: Oh, okay, it's bad.

Imageability

Participant 1: This is one of the guy that are, some of them are ... (inaudible) of the dumping site. This is one of the guy, one of them, this guy. Their members are already there ...

Sociability

Another voice: We are just members of the community, so we want to have (inaudible).

Interviewer: Ja, but after I'm done with him, I'll talk to you guys and have a interview with you.

Another voice: (inaudible) not now, (inaudible), like we are busy, like we told you that time, we are still helping people. Sociability

Interviewer: Okay, no, that's fine. And I'll come back to you, I just want to finish here quickly. If you come back and you see me here, come talk to me, please?

Participant 1: As I said, now when you come to the safety, safety is dangerous. There's no safety. Because when, at night you find the robbers, those who do drugs. At night they rob the people to get the money. } safety

Interviewer: Ja. So probably ... every time, most of the problems come back to the drug users.

Participant 1: Drug users. That's the main problem we've got here.

Interviewer: Ja, so that's the first thing you'd like to, like, sort out and have taken care of, the drug users. So we'll have less drugs in the area, and then we can clean it up and make it better again and build it up.

Participant 1: Sure.

Interviewer: Ja, that'll be nice. And then, ehm, all right. What would you like to see in the future? What would you like to?

Unemployment

Participant 1: People getting work.

Interviewer: Ja, so the training, jobs and stuff like that.

poverty

Participant 1: Yea, training, jobs (inaudible), our lives are getting difficult. We are going more and more and more horrible (?).

Interviewer: Oh, so going backwards.

Participant 1: Yea, (inaudible) when you grow up, there are still ... you've got the children, the children must know: my father (inaudible). Ja, I got this because of my parents. But if you don't work, what are you going to show the children, what I have done? You have nothing done. Why are these guys ...

ANNEXURE B:

AARP WALK AUDIT TOOLKIT

AARP Walk Audit Tool Kit

A step-by-step self-service guide for assessing a community's walkability

aarp.org/walk-audit

AARP®
Real Possibilities

Notes

THE PROBLEM

Too many communities in the United States are designed exclusively or almost exclusively for automobile travel, with very little consideration given to the needs of pedestrians. A scarcity of sidewalks, multilane roadways that are unsafe to cross, and a lack of street maintenance are all factors that discourage or outright prevent people from walking.

A SOLUTION

You can help make your community more walkable by conducting a walk audit to identify the roads and intersections that are dangerous for pedestrians but can and should be safely walkable and crossable.

THE TIME COMMITMENT

It takes about an hour to complete a targeted walk audit and a bit more time to summarize your observations and offer ideas for needed improvements.

WHO CAN CONDUCT A WALK AUDIT?

Anyone!

AMONG THE REASONS TO CONDUCT A WALK AUDIT

- It can help create a pedestrian-friendly environment
- It increases exercise opportunities for your communities
- It boosts social interaction among neighbors
- It enables people to get around without having to drive
- It can help reduce traffic congestion and pollution
- It can lead to increased property values

A publication of AARP Livable Communities | **AARP Community, State and National Affairs**
Web: AARP.org/livable and AARP.org/walk-audit | **Email:** livable@aarp.org | **Twitter:** @AARPLivable
AARP 601 E Street NW, Washington, D.C., 20049

Getting STARTED

1 RECRUIT PEOPLE TO CONDUCT THE WALK AUDIT

You can do a walk audit on your own, but it's more fun to do with other people. It's helpful to include a person who has a walking or physical challenge (e.g., someone who uses a walker, wheelchair or cane, or even a parent pushing a baby stroller). That will help you get a true sense of an area's walkability.

2 IDENTIFY YOUR ROUTE

Map out a walkable area that can get you to and from where you need to go.

3 GATHER YOUR SUPPLIES, WHICH MIGHT INCLUDE:

- Street maps
- Clipboards
- Notepaper and pens
- A digital or smartphone camera
- Comfortable walking shoes
- A hat and sunscreen
- A bottle of cold water
- The walk audit documents that start on page 4

4 CHOOSE A DATE AND TIME FOR THE WALK AUDIT

5 CONDUCT THE WALK AUDIT

6 "RATE" THE ROUTE

7 TAKE ACTION TO MAKE YOUR COMMUNITY MORE WALKABLE

NOTES:

▶ The WALK AUDIT

Review the walk audit documents and checklists before you head out, and as you walk note the locations of streets, sidewalks and any problems you would like to see solved. Take photographs of problem areas as well as good features you would like to see more often.

Suggestions for the types of photographs to take include:

- Crossing signals
- Overhead traffic lights
- Turning lanes
- Curb cuts
- Sidewalks
- Crosswalk lines and vehicle stop lines
- Important signage

The tool kit contains the following sections to help guide and record your observations:

- Mapping the Walk Audit
- Crossing Streets and Intersections
- Sidewalks
- Driver Behavior
- Safety
- Comfort and Appeal
- Overall Ratings and Observations

Each section asks you to rate your streets or intersections. Here's what each rating means:

Excellent	The area is very pedestrian-friendly and safe
Good	The area is moderately pedestrian-friendly and safe
Fair	The area is somewhat pedestrian-friendly and safe
Poor	The area is not pedestrian-friendly or safe

TIP: ***You can bring the pages for Assignments #1 through #6 with you during the actual walk audit and leave the rest of this guide behind.***

NOTES:

▶ Mapping the WALK AUDIT

Your walkable area can be as small as one intersection or it could include several streets and intersections. Consider starting small, with one or two intersections and a connecting street.

TIP: *The smaller your walk audit area, the easier it is to follow up and get results.*

1. Record the following for your audit area:

County: _____ **City/Town:** _____

State: _____ **Zip Code:** _____

2. Next, draw a simple map of your walk audit area in the space below and label the streets. Indicate North, South, East and West to show which direction the streets are oriented.

▶ CROSSING STREETS and INTERSECTIONS

Complete one set of the Assignment #1 sheets for each intersection you observe.

TIP: ***We suggest allowing 20 to 30 minutes per intersection.***

Intersection observed: _____ and _____
Street Name 1 Street Name 2

Day and Date of week: _____

Time observations began: _____ AM | PM **Time observations ended:** _____ AM | PM

DIRECTIONS: Place a ✔ next to any items that are a problem for pedestrians and note:

- What might be especially problematic for a child, older adult or person with disabilities?
- What is the exact location of each problem? Record a landmark or side of street (North, South, East or West) on the line to the right of each item you check.

PROBLEMS FOR PEDESTRIANS	LOCATION
❍ The crossing doesn't have a pedestrian signal or audible signal	_____
❍ The pedestrian signal doesn't give people walking at an average speed enough time to cross	_____
	_____
Time allowed for crossing:	_____ (Minutes) _____ (Seconds)
❍ The signal doesn't give slow walkers enough time to cross	_____
❍ The traffic signal makes pedestrians wait too long before crossing	_____
❍ The location needs a traffic signal or crosswalk	_____
❍ A Push-to-Walk signal is not available/operating/accessible	_____
❍ The crosswalk is not marked or is poorly marked	_____
❍ People need to walk >300 feet for a safe place to cross the street	_____
❍ The road is too wide to safely cross	_____
❍ There's no median on a street with four or more lanes	_____
❍ Parked cars or utility poles block the pedestrian view of traffic	_____
❍ Other issues and observations: _____	
_____	

▶ CROSSING STREETS and INTERSECTIONS

WHO IS USING THE CROSSWALK?	NUMBER OF INDIVIDUALS OBSERVED *(use hash marks 𝍸 for counting)*	TOTAL #
People walking at an average speed		
People walking slowly		
People with children or baby strollers		
People crossing against the signal		
People using assistive devices (wheelchairs, canes, walkers, etc.)		
Bicyclists		
Skateboarders		
Other		

Overall Rating of the Street Crossing(s) in the Survey Area: ☐ Excellent ☐ Good ☐ Fair ☐ Poor

Additional observations:

_____

_____

_____

_____

_____

▶ SIDEWALKS

Complete one sheet for each sidewalk-equipped street within your walk area.

Street observed: _____ (Street Name) between _____ (Cross Street 1) and _____ (Cross Street 2)

Day and Date of week: _____

Time observations began: _____ AM | PM **Time observations ended:** _____ AM | PM

DIRECTIONS: Place a ✔ next to any items that are a problem for pedestrians and note:

- What might be especially problematic for a child, older adult or person with disabilities?
- What is the exact location of each problem? Record a landmark or side of street (North, South, East or West) on the line to the right of each item you check.

PROBLEMS FOR PEDESTRIANS	LOCATION
❍ There are no sidewalks, paths or shoulders.	_____
❍ The sidewalks are not continuous (i.e., segments are missing).	_____
❍ The sidewalk isn't wide enough for two people to walk together side-by-side (minimum width needed: 5 feet).	_____
❍ The sidewalk is broken or cracked.	_____
❍ There's no buffer between traffic and the sidewalk.	_____
❍ The sidewalks are interrupted by driveways.	_____
❍ There are no ramps (i.e., curb cuts) or they're misplaced. *(Note: There should be two curb cuts per corner.)*	_____
❍ The curb cuts aren't textured or marked for people with visual impairments.	_____
❍ The sidewalk is blocked or interrupted by poles, signs, shrubs, dumpsters, low-hanging trees, etc.	_____
❍ Cars, trucks, vendors are blocking the sidewalk.	_____
❍ Other issues and observations:	_____

Overall Rating of the Street Crossing(s) in the Survey Area: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Poor**

Additional observations:

_____

_____

▶ DRIVER BEHAVIOR

Complete one sheet for the entire walkable area on your walk audit map.

Day and Date of week: _____

Time observations began: _____ AM | PM **Time observations ended:** _____ AM | PM

DIRECTIONS: Place a ✔ next to any items that are a problem for pedestrians and note:

- What might be especially problematic for a child, older adult or person with disabilities?
- What is the exact location(s) of each problem? Record a landmark or side of street (North, South, East or West) on the line to the right of each item you check.

PROBLEMS FOR PEDESTRIANS	LOCATION
❍ Drivers do not stop at stop signs	_____
❍ Drivers do not obey traffic signals	_____
❍ Drivers appear to be speeding	_____
❍ Drivers don't yield to pedestrians, especially at right turns	_____
❍ Drivers do not stop behind the crosswalk	_____
❍ Drivers don't look when leaving or backing out of driveways	_____
❍ Drivers make unexpected turns/maneuvers	_____
❍ Other issues and observations: _____	

_____

Overall Rating of the Street Crossing(s) in the Survey Area: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Poor**

Additional observations:

_____

_____

_____

_____

_____

▶ SAFETY

Complete one sheet for the entire walkable area on your survey map.

Day and Date of week: _____

Time observations began: _____ AM | PM **Time observations ended:** _____ AM | PM

DIRECTIONS: Place a ✔ next to any items that are a problem for pedestrians and note:

- What might be especially problematic for a child, older adult or person with disabilities?
- What is the exact location(s) of each problem? Record a landmark or side of street (North, South, East or West) on the line to the right of each item you check.

PROBLEMS FOR PEDESTRIANS	LOCATION
People don't feel safe walking here.	
❍ Car speeds are too fast	_____
❍ There's too much traffic	_____
❍ Drivers are distracted (e.g., they're using cellphones)	_____
❍ There's loitering or suspicious/criminal activity	_____
❍ There are unleashed dogs	_____
❍ The signage or directions for drivers/pedestrians are confusing	_____
❍ Other issues and observations: _____	
_____	

Overall Rating of the Street Crossing(s) in the Survey Area: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Poor**

Additional observations:

_____

_____

_____

_____

_____

▶ COMFORT and APPEAL

Complete one sheet for the entire walkable area on your survey map.

Day and Date of week: _____

Time observations began: _____ AM | PM **Time observations ended:** _____ AM | PM

DIRECTIONS: Place a ✔ next to any items that are a problem for pedestrians and note:

- What might be especially problematic for a child, older adult or person with disabilities?
- What is the exact location(s) of each problem? Record a landmark or side of street (North, South, East or West) on the line to the right of each item you check.

PROBLEMS FOR PEDESTRIANS	LOCATION
People don't feel safe walking here.	
❍ The street needs shade trees	_____
❍ The street needs grass, flowers and landscaping	_____
❍ The street needs benches and places to rest	_____
❍ The grass and/or landscaping needs maintenance	_____
❍ There are no water fountains and/or bathrooms	_____
❍ A sidewalk is needed to the bus stop	_____
❍ The bus stop doesn't provide shelter	_____
❍ The bus stop doesn't have adequate lighting	_____
❍ There's graffiti or vacant or rundown buildings	_____
❍ There's too much trash or litter	_____
❍ Other issues and observations: _____	
_____	

Overall Rating of the Street Crossing(s) in the Survey Area: ☐ **Excellent** ☐ **Good** ☐ **Fair** ☐ **Poor**

Additional observations:

_____

_____

▶ RATINGS and OBSERVATIONS

Now it's time to tally your scores from each observation section.

DIRECTIONS: Place a ✔ next to each rating from the previous sections.
If you observed more than one location, record the average of your observations.

STEP	RATING
Crossing Streets and Intersections	_____ Excellent _____Good _____Fair _____Poor
Sidewalks	_____ Excellent _____Good _____Fair _____Poor
Driver Behavior	_____ Excellent _____Good _____Fair _____Poor
Safety	_____ Excellent _____Good _____Fair _____Poor
Comfort and Appeal	_____ Excellent _____Good _____Fair _____Poor
TOTALS:	_____ Excellent _____Good _____Fair _____Poor

Your overall rating will be more than just your check mark total. Think about your observations as a whole. Were some areas much better or worse than others? For example, the sidewalks might be good for walking, but intersections might be poor for crossing the street. This might justify reducing the overall rating of your walk audit area. With this in mind:

Overall rating of the entire walk audit area: _____ Excellent _____Good _____Fair _____Poor

Additional comments about what works well and what needs improvement:

_____

_____

_____

_____

_____

_____

_____

▶ TAKE ACTION

It can be a challenge to persuade municipalities to make needed transportation and roadway improvements and changes. Obstacles abound, ranging from politics to price tags. But individuals and community groups can get the ball rolling by identifying problems and calling attention to them.

SOME NEXT STEPS

Rally community members to work with local government and transportation officials to add new walkways and sidewalks that can help improve safety and accessibility for pedestrians.

Contact the local public works and transportation departments, or the area's elected community representative, to report unsafe sidewalks. Provide copies of the completed walk audit as well as photographs that show the problems.

Ask local officials to create crosswalks, install traffic signals and use traffic-calming measures (such as a "road diet" that narrows the street) to help control the speed of traffic. If a traffic signal already exists, ask that the light's timing accommodate slower moving pedestrians, such as children, older adults and people with disabilities.

Organize a neighborhood watch group to keep an eye out for speeders, criminal activity or other conditions or activities that would prevent people from being able to safely go for a walk.

Advocate for the kind of walkability features that will make your community walkable and welcoming for people of all ages and abilities. (To learn about those features download the **AARP Livability Fact Sheet** series in English or Spanish by visiting *AARP.org/livability-factsheets*.)

A FEW WORDS ABOUT SIDEWALKS

- Sidewalk requests can be complicated because, although a community's public works department often addresses sidewalk maintenance, the maintenance might actually be the responsibility of the adjacent property owner. Adding a new walkway could require negotiating with the respective property owners. Installing a sidewalk where one doesn't already exist is easier if the work involves filling in a gap in an otherwise continuous sidewalk.

- In most areas, a community's department of public works or transportation can address concerns about the placement and width of sidewalks and the maintenance of publicly managed sidewalks.

- Caring for trees and bushes that intrude upon a sidewalk is usually the responsibility of the property's owner, but the local government can send a notice asking the owner to perform the maintenance. If the property owner does not comply, a public works crew might be able to trim the bushes and bill the property owner. In some neighborhoods, a homeowners' association is responsible for sidewalks.

- Some communities or neighborhoods have ordinances restricting the installation of sidewalks or curbs for aesthetic reasons or to make the area appear less urban. Advocating for sidewalks in these types of communities can be challenging. If action on sidewalks is not possible, the local government can still make the streets safer for pedestrians by employing traffic-calming measures.

▶ FINDING SOLUTIONS

▶ PROBLEMS
- There are no sidewalks, paths or shoulders
- Sidewalks start and stop, are broken or blocked
- There is too much traffic

▶ SOLUTIONS
- Identify another (safer) route
- Tell the traffic engineering or public works department about the problems and provide a copy of your walk audit results
- Speak up at board meetings
- Write or petition the city for better walkways
- Work with a local transportation engineer to develop a plan for a safe walking route
- Make the local media aware of the problems

▶ PROBLEMS
- The roads are too wide to cross
- Traffic signals don't allow enough time to cross and/or don't provide regular chances to cross
- There aren't any crosswalks or traffic signals
- Views of traffic are blocked by trees, landscaping and/or parked cars
- Curb cuts are missing or are in need of repair

▶ SOLUTIONS
- Identify another (safer) route
- Tell the traffic engineering or public works department about the problems and provide a copy of your walk audit results
- Ask permission to trim landscaping that blocks the street and/or ask the property owner to trim the landscaping
- Leave polite notes on the problem cars asking owners not to park in those spots
- Attend community meetings to advocate for crosswalks, signals, parking changes and curb cuts
- Report parked cars that cause safety hazards to the police or traffic departments
- Ask the department of public works to trim trees and bushes that block views of the street
- Make the local media aware of the problems

▶ PROBLEMS
- Drivers are backing up without looking
- Drivers aren't yielding to pedestrians
- Drivers are driving too fast and/or speeding up to make the light
- Drivers are running red lights and stop signs

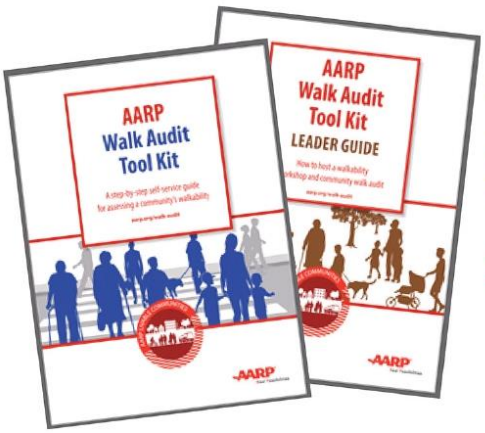
▶ SOLUTIONS
- Identify another (safer) route
- Set an example by being a safe driver
- Report unsafe drivers to the police
- Petition for better law enforcement
- Ask the municipality's transportation planners and engineers for traffic-calming solutions
- Organize a neighborhood speed watch program

▶ PROBLEMS
- The landscaping is in poor condition or nonexistent
- Dogs are off-leash
- The area isn't well-lighted
- There's a lot of litter
- There's no place to sit and rest
- There's criminal activity

▶ SOLUTIONS
- Identify another (safer) route
- Report unleashed dogs to municipal authorities
- Report unlawful activity to police
- Report lighting needs to the police or department of public works
- Collect the trash yourself
- Request increased law enforcement
- Ask the municipality's transportation planners and engineers for traffic-calming solutions
- Organize a community cleanup day
- Start a neighborhood crime watch program
- Sponsor a neighborhood beautification day
- Begin an adopt-a-street program

AARP thanks the **Institute of Transportation Engineers** for its assistance with this guide.

AARP Walk Audit Tool Kit



Available for download at **AARP.org/walk-audit**

AARP Walk Audit Tool Kit: A step-by-step guide for assessing a community's walkability

AARP Walk Audit Tool Kit Leader Guide:
How to host a walkability workshop and community walk audit

ANNEXURE C:

INFORMED CONSENT

Private Bag X6001, Potchefstroom
South Africa 2520

Tel: 018 299 1111/2222
Web: http://www.nwu.ac.za

Urban and Regional Planning
Tel: 018 299 2545
Cell: 084 551 0045/ 084 612 6001
E-mail: weslstrydom@gmail.com/
karen.puren@nwu.ac.za

27 August 2018

INFORMED CONSENT: MARABASTAD (KROONSTAD)

My participation is requested in research about Marabastad as an important place in the community. I have been informed that the purpose of the research is to observe aspects about Marabastad namely social aspects, economic aspects, environmental aspects, cultural aspects and political aspects, safety aspects and walkability aspects.

My participation involves:

(i) Taking part in a walkability survey/audit;

(ii) Taking part in a transect walk;

(iii) Taking part in a land use survey .

The following has been explained to me pertaining my participation:

(i) I understand that my participation is **voluntary** and I may withdraw my consent and discontinue participation at any time without penalty or loss or benefit to myself. In signing this consent form, I am waiving any legal claims, rights or remedies against the North-West University or the researchers.

(ii) I understand that there are **no foreseeable risks or discomforts** if I agree to participate in the research.

(iii) I understand that the results of the research may be published but that my **name or identity will not be revealed**.

(iv) I also understand that the results of the research may be used for **secondary research connected to this study**, in which my name or identity will not be revealed. The North-West University will maintain confidentiality of all records, materials, photographs, video recordings and voice recordings.

(v) I have been informed that I will **not be compensated** for my participation.

(vi) I have been informed that any **questions** I have concerning this research or my participation in it before or after my consent, will be answered by the researchers of this study.

I, the undersigned, _____ (full names and surname), have read the above information and by signing this form indicate that I will voluntarily participate in this research study.

_____ _____

Fieldworker: **Date:**

_____ _____

Researcher: **Date:**

ANNEXURE D:

ETHICS CERTIFICATE

NORTH-WEST UNIVERSITY
NOORDWES-UNIVERSITEIT
YUNIBESITI YA BOKONE-BOPHIRIMA

Private Bag X1290, Potchefstroom
South Africa 2520
Tel: 018 299-1111/2222
Fax: 018 299-4910
Web: http://www.nwu.ac.za

Senate Committee for Research Ethics
Tel: 018 299-4849
Email: nkosinathi.machine@nwu.ac.za

ETHICS APPROVAL LETTER OF STUDY

Based on the review by the **Faculty of Natural and Agricultural Sciences Ethics Committee (FNASREC)**, the Committee hereby clears your study as no ethical risk. This implies that the FNASREC grants permission that, provided the general conditions specified below are met, the study may be initiated, using the ethics number below.

Study title: Planning for walkable cities in South Africa: Marabastad, Kroonstad as a case study
Study Leader/Supervisor: Me K Puren
Student: C Kruger

Ethics number:	N	W	U	-	0	1	3	9	5	-	2	0	-	A	9
	Institution				Study Number						Year			Status	

Status: S = Submission; R = Re-Submission; P = Provisional Authorisation; A = Authorisation

Application type: Single **Risk Category:** **No Risk**

Commencement date: 01/02/2020
Expiry date: 02/11/2022

General conditions:
The following general terms and conditions apply:

- *The commencement date indicates the date when the study may be started.*
- *In the interest of ethical responsibility, the NWU-SCRE and FNASREC reserves the right to:*
  - *request access to any information or data at any time during the course or after completion of the study;*
  - *to ask further questions, seek additional information, require further modification or monitor the conduct of your research or the informed consent process;*
  - *withdraw or postpone approval if:*
    - *any unethical principles or practices of the study are revealed or suspected;*
    - *it becomes apparent that any relevant information was withheld from the FNASREC or that information has been false or misrepresented;*
    - *submission of the annual (or otherwise stipulated) monitoring report, the required amendments, or reporting of adverse events or incidents was not done in a timely manner and accurately; and / or*
    - *new institutional rules, national legislation or international conventions deem it necessary.*
- *FNASREC can be contacted for further information or any report templates via Roelof.Burger@nwu.ac.za 018 299 4269*

The FNASREC would like to remain at your service as scientist and researcher, and wishes you well with your study. Please do not hesitate to contact the FNASREC or the NWU-SCRE for any further enquiries or requests for assistance.

Yours sincerely,

Prof Roelof Burger
Chairperson Faculty of Natural and Agricultural Sciences Ethics Committee (FNASREC)

ANNEXURE E:

INTERSECTION ANALYSIS

Intersection number	Traffic signal and/or crosswalk present	Type of traffic signal	Additional comments
1	✓	Stop sign	Drain in the middle of the road
2	✓	Stop sign	Garbage in the road
3	X	N/A	Water running through the road
4	✓	Stop sign	
5	✓	Stop sign	No road markings
6	✓	Stop sign	Only painted on the road
7	✓	Stop sign	
8	✓	Stop sign	
9	✓	Stop sign	
10	✓	Stop sign; speed bump sign	Traffic calming measures present
11	✓	Stop sign	
12	✓	Stop sign	Traffic signs are obstructed by garbage and rubble
13	✓	Stop sign	
14	✓	Stop sign; speed bump sign	Traffic calming measures present
15	X	N/A	
16	✓	Stop sign	
17	X	N/A	
18	✓	Speed bump sign	Traffic calming measures present
19-20	X	N/A	Unpaved road
21	X	N/A	
22	✓	Stop sign	Only painted on the road
23-24	X	N/A	
25	X	N/A	Road is obstructed by garbage and rubble
26-34	X	N/A	
35	✓	Speed bump sign	Traffic calming measures present
36-38	X	N/A	
39	X	N/A	Water & sewage running down the sidewalk
40-42	X	N/A	
43-46	X	N/A	Unpaved road
47	X	N/A	
48	✓	Stop sign	Only painted on the road
49	X	N/A	
50	X	N/A	Sewage running down the road
51-54	X	N/A	
55	X	N/A	Unpaved road
56	✓	Speed bump sign	Traffic calming measures present

57	X	N/A	
58	✓	Stop sign	
59-61	X	N/A	
62	✓	Stop sign	
63	X	N/A	
64	✓	Stop sign	
65-73	X	N/A	
74	✓	Stop sign	Only painted on the road
75	X	N/A	Unpaved road
76	✓	Stop sign	
77	X	N/A	Unpaved road
78-80	X	N/A	
81	✓	Speed bump sign	Traffic calming measures present
82-95	X	N/A	Unpaved road
96	X	N/A	
97	X	N/A	Road is obstructed by garbage and rubble
98-100	X	N/A	
101	X	N/A	Sidewalk present
102	✓	Stop sign	
103-105	X	N/A	Unpaved road
106	X	N/A	
107	✓	Speed bump sign	Traffic calming measures present
108-109	X	N/A	
110	X	N/A	Road is obstructed by garbage and rubble
111-112	X	N/A	
113	✓	Stop sign	Only painted on the road
114-115	X	N/A	
116	X	N/A	Open manhole next to the street
117-120	X	N/A	
121	X	N/A	Sidewalk present
122	X	N/A	Road is obstructed by garbage and rubble
123	✓	Stop sign	
124	✓	N/A	Traffic calming measures present & Water and sewage running down the road
125	X	N/A	Water & sewage running down the sidewalk
126	✓	Crosswalk	Traffic calming measures present
127	X	N/A	Unpaved road
128	✓	Stop sign	
129	✓	Stop sign	Traffic calming measures present; sidewalk present

130-132	X	N/A	Unpaved road
133	X	N/A	Road doesn't exist anymore
134	X	N/A	
135	✓	Stop sign	
136	✓	Stop sign	
137	X	N/A	Road is obstructed by garbage and rubble
138	X	N/A	Water & sewage running down the sidewalk
139-140	X	N/A	

ANNEXURE F:

TURNITIN REPORT

turnitin

Digital Receipt

This receipt acknowledges that Turnitin received your paper. Below you will find the receipt information regarding your submission.

The first page of your submissions is displayed below.

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File name:	9439-4e83-b4d8-d70692c2652b_Kruger,_C_Chapter_6___7_FE...
File size:	5.99M
Page count:	174
Word count:	48,697
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Submission date:	12-Dec-2021 01:00PM (UTC-0800)
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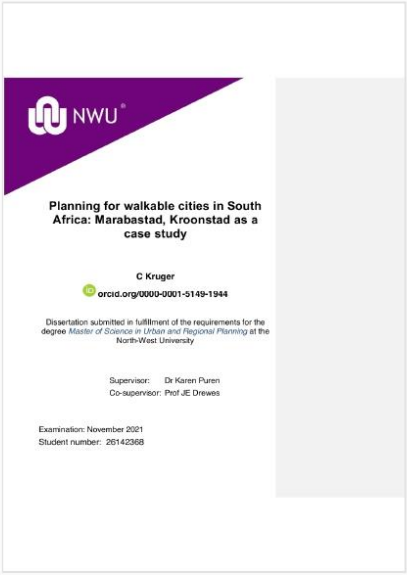

NWU

Planning for walkable cities in South Africa: Marabastad, Kroonstad as a case study

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