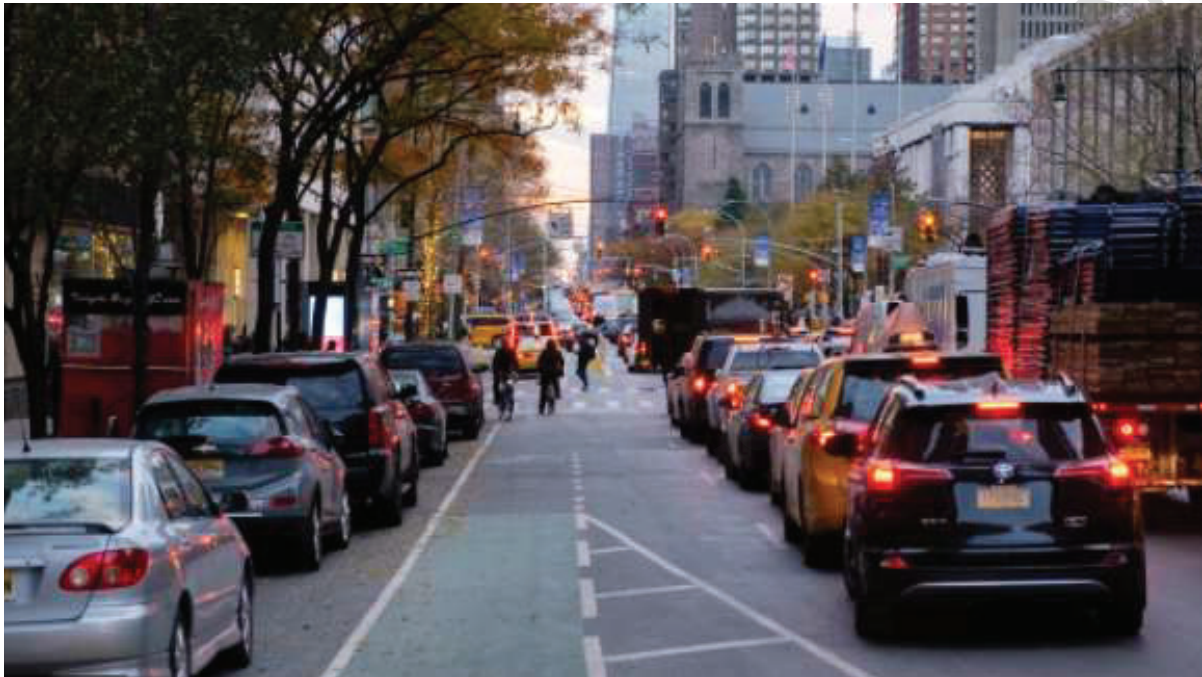


Why and when to manage parking – key indicators to be considered before implementing an on-street parking management system in Cape Town



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I would also like to thank the City of Cape Town municipality for granting permission and ethical clearance that the survey and data presented in this research may be used in completion of this thesis.

I would also specifically like to thank the Public Participation Unit of the City of Cape Town, who assisted in the surveys by the use of EPWP staff.

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III. Abstract

The City of Cape Town is responsible for the administration, management, and regulation of all public parking bays within the metropolitan area of Cape Town. On-street parking, within central business districts (CBD), aims to facilitate and provide access to short-term parking within short distances of places of business and opportunities, and the turnover of these parking bays is essential for the economic viability of these businesses. Historically, the implementation of newly managed parking areas was based on public outcry rather than proper planning.

The purpose of this study is to understand why parking is managed, by looking at literature from around the world, then to see when management gets implemented. This study then wishes to develop a set of indicators that municipalities should consider monitoring before formal parking management gets implemented within Cape Town areas. The aim of this study was therefore to develop a list of indicators that needs to be surveyed on an ongoing basis to use parking efficiently as a travel demand management tool in Transport Planning, by knowing why and when to implement parking management, instead as an operational tool to facilitate management once the situation on-street becomes a problem.

The methodology used in this study was to look at the historical literature from various parts of the world and determine what the main reasons for management parking are. Once it has been determined why parking is managed, the study aims to understand when to manage parking. Essentially develop a list of indicators, then set targets for these indicators, then when these targets have been achieved, the municipality can identify when to manage parking.

Three areas were selected that could serve as a proxy for the Cape Town context and test these areas against the indicators. A residential area, Durbanville, was selected which, over the past few years, has seen land use changes driving up the competition and demand for on-street parking. The second area selected was Camps Bay which is a recreational area with mixed-use and mixed demand for parking. The third area that was selected was De Waterkant which is a developed area with minimum off-street parking. The area is adjacent to the Cape Town CBD and therefore is subject to urban sprawl. Many drivers aim to park their vehicles for free all day and walk into the CBD. There is therefore massive competition for parking by residents, workers, and recreational parkers wanting to visit the local shops.

It was found that the main reason for managing parking is to increase the viability of public transport, for parking bay turnover to increase business viability, and to reduce traffic congestion and CO2 emissions. Although part of the world has implemented parking

management to increase revenue, the efficient use of parking is more linked to ensuring sustainability across the area locally and metro-wide, and therefore the revenue should be a result of proper and effective management rather than the main aim.

There were 7 indicators established through this study which were tested against the 3 areas. When the surveyed areas were tested through the indicators, the outcomes were that parking management implementation was required in De Waterkant and Camps Bay. The Management in Durbanville was not recommended as certain triggers were not met.

Regular monitoring allows for improved problem-solving from the municipality when demand outweighs supply. These indicators will vary between areas and may not be applicable in certain areas. Additionally, the development of the thresholds of these indicators also varies, however, this may inform part of a further study.

IV. Abbreviations and Definitions

Anonymity – remaining anonymous.

Consumer Price Index (CPI) – measures the weighted average prices for a basket of consumer goods and services, i.e. transportation, food, medical care. It is calculated by taking price variations for individual items in the predetermined basket of items, then averaging these price variations. Variations in CPI are used to evaluate price variations related to the cost of living.

CCT – The City of Cape Town, a municipality established by the City of Cape Town Establishment Notice No. 479 of 22 September 2000, issued in terms of the Local Government: Municipal Structures Act, 1998 (Act No. 117 of 1998), or any structure or employee of the CCT acting in terms of delegated authority.

Central Business District (CBD) – is the main part of a city where most of its offices, stores, businesses, employment opportunities etc. are.

Confidentiality – to keep secret or private.

Exclusive use bay - A parking bay which has been earmarked for the exclusive use of a particular user subject to a permit approval.

Informal parking marshal or car guard – usually a homeless person assisting vehicles with parking on a voluntary basis, in order to obtain voluntary payment from a parker.

Informed consent – permission obtained by a party understanding the risks or consequences.

Level of service (LOS) - a qualitative measure used to relate the quality of public transport services provided.

Managed parking areas - A business or recreational area of high demand and limited parking availability, which has been demarcated by the CCT, where the CCT implements a tariff charge for use of the parking bays in an effort to increase turnover of bays, use of alternative means to travel, reserving bays for designated uses, increasing availability and implementing timing restrictions in an effort to support and promote economic activity and viability of the area. The area may consist of various sub-zones.

Metro – means the area within geographical municipal boundary lines that fall under the City of Cape Town’s authority for service delivery.

On-street parking bay - A parking bay within a public street.

Parker – someone who operates a vehicle and parks it in an available parking bay.

Parking bay - A demarcated area within which a vehicle is to be parked, demarcated as such upon the surface of a parking ground or a public street.

Parking Management (PM) – the process of implementing formal management of parking bays. This can be done through a service provider being appointed to collect fares on behalf of the client.

Protection of Personal Information Act (POPIA) – stands for the Protection of Personal Information Act, Act No. 4 of 2013 or POPI Act. The act aims to protect any personal information that relates to an identifiable natural or juristic person (e.g. a company), comprising all information about persons, their characteristics and identifying information; and all confidential correspondence about or in reference to the person.

Public parking - Parking bays for use by the general public.

Public participation (PP) – Public participation, in this context, is a process to encourage the public to have meaningful input into the decision-making processes of the City of Cape Town. Public participation thus provides the opportunity for communication between agencies making decisions and the public.

Public participation unit (PPU) – the branch of the CCT who is responsible for the facilitation of public participation between the members of the public and the CCT.

Reserved parking bay or exclusive use bay - A bay reserved for a particular use or user group, such as a bay for people living with a disability, a loading bay, a bus stop, a bay for high occupancy vehicles, a bay for electric vehicles (with or without charging facilities), and motorbike or bicycle parking bays or any other bay, which falls under the reserved bay category as classified by the South African Road Traffic Signs Manuals (SARTSM). The bay will be signposted or display the appropriate markings as set out by SARTSM.

Travel Demand Management (TDM) - Actions, strategies, policies and tools used to encourage reduction in travel demand, or to redistribute this demand in space or in time by

travellers making travel choices which maximises the efficiency of the transportation system leading to improved mobility and environmental sustainability, reduces congestion and lowers vehicle emissions.

Transit-oriented development (TOD) - A development strategy with a bias towards viable public transport and, therefore, speaks to urban form, development type, development intensity and development mix. TOD requires a city's transport system to respond to urban development in a way that caters for the needs of the passengers while remaining affordable to the local authority and its residents, however it may also require the development of new transport infrastructure to be used proactively, to drive sustainable and compact development.

The Expanded Public Works Programme (EPWP) – is one of the numerous programmes offered by the CCT. The EPWP aims to provide poverty and income relief through temporary work for the unemployed to carry out socially useful activities.

Victoria Transport Policy Institute (VTPI) - is an independent research organization. They develop innovative solutions to assist in resolving transport problems.

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1. Introduction

Municipalities and government institutions are generally responsible for the administration, management, and regulation of public on-street and off-street parking on municipal and government-owned land. The main intention of public parking is generally to assist in the facilitation of the public in their daily business and duties. Parking provides them with easy access to opportunities and increased economic viability from such opportunities, be it commercial, recreational, business, or any other form of visitation to an area.

On-street parking aims to facilitate shorter-duration parking within the CBD. Without the turnover of these bays, it greatly limits the number of clients that can access businesses. Medium and longer-term parking is mainly situated at greater distances from the centres of business areas because parking bay turnover will be minimal. If they are found within the centre of business districts, the parking is very expensive. Parkers requiring all-day parking should ideally be accommodated in parking spaces at the edges of the CBD or in parking garages within the CBD. Facilitating on-street parking is normally accomplished by payment structures, appropriate management, and enforcement of time restrictions.

Along with highly trafficked recreational and high tourist-attracting destinations, the availability of parking and turnover of bays is becoming a challenge. Congestion results as the use of private vehicle ownership increase the level of service of public transport services decreases. The absence of parking management in these areas is now also leading to an increase in illegal car guard activities, which in some cases, support anti-social and other criminal activities.

The Urban Mobility Directorate of the City of Cape Town manages on-street parking in several areas within the Metro. Demand for parking in some areas has increased over the past years. Residents and councillors have requested management within certain areas due to the increase in demand. Parking accessibility impacts the viability of businesses when it is not available and turned over. To turn over bays timing restrictions are required. There may still be a limited amount of bays i.e. supply is less than demand. As a result, a parking charge would be implemented as it reduces demand. Achieving this balance is of utmost importance, both for the viability of businesses and the efficient utilisation of parking bays.

Historically, if CCT wanted to expand management of public parking into new areas, a public participation process would follow, to ascertain whether the public would support the implementation of on-street parking tariffs. This method is a reactive method when the problem

has surfaced. Instead, the CCT must gather information regularly and implement management when thresholds of identified indicators have been met.

The previous public participation process was in 2012. Since then, the demand in the following areas has increased to such an extent, that urgent intervention is now required.

The areas where interventions are requested are as follows:

- Camps Bay (Ward No 54, Sub-council 16) – will be analysed as part of this study
- Durbanville (Ward No 112, Sub-council 7) – will be analysed as part of this study
- De Waterkant (Ward No 115, Sub-council 16) – will be analysed as part of this study

In 2012, the public did not support the management of the above areas. However, the demand for management of the above areas has continuously increased.

In 2019 CCT undertook a public participation process, to allow the public an opportunity to provide their views and comments on the proposal to extend managed parking to these areas.

For this study, the areas of Durbanville, De Waterkant, and Camps Bay are investigated, to serve as proxies for similar areas across the metropolitan area. Durbanville is a mixed-used area, which is mainly residential. Over the past few years, the area has been developed and more businesses have opened. This has led to the development of a mini CBD. The area could therefore be used as a proxy for similar residential areas within the city.

De Waterkant is an area very close to a CBD where the land use has rapidly changed from majority residential to a more even spread of residential and business. With on-street parking being charged for in the Cape Town CBD, many workers park for free, in De Waterkant, during work hours in the absence of an on-street parking management system. The area also has many residential properties that don't have off-street parking and this leads to competition and friction between residents, businesses, workers, and visitors.

Camps Bay was chosen as this is a recreational area, which is common in Cape Town and South African coastline cities. The area's attractiveness leads to competition between people coming from all over the metro to visit the beaches and restaurants, workers in the restaurants, and residents. The Camps Bay area may require a different form of parking intervention as generally, people stay longer at beaches than in an area with higher business needs.

1.1 Problem Statement

With the expansion of CBDs, limited space within CBDs, and urban sprawl, businesses also expand into the adjacent residential areas which increases the competition and demand for parking. Municipalities are responsible for the facilitation and management of these parking bays and therefore need to know when and what are the most appropriate parking interventions to be implemented. Even more so, planning when to implement these interventions requires regular surveys. It is therefore important to develop a set of indicators that municipalities may use to plan for the implementation and operation of parking management systems. These systems will require regulation in a manner to facilitate use and occupancy.

All painted parking bays within the City of Cape Town has allocated time restrictions, which will show the maximum allowable time a vehicle may utilise those parking bays. Without formal parking management or enforcement, parkers occupy bays for the entire business day, ignoring timing restrictions. Visitors of businesses and retailers are therefore unable to access parking near where they wish to be. The unavailability of parking bays in an area may result in the area being less desirable to visit, which would affect the viability of businesses in that area. With capacitated Law Enforcement teams, the enforcement of timing restrictions, without a management system, is almost impossible.

Parking may also be used as a travel demand management tool, where the price of parking and the restrictive timing, influences the modal choice of a traveller. However, for it to be adequately achieved, you require a public transport system with a high level of service and available alternatives. The benefits of this are that you can reduce the parking/space requirements at destinations, lower CO2 emissions, reduce traffic congestion, free up public open space, create more walkable and environmentally friendly areas and increase economic viability with the generated foot traffic. In the absence of adequate levels of service on public transport, travellers are left with very little choice other than to use their private vehicles, which increases the demand for parking bays, which increases congestion and negatively impacts the environment.

One of the main problems is that there is sometimes very little analysis in new areas about when to implement a system for the management of on-street parking. Thus, as the land use of an area changes and the demand for parking increases. It is therefore required to set an indicator for the desirable land use and demand level before parking management should be

implemented. Without knowing the changes in land use, ongoing surveys of parking occupancy could be done and analysed to determine changes in trends.

Parking management interventions vary from the implementation of timing-restrictive signage to an actual on-street management system requiring payment for the use of parking. However, when management is implemented the tariffs associated with parking should vary depending on certain factors. An example using duration would be that the average person would want to spend a longer time at the beach, than at the local coffee shop.

Thus the viability of the coffee shop is impacted by the turnover and availability of parking bays near the coffee shop. If these bays are occupied for long periods of the day, then the economic viability of the coffee shop may reduce. It then becomes evident that parking management not only varies from municipality to municipality but from suburb to suburb.

The current process for the implementation of on-street parking management is a response to public and political complaints. Public Participation is then conducted and if the majority of the public supports the decision to implement parking management, then a contract is implemented. This is not deemed an acceptable plan of action, therefore, the purpose of this study is to assist South African Municipalities on when to manage on-street parking at a suburb level and which data to track to make informed decisions about managing parking, aiming to determine a set of indicators that needs to be considered when deciding on implementing parking at a technical level.

1.2 Problem Description

In 2018 and 2019 there was a considerable outcry from Cape Town residents and Ward councillors, for certain areas, requesting urgent parking intervention. The issues that were raised were the unavailability of bays, illegal vagrants charging for parking through bullish tactics, illegal demarcating of parking bays with cones, overstaying of timing restrictions, and high occupancy. At the time the Municipality did not have proper policy directives that drove the implementation of parking management from technical directives.

This research is intended to be used by the City of Cape Town Municipality, to better understand the significance of parking management and understand the technical aspects of implementing parking management interventions linked to indicators.

The City of Cape Town is one of the first and only municipalities, in South Africa, that have successfully managed on-street parking, as a service to the public, while creating a revenue

stream. Improved understanding of the balance between services versus revenue will lead to a better understanding of the cross-subsidisation of Public Transport operating costs, thereby increasing levels of service and assisting in future rollouts, however, this does not form part of this study.

1.3 Rationale/Significance of the Study

The significance and impact of this study are to provide municipalities, in particular the City of Cape Town, with a rationale for why and when to implement parking management interventions in suburbs based on a set of indicators.

The aim is to improve service delivery to the public and businesses by adequately managing bays, creating a turnover of bays, and reducing occupancy of long-stay parkers within the core hubs of suburbs to promote the turnover of bays.

The findings of the study are intended to gauge how the public perceives managed parking. Do they welcome a parking management system, as a tool to increase economic viability or do they perceive parking in a negative light, a burden and an extra cost?

If managed parking is viewed in a negative light, then this study aims to identify the problems with unmanaged parking and the significant value added by managing parking. For municipalities, it will act as a guide of when to consider implementing a parking management system and what consideration needs to go into the implementation of such a system. It would also assist in providing key indicators that municipalities should aim to consider and regulate to facilitate the transition of implementing a parking management system.

The impact and significance to business owners would mean that there will be available parking near, allowing access and more traffic to their businesses thereby making them more desirable and viable.

As previously mentioned, the City of Cape Town embarked on a public participation process in 2019 intending to gauge the public's reaction to the implementation of managed paid parking in various areas, where high demand for parking management was observed. The outcomes of this will be analysed under Section 3.

This study is, therefore, important for the viability of the businesses in local areas, the municipality in its role to increase this viability, and as a travel demand management tool of provided modal choices options.

1.4 Research Topic

Why and when to manage parking – key indicators to be considered before implementing an on-street parking management system in Cape Town.

1.5 Research Objectives

The main objective of the research is to use international knowledge to understand why and when on-street public parking should be managed. Then to develop indicators to consider when parking should be implemented at a local level, specifically for Cape Town Municipality.

Land use changes over time have a major impact on the demand for parking. Although the changes in land use will not be measured in this study, the demand and occupancy will be used as an informant to changes in land use.

Research objectives based on the CCT's public participation process and engagement with the public will aim to understand: whether parking, in the areas identified as high demand, is easily found on weekdays (between 8 am and 5 pm) and during weekends. This would determine whether the land use is more business or rather recreational orientated.

In Cape Town, one of the informal indicators of high demand for on-street parking is the presence of illegal car guards, often vagrants or homeless. Similarly, to how increased demand on public transport gets taken up by illegal operators, the same principle applies to increased parking demand and parkers getting harassed by illegal car guards. On numerous instances, local ward councillors appeal to officials to implement parking management to eradicate the illegal car guards, as their illegal operations often create an unsavoury environment. Engagement with the public in these areas can help identify how often and when they are approached by illegal car guards. Again it is important to understand, if this happens during the core business hours on weekdays or if this happens over weekends, which suggests that the land use and demand for management may be more associated with recreational activity.

Another aspect of parking management that can be learned from these illegal car guards is an indication of the duration that people park. When observing car guards, one can easily determine when the busiest times are. In business areas, when people park their vehicles in the morning, car guards will be visible in the morning and will go elsewhere during the day. They will then return in the afternoon when people return to their vehicles. In areas where there are a lot of recreational and leisure opportunities, illegal car guards hover around and

wait for when people park and leave, much like the parking marshals operating hours in a managed parking area. In some instances, car guards will only be visible on certain days of the week. An example of this would be Woodstock lower main road on a Saturday in the Silo district. Therefore, as crazy as it may sound, by observing the illegal car guard operations, information about the on-street parking operational requirements can be extracted.

Needless to say, people have become accustomed to paying for parking in some areas. Formal parking marshals, collecting parking fees on the street, have been introduced in the City of Cape Town in 2009. They replaced the on-street parking metres. One of the reasons this was done, was the lead-up to the 2010 World Cup, which took place in South Africa, to create jobs. Numerous people, therefore, sympathise with vagrants illegally collecting parking fees and, therefore, in unmanaged areas where vagrants assist in parking, people pay these illegal car guards. The amount people deem acceptable to pay may vary considerably from area to area. This would depend on the demand of the area, as well as the price of property and rates in the area, which is an indication of the living standards measure of the area. The consumer price index will vary for an area like Sea Point in comparison to Bellville. Therefore, it could be assumed that the amount people are willing to pay an illegal car guard in Bellville differs from that in Sea Point. Therefore, finding out whether people pay car guards and how much they pay them, can assist in understanding what the tariffs would be to consider when implementing managed parking.

Currently, if an area is unmanaged, the first point of action is that the City of Cape Town implements timing restrictions. These timing restrictions are required to be enforced by Law Enforcement. Due to land use changes, it is difficult to understand what the exact allowable time should be that vehicles can park in a certain street or area. On a suburban level, the timing restrictions will vary. For example, if you were to have timing restrictions outside a hospital then with visiting time being 1 to 2 hours the on-street parking allowable time should be 2 hours. Conversely, if the parking is outside of a line of different fast food restaurants, the timing restriction would be between 30 to 60 minutes. Therefore, it is important to gauge from the public how long they park in different areas.

It must be understood by the public that the illegal car guards are not employed by the CCT and, therefore, there is no obligation to pay them. Conversely, some of the illegal car guards impose bullish tactics to ensure that motorists pay them, which is why the public is allowed to comment on whether they support the CCT's plan to implement charging motorists for on-street parking by using formal car guards.

This study will also aim to understand any other comments/questions/proposals related to parking, that the CCT may take into consideration as recommendations but for this thesis, extract possible indicators for future management roll-outs.

The areas of Durbanville, De Waterkant, and Camps Bay would be considered was considered for this study as a proxy for other areas with similar characteristics. The reason for this is that Durbanville is a mixed-used area that is mainly residential and could be used as a proxy for areas with similar characteristics across the Metro. De Waterkant is an area very close to a CBD where the land use has rapidly changed from majority residential to now majority business as a result of possible urban sprawl. Camps Bay was chosen as this is a recreational area that is common in Cape Town and South African cities.

1.6 Main Research Questions

The questions are summarised as follows:

1] Why and 2] When to manage parking?

The intention is to look at the literature and also places where parking management has been implemented and determine if there are similarities in why parking is managed and when parking is managed.

3] What are the key indicators for the management of on-street parking implementation?

It is then important that if a trend could be determined of why and when parking is managed, are there indicators that can influence the implementation of formal management? The study will look to find these indicators and will make recommendations of what the CCT should consider implementing.

1.7 Main Assumptions

An assumption was made that only residents and people travelling to an area by personal vehicles for work opportunities would be directly impacted by cost implications. Due to the assumption that the most adversely affected, by any form of intervention, would be the residents, workers, and business owners, the focus of the study was, therefore, built around them. The survey was therefore done in the areas at parking bays.

Another assumption was that most businesses have off-street parking as a requirement of the zoning scheme.

It was also assumed that parkers have limited options in terms of mode choice and, therefore, have very little choice but to use their vehicles.

It was assumed that parkers parking for more than 2 hours are parking for the whole day. The reason for this was that the maximum allowable timing restrictions implemented by the City of Cape Town are 2 hours.

It was assumed the participants of the survey answered truthfully and to the best of their knowledge.

It was also assumed that increased demand for parking is linked to land use changes over time.

1.8 Main Ethical Considerations

The survey was designed by Mr. Imeraam Frydie in his role as the Senior Professional Officer for Parking Management within the City of Cape Town. This information would serve both as data gathering on behalf of the CCT and the findings of this Thesis would be to complete Mr. Frydie's minor dissertation. The outcomes found would possibly be implemented by the CCT. The Survey was done in 2019, however, some of the information provided to the CCT was sensitive information. The POPIA Act aims to safeguard personal information and, therefore, the CCT is required to identify all sources which contain personal data and mitigate this to disseminate data free of personal information. So, although the information was provided to the CCT, this study will not include any personal information of the public who were surveyed.

The City of Cape Town granted permission that the survey and data presented in this research may be used in the completion of this thesis as shown in Appendix B. Ethical clearance was then granted by the UCT ethics committee.

The survey questionnaires were printed and surveyors were strategically placed in the various suburbs. Before engaging in the survey, surveyors were to approach parkers on the street, introduce themselves, and indicate that they are surveying on behalf of the City of Cape Town, concerning on-street parking. The members of the public would then be asked if they would like to partake in the survey. If the person wished to partake, they were asked for their details. They were given the option to remain anonymous. This is how informed consent was achieved. The consent requested was not just to partake in the survey but also whether the information provided in the survey could be used as part of the study.

No coercion to participate was created and participation was completely voluntary. It was explained at the start of the interview that people were allowed to withdraw midway through the survey without prejudice. If the participant withdrew, their information was withdrawn from the data.

The privacy of the members was also taken into consideration. The surveys were done in a manner where the general public or passers-by would not overhear or interrupt the interview.

The surveyors were requested to interview random members of the public, but not people whom they may know. They were to interview passers-by randomly to achieve anonymity.

For this research, there were no financial contributors as the researcher worked independently. It must be noted that the researcher used his employer's resources in obtaining the data as the employer was undergoing a process of public consultation to expand public on-street parking.

1.9 Report Structure

Section 1 of the report dealt with the introduction of the study.

Section 2 of the report looks at the literature, concerning the research questions, from around the world. The section also looks at the relevant Policies and Legislation in the Cape of Town Municipality.

The report then goes into the methodology under Section 3. It develops a conceptual framework and then unpacks the design of the questionnaire and looks at the sample and population. It also looks at the data collection approach and method.

Under Section 4 of the report, the data is analysed and outputs are summarised for the selected areas. From the data analysis, the study will aim to extract the indicators.

Once this has been done, the findings and outcomes of the study will be captured under Section 5, followed by the recommendations in Section 6 and the conclusion of the study under Section 7.

The references and appendices will follow as Sections 8 and 9 respectively.

2. Literature Review

2.1 Introduction

The literature review aims to look at different places where parking management has been implemented and find the reasons why and when parking management was implemented. In addition, the study aims to try and find possible indicators that led to the implementation of such management interventions.

2.2 Parking Management

Parking management refers to policies and programmes that result in more efficient use of parking resources (Litman, 2016). Parking management includes several strategies, which can significantly reduce the number of parking spaces required in a particular situation if appropriately applied (Litman, 2016). Parking provides a variety of economic, social, and environmental benefits, and when all impacts are considered, improved management is often the best solution to all parking problems (Litman, 2016).

The first parking meters were first installed in Oklahoma City, in the United States of America in the year 1935 (Gershon, 2019). It was considered one of the greatest traffic inventions (Orrick, 1941). It was considered a suitable regulatory method for parking and was an intervention to prevent vehicles from congesting parking bays and streets, rather than a money-making operation (Orrick, 1941).

On-street parking management should not only be considered to be used when the environment to do so is correct but may also assist as a tool to creating the most desirable environment (Marshall, 2014) i.e. a planning tool rather than an operational tool only.

Globally, parking is becoming an increasingly expensive resource in all major cities (Willigmann et al., 2018). Concurrently, due to the limited availability of parking and space, urban traffic congestion and air pollution are problematic (Barone et al., 2014). In older cities, the structure of public parking is in the form of on-street parking spaces, conversely, this is to the detriment of the quality of urban mobility, because these parking spaces cannot be reserved beforehand (Barone et al., 2014). Although the technology for reservation and payment does exist, the implementation of such technology may increase car dependency, thereby reducing the viability of public transport and increasing congestion.

The comparison of traffic, financial and environmental effects, requires the use of more resources and higher public expenditure. Moreover, when parking systems become more controlled and restricted, traffic, financial and environmental effects worsen, over the short term. In the long term, controlling the capacity of parking and introducing a fee will contribute to the transference from private to public transport, and alternative ways for more sustainable travel solutions (Costa et al., 2014).

The outcome is that parking and the management of parking are used as a tool to increase the viability of public transport and to reduce the dependency on vehicles. So the authorities who control parking tariffs may increase PT viability by increasing parking fees. Increased fees will deem it unviable or inconvenient to use vehicles to visit certain areas, which will result in lowering congestion and CO2 emissions.

Numerous metropolitan cities are faced with the problem of too many vehicles (both from high car ownership and high car dependency), causing too many vehicles to compete for too few parking spaces. The problem is heightened during peak times in CBDs when numerous motorists are trying to locate a parking space. Furthermore, parking consumes a lot of physical space in cities, which are dedicated to vehicles that are stationary for most of the day, instead of alternative social or economic activity, such as spaces where people live, work, and socialise (de Vries and Cohen, 2018). According to The Economist (2017), numerous companies allocate an equal amount of space and funding to parking as they do to actual office space. Optimistically, parking plays an important fiscal role in the economy, as parking fees and fines provide a considerable revenue base for local municipalities. This additional revenue generation can be reinvested into city urban upgrades and improvements (Rye, 2010) and more specifically, improvement of public transport as the level of service for public transport has a direct effect on travel demand management. It, therefore, has a direct effect on parking requirements.

The improvement of public transport is therefore another reason why parking management is so important, due to the ability to generate substantial amounts of revenue (Rye, 2010). Furthermore, adherence to a set of policies and programmes will increase efficiency, manage demand and supply of parking resources, which will improve the transport, environmental and economic situation in any city's CBD (Rye, 2010). It also has a direct effect on the viability of businesses which in turn grows the economy.

The aim of parking management varies depending on the provider, for example, if local government wants to address congestion, revenue regeneration is suggested to be a solution.

Contrastingly, for private provider revenue and profit is important, so access and revenue are key indicators (Ison, 2014).

It is learned that a reason why authorities implement parking management is to generate additional revenue. Another reason why parking management is implemented is to reduce space or better manage the limited space in metros. These can be achieved when there is an adequate level of services on public transport supported by adequate policy

There can often be a conflict between the quantity and availability of parking, the price thereof, and economic development (Ison, 2014). According to the VTPI, Parking Pricing means that motorists pay directly for the use of all parking facilities (Litman, 2016). This is often used as a parking management strategy to recover facility costs or to raise revenue for transport programme improvements. Litman (2016) suggests that parking is inefficiently priced; it is either for free, significantly subsidised, or comes standard with the purchase of a house or rental, regardless of whether the user wants it or not.

The driver's behaviour may change among various considerations. It is assumed that drivers are aware of specific delays and mobility costs when deciding to use their vehicles to get to and from work. This may affect the driver's behaviour immediately, however, in the long term, this behaviour may be different when it is not considered in the immediate term (Costa et al., 2014).

In the United Kingdom, unregulated on-street parking usage changes with demand and the availability of off-street parking. Interventions are therefore only applied when supply is exceeded by demand in areas (Balcombe & York, 1993).

It is important to get the pricing right for parking. If parking is too cheap and demand is high, then vehicles will occupy parking for longer periods and this will lead to other parkers circling the area many times searching for parking, leading to congestion (Shoup, 2011). Shoup refers to 16 studies conducted in America between the years 1927 and 2001, whereby it found that 30% of vehicles in congested areas were cruising around looking for parking. In three years 2006 and 2007, researchers interviewed vehicles stopped at traffic signals in New York, between 28% and 45% were cruising around looking for parking. In 2008, it was found that the average time to find parking in New York was about 3 minutes (Shoup, 2011).

If parking is free of charge, it will only serve and benefit a few drivers who happen to be lucky enough to find a spot. This is a concern and drives up social costs to the rest of the public

daily. To better manage curb side parking and avoid the negative effects caused by cruising, it's important to vary parking prices by locality and time. Commonly, in cities that aim to achieve this, the pricing model is kept simplistic as the main intention is to manage parking rather than drive additional revenue. The purpose of these pricing and management implementation sets and targets are to achieve an occupancy of 85%. Where the price of parking is too high, many parking bays will become vacant leading to massively reduced occupancy. Over time, the occupancy should be monitored to drive the occupancy to a percentage around 85% which means that there will still be available parking for parkers close to their destinations, this is what is referred to as the Goldilocks principle of the cost of parking. (Shoup, 2011).

In summary, the Goldilocks principle is that if too many curb spaces are vacant, adjust the price downwards, and if no spaces are available, increase the price. Although the cost of parking is not the intention of this it is important to note that municipalities increasing parking prices to increase revenue is not the ideal way of managing parking, instead by rather doing theoretical testing will limit the politics around parking management.

Limited space will result in conflict over quantity and availability. When this happens pricing could be used as a deterrent to manage car dependency and reduce occupancy. Adjusting the price of parking to achieve the desired occupancy is known as the Goldilocks principle.

According to Victoria Transport Policy Institute (VTPI, 2005), shared parking means that a parking facility serves multiple users or destinations. This is suggested to be most successful if destinations have different peak periods, or if they share customers so that motorists can park at one facility and walk to several destinations (Litman, 2016). Catering for peak demand in a shared way allows for more efficient use of parking that can be achieved by provisioning parking by individual sites. Regulating shared parking through the District Plan may be difficult, due to the temporary nature of access arrangements of parking owned privately or by someone else (Genter et al, n.d). Shared parking can be considered a temporary strategy to secure an appropriate parking strategy and it can emerge without any regulation. It is highly unlikely for any development to secure a parking facility for longer than 12 months (Genter et al, n.d). The biggest advantage of shared parking is that two companies can benefit from the same parking facility at different times of the day and local authorities can help this process gain momentum through education and non-coercive incentives (Genter et al, n.d).

Understanding the influx of informal car guards can assist in when to manage parking. There are different peak times to manage parking around weekdays and weekends

demand and understanding the different needs of parking on an area-to-area basis will assist in when to manage parking.

According to the VTPI in Litman (2016), parking regulations control who, when, and how long vehicles may park at a specific location, to prioritise parking facilities, and use. An example of this may be “Duration”, whereby short-term users are limited to the parking space in terms of the duration. Another example is Residential Parking Permits which favours residents, giving them priority use of the parking spaces closest to their homes (Litman, 2016). Even though residents mostly use these spaces, there has been a growing trend in recent years for them to be hired out for use by non-residents in certain locations (Ison, 2014). Further to this, an issue to emerge recently has been the presence of unregulated residential car parking provision, and although this is suggested to be currently relatively small, it may become problematic in the future, due to its trend progression.

Parking maximums mean that an upper limit is placed on parking supply, in an area – called Parking Caps, or individual sites (Litman, 2016). Parking caps can be in addition to minimum parking requirements. Further to this, excessive parking supply can also be discouraged by imposing special parking tax, reducing public parking spaces, and enforcing regulations that limit temporary parking spaces (Litman, 2016). More so, parking maximums only apply to certain types of parking, such as free, long-term, or single-use, all depending on the suggested planning objectives (Litman, 2016).

Remote parking refers to the use of off-site, shared, parking facilities (Litman, 2016). An example of this may be when office workers use a restaurant parking lot during the day, in exchange for restaurant employees using the office parking lot on weekends and at night (Litman, 2016). Remote Parking may also involve parking facilities that are located on the outskirts of the city or business district and uses overflow parking during special events that attract large crowds. These motorists will then make use of the free transit shuttle service that may be provided to connect the destination to the remote parking facilities (Litman, 2016).

San Francisco has implemented an operation tool to achieve the correct parking pricing linked to the correct occupancy. They installed parking metres with varied prices and implemented a sensor system that provides them with real-time occupancies. The outcome of this is that the municipality will be able to adjust its prices over time to achieve the Goldilocks principle (Shoup, 2011).

Maximising supply and demand by understanding the peak time people park, understanding the influence on the duration, assessing the occupancy, and

understanding the pricing to achieve adequate occupancy are key indicators of when to implement parking management. As far as possible this parking management would be implemented before unregulated interventions.

Parking management is an important consideration for public authorities and for private vendors that run the parking facilities. Even though there are a few regulations and minimum standards for parking on a local and national level, parking has mostly been addressed at a local level with municipalities imposing minimum standard requirements on parking vendors (Shoup, 1999). These standards are dependent on the land use and the activities that will be served by the parking facility (Shoup, 1999). Unfortunately, since there is no integration between parking policies, the minimum standard requirements can lead to an oversupply of parking facilities, both on and off-street (Shoup, 1999).

To manage space requirements and availability, sustainable urban development is required to avoid land disintegration and public fragmentation. Considering that between 60% and 70% of urbanisation is uncontrolled due to rapid growth, detailed urban planning with proper monitoring systems should be in place and is of utmost importance to influence urban growth policies (McLaren/Coleman/Mayunga, 2005).

A negative effect of land use changes over time is the effect on residents. As changes in land use occur the demand for parking increases and the demand for parking management will increase. This means that residents who have lived and enjoyed free parking for years will now need to pay a premium for parking even though they will also benefit from the introduction of paid parking, due to the reduction in cruising time and cost. In the Netherlands, the use of residential parking permits assisted residents with paying a lower cost of parking in the form of a permit (De Groote et al, 2018).

Land use change policies need detailed monitoring systems linked to urban growth policies. As land use changes so does demand and competition for space and parking. Tools need to be in place to address the competition. An example of such a tool would be the consideration of residential permits for locals due to urban growth and sprawl close to the CBD.

It is also important to consider the characteristics of both the origin and destination. There may be very few options available to users of personal vehicles from their destinations. So it is important to understand and consider these factors, before setting tariffs as this could be a double tax on users that have no alternative but to use their vehicles and the premiums associated with it, then also charging them for parking on-street at their destinations for work.

Free parking spaces at companies may suggest sought-after privileges that are not provided to all. Generally, it is provided for management-level employees. Furthermore, minimum parking requirements are suggested to have led to an oversupply, because they assume free parking at each company's building during peak hours (Shoup, 1999). This assumption for the demand for free parking during peak hours considerably undervalues the land required for the parking demands (Genter et al., n.d.).

When parking is freely available, the need for increased bays and bay turnover will arise.

Unemployed people started offering informal ad-hoc services of assisting parkers find and park in bays in exchange for a voluntary payment by a parker, across municipal parking bays in the CBD. This would also take place where the demand would arise such as outside sporting events, near schools, hospitals, churches, busy restaurants, and especially shopping centres (Kitching, 1999).

When Businesses started seeing the positive externalities that informal car guards indirectly provided, such as deterring car robberies and theft, it assisted in changing the mind of business owners in seeing the positive impacts that official car guards would bring (McEwen and Leiman, 2008).

Although car guards provided varied services and were received with mixed feelings, the significance of the services they offer may differ across areas. Parker's perceptions of engagement with informal car guards may help understand location and time aspects (McEwen and Leiman, 2008) i.e. why and when. Car guarding has become an indicator to gauge understanding of the development of a free parking area.

In a dissertation submitted by John Robert Wilfred Foster in 2015, to the University of Kwazulu Natal, Foster makes the point that car guards are not going anywhere. So the more knowledge is gained from understanding these informal car guards and their behaviour, the better information could be extracted, to understand business and public needs (Foster, 2015).

Understanding the behaviour of informal car guards could help municipalities understand and gauge when to manage parking.

2.3 Policy and Legislation

The CBD's of major cities and that of outlying smaller cities present different situations and considerations for parking. Factors that need consideration include the scarcity and cost of land, the availability of public transport, and the high density of development (Mackey et al., 1981). All of these factors may prevent the provision of parking in outlying smaller cities. In this instance, a separate parking policy is developed for parking in the CBD of large, major cities (Mackey et al., 1981). However, it is not possible to recommend a set of minimum standards for the CBD's of large, major cities because of local circumstances, precluding highly pedestrianized areas, and the parking policies adopted by local authorities (Mackey et al., 1981).

Policies should address the local needs as a set of minimum standards may not address local requirements.

In the Netherlands, it was found that the introduction of paid parking is the recommended policy tool to deal with cruising for on-street parking and when this introduction was made, it was made with the implementation of a resident parking permit system to increase political support (De Groote et al, 2018).

The City of Cape Town's IDP and CIP and IPTN

Within the Integrated Development Plan (CCT, 2017), Comprehensive Integrated Transport Plan 2013-2018 (CCT, 2013) and Integrated Public Transport Network (CCT, 2014), the City of Cape Town Municipality has adopted a policy position towards the development of a sustainable city characterised by a more compact urban form supported by a public transport system for Cape Town.

The intention of a Parking Management System is to encourage, facilitate and enable changes in travel patterns that aim to assist in the development of a more sustainable city.

The Parking Bylaw 2010

Section 156(2) and (5) of the Constitution allows for municipalities to create and manage by-laws for the administration of certain matters, which it has the right to control, and to exercise any authority regarding matters which are reasonable and necessary for, or related to, the efficient performance of its duties and functions.

Based on the above, the City of Cape Town Parking By-Law, 2010, has been approved by Council on the 9th of December 2010, and has been promulgated on the 18th of February 2011. The purpose of this By-law is to control parking within the metropolitan area of authority and boundaries of the City, in order to provide a safe environment in order to assist and promote the viability of business and assist the public in their daily endeavours.

In accordance with the Parking Bylaw of 2010, the provision and management of on-street parking is inextricably linked to high parking demand areas. As new managed parking areas are considered and identified a process of implementation of an on-street parking management system is provided for. However, this intervention should also meet the broader Travel Demand Management and Transport Orientated Development principles.

[The Parking Policy for City of Cape Town 2014](#)

The Parking Policy for The City of Cape Town (Policy Number 17913) was approved by Council on the 24th of April 2014. The Parking Policy was the first of its kind for Cape Town. The aim of the Policy was to be a comprehensive methodology for the provision, management, regulation and enforcement of parking within the Municipal boundaries of the City of Cape Town Metropolitan area. (City of Cape Town, 2014).

The Parking Policy was based on the then direction provided by the existing legislation of the City of Cape Town's 2040 Vision, which included principles, directives and actions to address parking issues and considerations Metro wide (City of Cape Town, 2014).

Transport and urban trends, such as increased car ownership, increase of business opportunities and deteriorating public transport necessitated the need for the drafting of a parking policy for the City of Cape Town. However, the availability and management of parking had become complex and a controversial issue for residents, commuters, visitors and business/private sectors as per the Parking Policy (City of Cape Town, 2014).

Strategically, the Parking Policy was aimed to manage parking supply and demand in high parking demand areas efficiently with the inclusion of exclusive use bays, such as loading bays, bus bays and disabled bays in a manner to act as a travel demand management tool to reduce private vehicle use and dependency (City of Cape Town, 2014).

In addition, the policy directives and actions were aimed to address enforcement of on-street and public off-street parking, manage parking, provision of off-street parking, Park & Ride

facilities, loading bays, bus bays, parking permits, reserved parking, bicycle and motorcycle parking. (City of Cape Town, 2014).

Some of the successes of the 2014 policy were:

- The identifying and establishment of managed parking areas, in certain CBD's, within the City of Cape Town.
- The appointment of Parking Management Service Providers.
- Encouraging transit-oriented development at Park & Rides.
- The provision of bicycle and motorcycle parking.
- Providing a long distance bus facility.

Some of the investigation and more moderate levels of successes of the 2014 policy were:

- Investigation and movement towards management of high demand recreational parking areas.
- Investigation of residents' permits.
- Investigating the option of implementing maximum parking standards.

Revised Parking Policy 2020

The Parking Policy for The City of Cape Town (Policy Number 17913), was revised and approved by Council on the 3rd December 2020 (Vide Item C22/12/20). Generally, in the City of Cape Town it is common for a review of a policy to take place every 5 years or if the environment, wherein the policy is applicable, undergoes drastic changes.

2.4 Alignment of this study with Policy shortcomings

The 2014 Parking Policy had certain directives that were not successfully implemented or least successfully implemented. These include:

- The increase of the enforcement capacity for parking in the Safety & Security Directorate of the City of Cape Town and applying new enforcement technology.
- Enforcement through the use of administrative penalties.
- Instituting priced parking for motorcycle and converting existing parking bays to motorcycle bays.

- Lack of support to ring-fence parking income. Within the City of Cape Town, all revenue generated from parking goes into the CCT's general fiscal and therefore goes to the general service delivery budget instead of strategic being align to transport improvement and public transport viability.
- The rail crisis has caused little to no demand in resourcing the management of parking at railway stations.
- Parking provision for overnight freight vehicles.

There were three areas identified that were critical in needing inclusion or strengthening, to support transit-oriented development, travel demand management and environmental sustainability. The first was the provision or lack of provision of parking, which favours more sustainable modes of private travel, e.g. bicycles, motorbikes, electric vehicles and ridesharing. The second was designing parking facilities in way that is more environmentally responsible in their function, guided by the CCT's Green Infrastructure planning to support climate change. The third one, which is the main reason and focus of this study, was the management of parking within the main commercial areas in order to influence, rather than respond to, demand patterns.

Although these gaps are addressed from a policy perspective in the 2020 Parking Policy, there is not a clear cut process of how expansion of parking management areas has to be executed and what measurable objectives should be achieved within specified timelines.

The aim of the study is to develop and monitor a list of indicators that should be monitored in order to manage the expansion of managed areas as a planning tool rather than responding to demand, as responding to demand, which could be perceived as resilience, is often and most likely costly and not sustainable.

2.5 Conclusion of the Literature

It is evident that the driving forces and requirements of a parking management is dependent on the demand, which varies considerably from area to area and country to country. In the United Kingdom, there has been a move towards implementing parking management as a tool to increase revenue. Whereas in America the aim was to turn-over parking bay, reduce traffic congestion, reduce car dependency and increase public transport use. There is also great need to reduce space required for parking where public transport levels of service are optimal and encourage alternative modes to vehicles.

In a Cape Town context, due to the competition for land, dependency on vehicles and reduced levels of service of public transport, the number of parking bays required, may not be easily reduced. This will also mean that although the correct policy decisions are taken, it doesn't mean that they could be achieved operationally due to interdependencies of other factors.

The balance of price vs occupancy is of utmost important, thus if you are implementing management to increase revenue and increasing parking prices, the occupancy may drop substantially which may negatively affect businesses in the surrounding areas. This dependency has been found as named the Goldilocks Effect.

In Cape Town, charging for the use of parking has been in place prior to the year 2009. At that time it was in the form of installed parking metres and parkers were required to pay for a certain amount of time in advance. The parking metres were subsequently replaced in the metro which saw the introduction of parking marshals in 2009 (Xolani Koyana, 2015).

The aim of the Parking Policy, which was implemented by the City of Cape Town in 2016, aimed to manage the supply and demand of parking in areas and suburbs with high and increasing parking demand in an effort to reduce private car dependency and use (Parking Policy, 2016).

In the City of Cape Town, the first point of action in high parking demand areas where supply is limited, is to implementing timing restrictions, as per the Parking Bylaw (2010). This means that a cap is applied to period that a bay may be used before a vehicle has to vacate the bay. The shortcomings of this mechanism is that you either require the full time enforcement of these timing restrictions or you need automated timing devices that monitor the stay in these bays. Both of these mechanisms are unviable. The law enforcement strategy would be unviable as this is considered to be a waste of resources and the monitoring sensors would be considered wasteful if you don't charge a premium for the use of parking to cover the capital and maintenance cost of the system.

In accordance with the Parking Bylaw of 2010, the provision and management of on-street parking is inextricably linked to high parking demand areas. As new managed parking areas are considered and identified a process of implementation of an on-street parking management system is provided for. However, this intervention should also meet the broader Travel Demand Management and Transport Orientated Development principles.

The literature from around the world supports a system of developed indicators that can be adapted to specific needs of an area or city. In a Cape Town context, although policies have

been derived to successfully manage, regulate and administer parking, there are still shortcomings of processes of exactly how to achieve the outcomes. Through identifying these shortcomings and considering international best practices and guidelines, the study intends to provide municipalities with the factors to consider of why and when to implement parking management.

3 Methodology

The intention of this study is to understand why and when parking management is required. Then to extract key indicators to be considered before implementation of new managed parking areas. This will allow that parking doesn't only get looked at as an operational tool but rather a planning tool.

The intention was to interview parkers and ask them a series of questions in order to better understand the parking requirements of an area in order to determine what would be the best time to implement management in an area.

3.1 Conceptual Framework

The management of CCT owned public parking varies throughout the CCT metropolitan area. In some parts you have managed parking where you park but you have to pay for the use of such parking. In other parts there are timing restrictions in place in order to facilitate turnover of parking bays.

The availability and cost of parking can influence decisions on the transport mode used, this may ease congestion, reduce travel time and, possibly, the choice of destination. It may also increase the viability of public transport if the mode is shifted from private car usage to public transport. As outlined in the draft Transport Demand Strategy for the City of Cape Town (2017), public parking is considered a pivotal revenue enhancement mechanism and TDM tool to reduce car dependency and improve modal share. So with effective Parking Management, revenue generated from parking can be used to offset the cost of providing high quality public transport and cross-subsidize alternate TDM/TOD interventions. Therefore, knowing when and where to expand the management of bays is an important aspect of travel demand management.

So parking should be managed as a travel demand management tool according to City of Cape Town Draft Transit Oriented Development Strategic Framework of October 2015.

The approach and application of parking management strategies to support TOD outcomes as well as improved utilisation of public parking differs between the various areas of study. Furthermore, theoretically, in the absence of parking management, vehicles will occupy bays for long periods of the day if not all day. Without turnover of parking bays, the viability of businesses will depreciate, due to lack of access to opportunities. So when certain triggers are fulfilled, suburbs are identified for management. When management has been identified

for an area, then a tariff needs to be applied to the area. When parking now comes at a premium, this will deter users of all day parking due to the cost implications.

Illustration of the no parking management

The effect of parking management and no parking management is illustrated below in Figure 1. In Dreyer Street, Claremont on 12 October 2021 with no parking management in place. Recorded occupancy between 90-95%, which means there was very little parking available and turnover of bays.



Figure 1: Dreyer Street Claremont with no Parking management

The situation in the Cape Town CBD was no better the occupancy in Bree Street on the 5th October 2021 was recorded as 90-95%.



Figure 2: Occupancy Bree Street, Cape Town

In the Cape Town CBD, Long Street occupancy was recorded at 90-95% occupancy on the 5 October 2021.



Figure 3: Long Street, October 2021

The CCT parking management contract came to an end on 30 June 2021. With no replacement contract in place and free on-street parking, this had a negative impact because public transport services levels were low due to reduced demand. This meant that the public utilised private transport as their modal choice. These people disobeyed the timing restrictions and the businesses were being negatively affected because parking bays were occupied all day.

This led to complaints from the public which forced the CCT to reconsider the strategy of allowing vehicles free parking in order to increase flow to the business as shown in Figure 4 below.

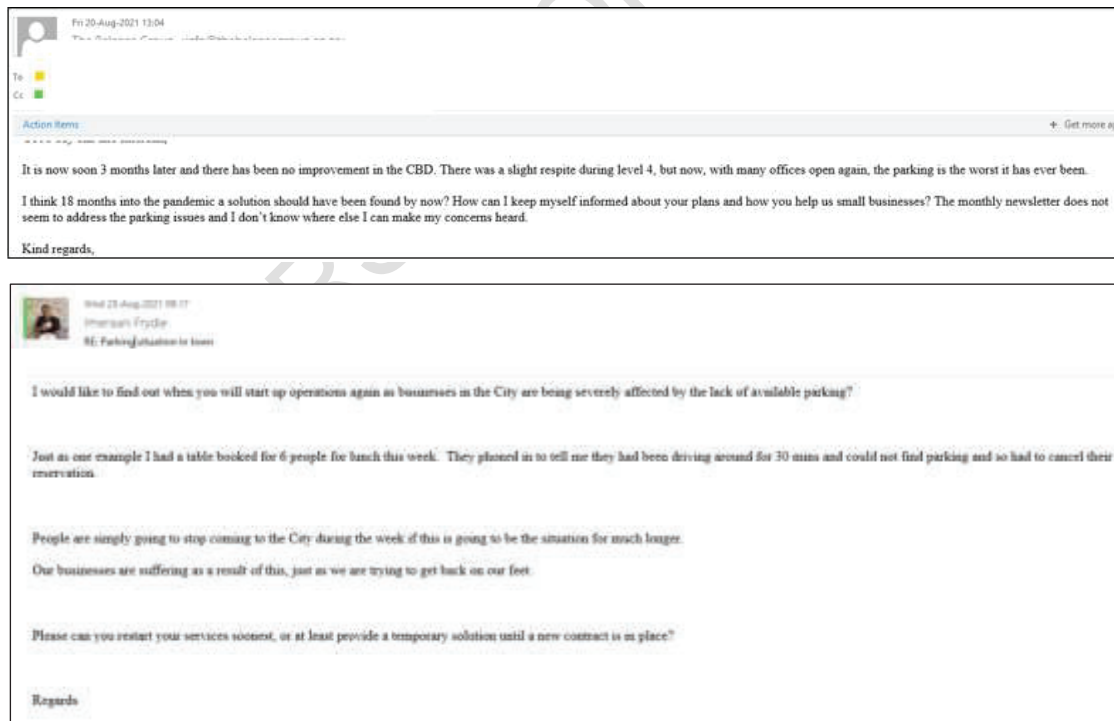


Figure 4: Complaints from businesses

Illustration of the reimplementation of parking management

When parking management eventually resumed in November 2021, there was an immediate impact on availability of parking, which meant the area was more attractive to clients visiting businesses.

Parking Management resumed in Claremont in December 2021. The availability changed as shown below in Figure 5. The occupancy dropped from the 90-95% to between 80-85%



Figure 5: Dreyer street Claremont, 11 January 2022

In the Cape Town CBD, both Bree and Long Street's occupancies reduced and availability increased. The occupancy was recorded between 75% and 80% for both Bree and Long Streets post management implementation. See Figures 6 and 7 below.

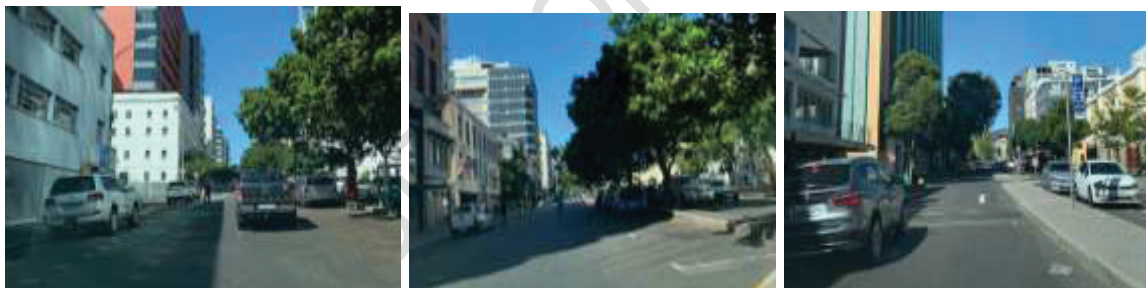


Figure 6: CBD: Bree Street 25 January 2022

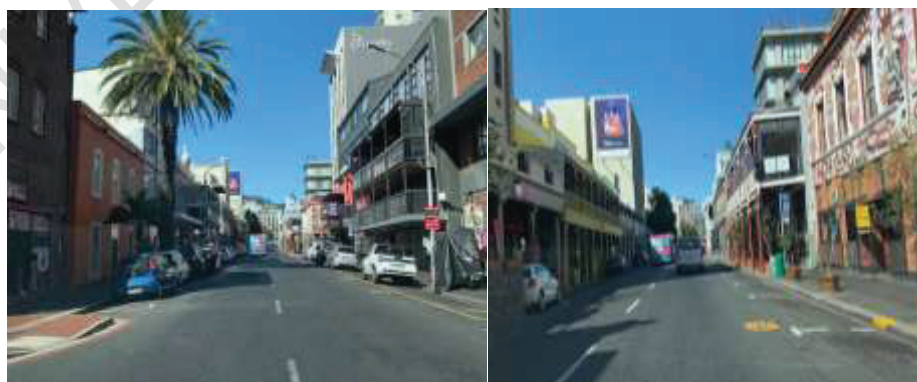


Figure 7: Long Street, 25 January 2022, Occupancy 75-80%

Illustration of the Conceptual Framework

So to summarise the theoretical framework, the objective is to move the implementation of parking management from a reactive implementation tool to a planning travel demand management tool, once certain indicators have been fulfilled. The theory is to move from the status quo, as shown below, to the proposed implementation framework further below.

Status quo – this is a reactive implementation framework with little to no planning phase:

Figure 8 below shows the process flow of how the parking management is considered before implementation. Figure 9 illustrates what the proposed process flow of implementation of parking management should look like.

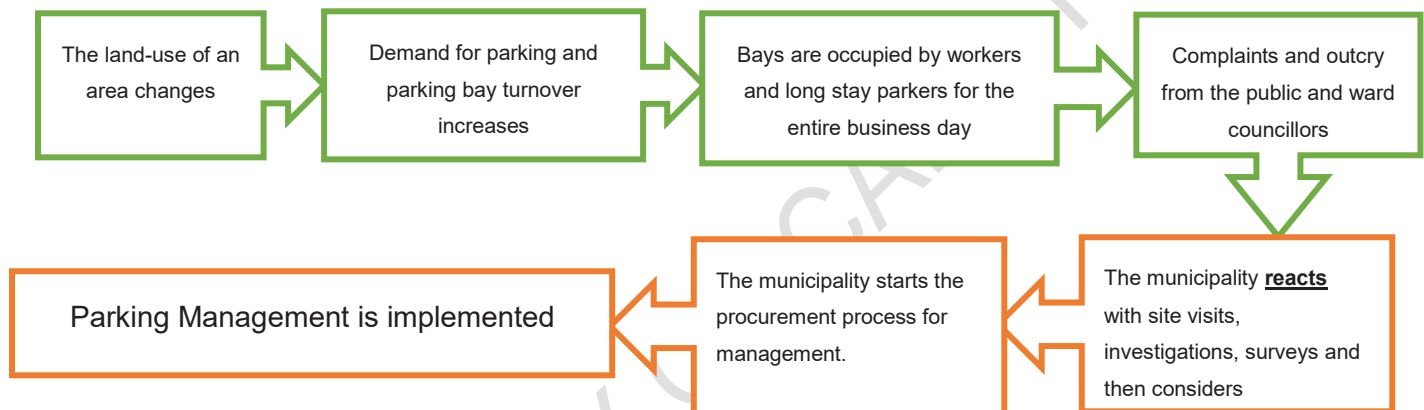


Figure 8: Process flow for existing parking management implementation

Proposed implementation framework based on the theory of this study:

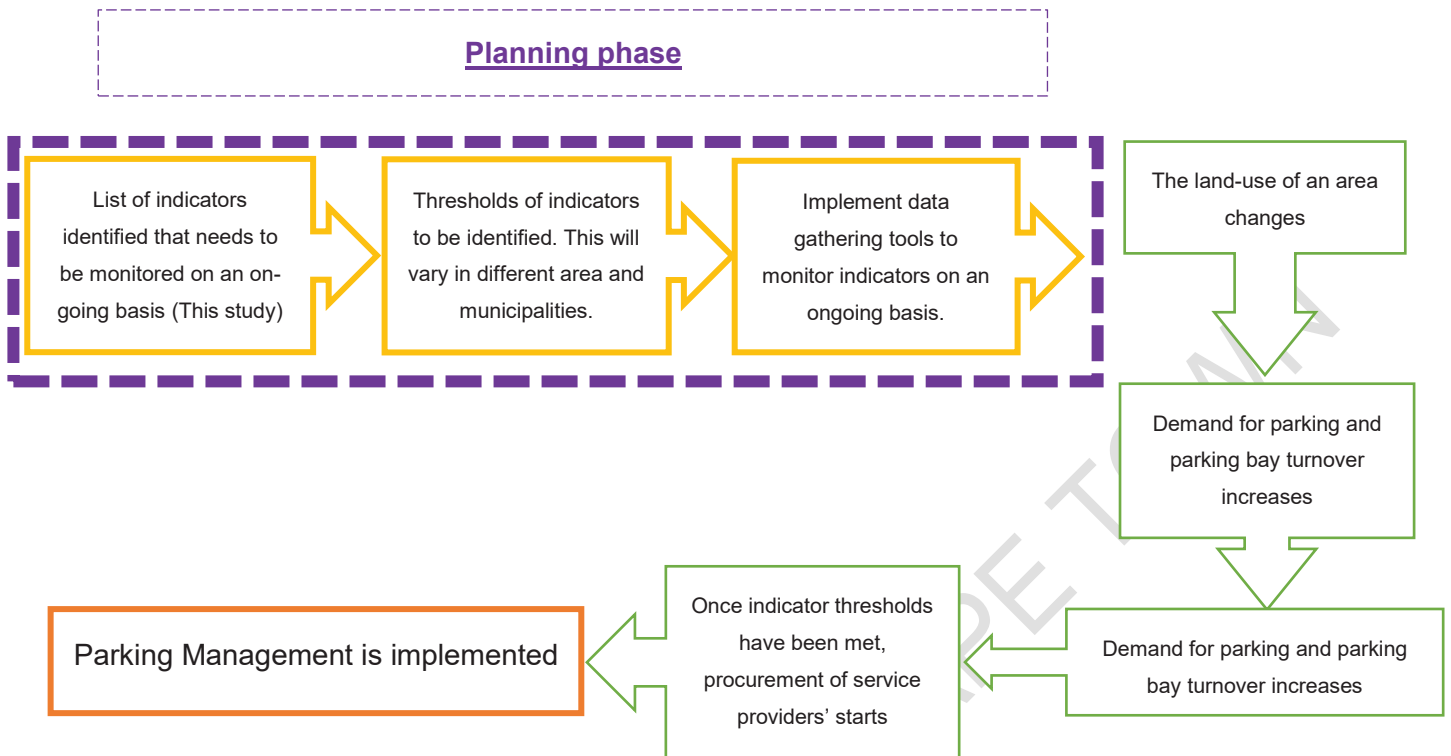


Figure 9: Proposed process flow for the implementation of parking management.

3.2 The Research Plan

The research plan was to select 3 areas that would act as proxy areas for the City of Cape Town. The aim was to select an area that would be a residential area with a mini city centre that was expanding. The area that was chosen was Durbanville.

An area adjacent to a CBD was then chosen. With urban sprawl and general free parking in adjacent areas, it comes as no surprise that such an area would require indicators and intervention as parker's park free, all day, and walk into towns, causing massive parking issues for residents and businesses. The area that was chosen was De Waterkant which was adjacent to the Cape Town CBD.

The third was a recreational area. Typically, there's competition between workers, visitors, and residents in such areas. In addition, the demand for recreational areas stretches to all areas not just surrounding areas.

It is important to note that the wording of all questions was carefully conducted to avoid any respondent bias. The research questionnaire is attached as Appendix A.

The first objective was to obtain whether the person was a resident of the area or whether the person came to the area for work. This information was important to obtain to determine whether the person lived near where they are parking. It was then important that the questions and answers to follow are linked to the travel demand management strategy for parking instead of any other attribution. With this study the objectives were precise. The information that needed to be obtained was whether the person lives in the affected area, works in the affected area, or both.

One of the shortcomings that could be identified is that the person could neither work nor live in the area. The person could have been coming for an interview in the area and thus the answer would not be one of the options. However, as mentioned previously, this study was aimed at people who live and work in the area, as they are more likely to be affected over long periods so the once-off visitors were not considered of high importance to the study.

It is important to determine the ease or difficulty in find parking. To extract the information qualitatively a scale was introduced where easy meant that most times when the person visited the area, they found parking pretty easy. Neutral was provided as an option for when parkers would sometimes find parking easily but other times it was more difficult.

To gain an understanding of whether the areas were more recreational and whether the highest demand was over Weekdays, an understanding of the weekdays as well as weekends was required.

Harassment from illegal parking marshals also formed part of the research, as well as the willingness to pay. It needed to be determined whether people were harassed by illegal parking marshals as well as their willingness to pay these marshals. Coupled with the willingness to pay the average amount paid was also required as this would assist the City of Cape Town in a Tariff setting.

One of the key factors is the duration of stay. Most coffee shops and local businesses require an hour or two maximum of more than 2 hours would be associated with possible meetings and all day would be associated with business workers. By obtaining this data one may be able to understand the needs from area to area.

To gain insight as to how people viewed parking resources, it was required to test whether they would support the implementation of paid parking.

3.3 Design of the Survey Questionnaire

Below are the formulated questions with a basic description of the role of each question.

How easily do you find on-street parking on weekdays (between 8 am and 5 pm)?

The ease by which parkers find parking may give a good indication of demand, availability, and occupancy of parking. These may be indicators of when to manage parking. It may also provide information on how adequately bays are turned over, and if not adequate, the determination of when turnover is required.

How easily do you find on-street parking over weekends?

The ease by which parkers find parking on a weekend may give a good indication of demand, availability, and, occupancy of parking over weekends. This may be an indicator of when to manage and whether the area is served by more offices or retail.

How often are you approached by informal car guards on weekdays and weekends?

There has been a growing trend in Cape Town suburbs that wherever vehicles are parked consistently over a period, then there is an influx of illegal car guards. This trend needs to be understood as it may be an indicator that management is required. It is most certainly an area that needs to be understood as it is one of the complaints received a lot of the time in areas of changing land use and increase in demand for parking. Many residents, councillors, and members of the general public complain about informal car guards harassing them when they park.

In addition, the presence of at certain times of car guards may also indicate when the demand and occupancy are high. For example, if car guards are present throughout the day then this may show that bays are being turned over. If car guards are only present after 5 pm, then this may mean that an area's land use is more business orientated.

It must be noted that the intention is not to implement an indicator of illegal car guards, but rather to use the presence of car guards as an indication of how far or behind the planning should be because technically speaking the indicators should have driven an intervention before the presence of illegal car guards appeared.

Do you pay for informal car guards? If yes, what is the average amount?

To avoid the negative impacts of parking fees, by answering the question it may be able to gauge an understanding of whether parkers see parking as a convenience and thus will pay for that convenience of parking closer to opportunities and addition, it may also provide foresight as to what parkers perceive as a “fair” parking charge or tariff.

How long do you park, on average?

As the literature indicates, it is important to know how long people park. This will give us insight into how much people are prepared to pay for the time they park. This may be based on their experiences of parking elsewhere such as when going to malls.

Understanding how long people park may also give us an indication of the land use for example if the majority of people park an average of 15 to 30 minutes in a particular area, then this may mean that the shops are maybe coffee shops, quick in and out, which will aid in the setting of timing restrictions and cost of parking. If people park all day, then it can be assumed that the majority of these parkers are workers and the parking bays may not be utilised as efficiently as possible.

Do you support the CCT’s proposal to charge motorists for on-street parking by using formal car guards?

Lastly, the aim was to determine whether parkers would support the initiative of implementing a parking management system. This may give us insight into when to implement. If the majority of parkers support the initiative then management implementation would transition much smoother.

This may also be easier to implement politically. Municipalities, specifically officials, cannot implement radical changes without considering the political impacts. With the implementation of something as contentious as a parking management system, it is important to know when to implement it politically as well. If the majority of parkers support the implementation of new parking, then this may be implemented sooner and marketed as a political win if there is an imminent election coming alternatively, if the majority disagrees with the implementation however the need for implementation is required, then this may be slightly delayed until after the election.

As mentioned that to extract quantitative information, a survey questionnaire was developed by the researcher. The intention was to analyse this numerical data to find patterns, averages,

and maybe possible relationships between some of the variables that were used in the comment form or questionnaire.

A quantitative survey was used to cover a larger sample. A quantitative approach was used to extract numerical data and statistics. The reason a qualitative survey was not used was because the objective was not to extract concepts or methods but to rather determine concepts from the results. Impartiality and correctness of the data were crucial for a few variables to be involved as that data related to close-ended information.

A quantitative study would enable us to know more about the parker's perceptions and opinions of parking. It would also indicate how the parkers perceived having to pay for parking and what an acceptable amount would be. The study would assist with patterns of parkers and the outcome would be whether the public supports the management of parking.

3.4 Population and Sampling

South Africa's most recent census was accomplished in 2011. During that time the population of Cape Town was counted as 3 740 026 people. The calculated annual population growth rate was found to be 2.57% over the past ten years. If an assumption is made that this average growth rate was sustained over the period between 2011 and 2019, then at the time of the interviews and survey, the population of Cape Town would be somewhere around 3.91 million.

The largest share of the population in Cape Town is within the young working age (25-39 years) category. The age category with the second largest population share is the 0-4 year's age category. The age category with the lowest number of people is the elderly population (i.e. 65 years and older age category).

The platforms used for this particular study allowed for a far and wide reach of the population. An assumption was made, however, that if somebody owns a vehicle and has an interest in visiting areas for parking, then those people are likely to own a smartphone, so people could submit feedback via smartphone. The population that applied to this study were all parkers and the general public that had a vested interest in a particular area, no matter how small that interest may have been. Such interests included people visiting a particular area for several reasons such as work, children attending school in the area, recreation, leisure, and so forth.

The population for the 3 selected areas are summarised below. This is based on the 2011 census and then a growth factor of 2.57% applied to obtain 2019 population. The outputs are shown in Table 1.

Population growth	2011	2019
Camps Bay	2773	3397
Durbanville	54286	66504
De Waterkant	361	442

Table 1: Population by area

The sample was aimed at surveying only parker's on-street. The sampling technique that was used was purposive sampling for the in-person surveys, which formed the basis of the analysis. Purposive sampling is where the surveyors use their own judgement when selecting participants to take part in the survey. Qualitative information from parkers were required which is why it was important for the surveyors to use their judgement in choosing people who parked.

The main reason that this technique was used in the study was because the sample that was applicable to this study were actual parkers in a particular area. Therefore, the surveyors locate themselves at strategic locations adjacent to on-street parking and then approach people who parked their vehicles and enquired about their willingness to partake in the survey.

It was important to aim to exclude people who were not directly impacted by the implementation of managed parking. This would certainly deliver irrelevant results because they would they would skew the sample based on theoretical feedback rather than actual parker occurrence feedback. An example of this would be if a minibus taxi stopped to unload passengers, then it is important for the surveyor to understand that the passengers were not directly impacted by any variance in parking requirements. Therefore, the sample would be limited to car owners. The surveyors, however, were brief to also enquire whether a person was from the neighbourhood. These people would be included in the sample, because the occupancy percentage levels of parking bays may have directly influenced their decision to walk, which is exactly what you want from parking as a travel demand management tool.

3.4.1 Statistical analysis of sample

Accordingly to a community survey done by the City of Cape Town in collaboration with the Western Cape Government in 2016, the average ages by population is summarised in figure 10 below.

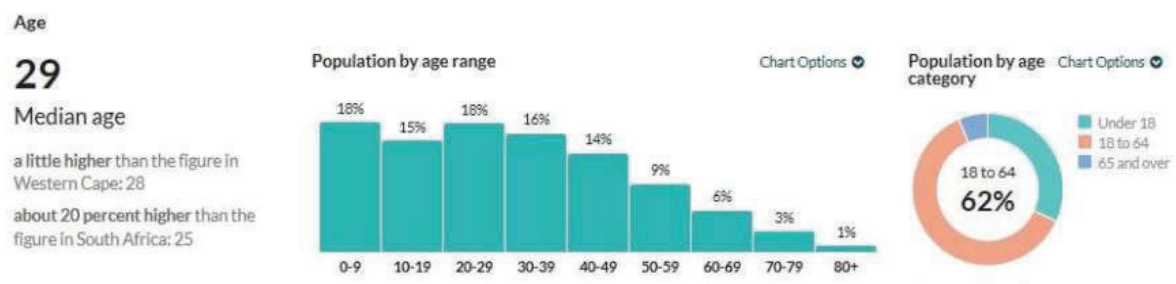


Figure 10: 2016 Community survey – City of Cape Town

All people under 18 were therefore filtered out as they are not legal drivers.

Population growth	2011 Population census	2019 Growth	People under 18 Excluded	2019 Parkers	Required Sample size @ 95% Confidence level	Actual Parkers Surveyed feedback	Confidence level	Revised min. Required Sample
Camps Bay	2773	3397	38%	2106	326	148	75%	125
Durbanville	54286	66504	38%	41232	381	399	95%	381
De Waterkant	361	442	38%	274	161	220	95%	161

Table 2: Statistical calculation of the sample size

For Camps Bay, a minimum of 326 parkers would have been considered a representative sample in order to achieve a confidence level of 95% that the real value is within $\pm 5\%$ of the surveyed value. Unfortunately only 148 participants agreed to participate in the survey. Therefore Camps Bay's sample was not a representative sample. This meant that the confidence level of the Camps Bay sample needed to drop to 75% which meant that a 125 of parkers need to be surveyed.

For Durbanville, a minimum of 381 parkers would be considered a representative sample in order to achieve a confidence level of 95% that the real value is within $\pm 5\%$ of the surveyed value. There were 399 participants who agreed to participate in the survey. Therefore the sample was a representative one.

For De Waterkant, a minimum of 161 parkers would be considered a representative sample in order to achieve a confidence level of 95% that the real value is within $\pm 5\%$ of the surveyed value. There were 220 participants who agreed to participate in the survey. Therefore the sample was a representative one.

3.5 Data Collection Approach

3.5.1 Data Collection Method

The data was obtained using 2 methods. The one method was one on one interviews; the second method was an electronic approach.

a. Interviews

The one-on-one interviews were done by the surveyors between the period of beginning November and early December 2019 in an effort to not capture the holiday rush. The surveyor needed to do all the formal introductory, ethical clearance from the participants and advisory processes, and the member of public has agreed to participate in the survey. In order to not discriminate against illiterate people, the surveyor would ask the question of the parker, would provide the options available and then would complete the form on behalf of the person. It was important for the answers to be completed in full sight of the person being surveyed in order for transparency and so that no prejudice is applied to the results or outcomes by the surveyor.

b. Electronic platforms

Two electronic platforms were utilised. The first was an email address that was set up where people could send an email advising whether they support the proposed parking plans in the area. The second method was by setting up a questionnaire on a website where people could also comment. Table 3 shows the information that was required to be completed when going on the website.

No.	Name and Surname	Email Address	Contact Number	Address if given	Area of Residence	Area for Comment	Comments
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Table 3: Questionnaire on website

For the purpose of this study, the electronic platform information was excluded. The main reasons for this is that the information requested on the website was simply to determine

whether the participant would support or not support the implementation of parking management. An example of this is shown in Table 4 below.

Area for Comment	Comments	Comments Date	Relevant to Parking (yes/no)
Not Indicated	Why focus on such trivial issues when there are so much more important issues to deal with that will make life in this City a bit more liveable. I was born and bred in Cape Town and have been a ratepayer for 20 years. I can honestly say over the course of my life the situation in the City in numerous overall have gotten much worse over the course of my life.	11-11-2019	No

Table 4: Comments not related to Parking management

Another issue encountered with the electronic platforms was that website creators and private companies, such as DearSouthAfrica could set up commenting forms on their website, which would automatically send an email to the CCT's email. This means that the private platforms could apply their own bias to the questions and explanations of the survey, which would not be a true reflection of the results and may manipulate the outcome of the data depending on their reach and followers.

3.5.2 Data Recording

Once all the survey questionnaires were completed, they were captured into excel. This was done per area. The electronic comments, after data cleaning were also inserted into excel. The data and outcomes will be presented in the next chapter.

4 Data Analysis and Outputs

The study will go through the information per area. It is important to note that the areas have very different characteristics and therefore cannot be compared to each other. However, the areas will form proxies with for other areas with similar characteristics. An example of this would be that an area like Camps Bay could be a proxy for other recreational areas where development and demand for parking has increased such as Muizenberg.

4.1 Camps Bay

Camps Bay is one of the most upmarket residential areas in the Cape Town Metropolitan area. According to Property24, on a publication which was published on 24 August 2017, it was reported that the average property price in Camps Bay was R15.4 million. (*Property 24, what you'll pay for a house in Cape Town's Camps Bay, 2017*)

4.1.1 Locality and information about Camps Bay suburb

The area is located between a beautiful beach known as Camps Bay beach and Table Mountain. The area has a main road with numerous restaurants and hotels. The area consists of rock pools and clear beach, which are interlinked with a wonderful promenade. The area has very little businesses and companies that have full day parking requirements. The area is limited in off street parking areas and private parking garages (Laura Whateley, 2019). The locality map can be found in Figure 11.



Figure 11: Locality map for Camps Bay (Source – Google Earth)

4.1.2 Sample that participated in Camps Bay surveys

The total amount of people that were interviewed in Sea Point were 148 parkers. The parkers came from various areas around the metropolitan, such as Kalksteefontein, Netreg, Albertina, Athlone, Bakoven, Bantry Bay, Bellville, Blouberg, Bothasig, Brooklyn, Camps bay, Cape Town, Delft, Dunoon, Elsies River, Eesteriver, Fish Hoek, Gardens, Goodwood, Grassy Park, Green Point, Gugulethu, Heideveld, Hout Bay, Kenilworth, Khayelitsha, Kuilsriver, Langa, Langebaan, Lower crossroads, Manenberg, Milnerton, Mitchells Plain, Paarl, Parklands, Parow Valley, Phillipi, Rawsonville, Rugby, Sea point, Somerset west, Steenberg, Table View, Tokai, Vredehoek, Woodstock and Wynberg.

From the areas above it is evident that participants from all over the city metro were captured and therefore the sample represented the context of a working day and weekend. The sample also show that based on the areas that participated, participants from various incomes groups were captured.

4.1.3 Parking in the Camps Bay area

When the parkers were asked what the main reasons were for visiting the area. From the interviewees, as depicted in Table 5, 64% indicated that they work in the Camps Bay area. Around 5% of parkers resided in the area and 28% of people indicated that they were in the area for other reason. Due to the fact that the area is of a recreational nature it was assumed that the percentage of people indicating that they are in the area for “other” reasons, are there for recreational purposes.

Row Labels	Count of No.
Other	42
Reside	8
Work	95
(blank)	3
Grand Total	148

Table 5: Camps Bay – Reason for visitation

4.1.4 Demand for parking in Camps Bay

The result outputs for the level of difficulty or ease by which parkers to find parking on a week day between 8am to 5pm and on a weekends as illustrated in Table 6. The majority of people experience difficulties in finding parking both during the week days’ core business hours of

8am to 5pm as well as over weekends. From the outputs shown in figure 12, 78% of people found it difficult to somewhat difficult to find parking during the work week. Over weekends, the parkers who found it difficult to find parking, increased to 81% (figure 13).



Figure 12: Parking availability in Camps Bay, between 8am and 5pm week days

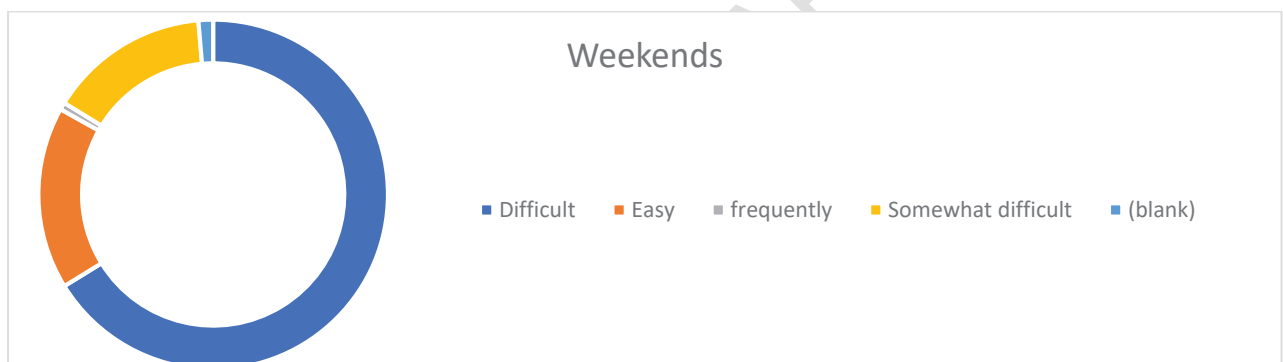


Figure 13: Parking availability in Camps Bay, on weekends

4.1.5 Illegal car guards in Camps Bay

The next three questions were related to the presence and payment of illegal car guards. The feedback is illustrated in Tables 7 and 8 below. The results indicate that 48% of people are regularly approached by illegal car guards during the work week. Table 8 shows that 45% indicated that they were never or seldom approached by illegal car guards during the week. In Table 9, there was a slight increase in people being approached by illegal car guards over weekends.

Row Labels	Count of No.
Always	47
Frequently	24
N/A	1
Never	34
Seldom	33
(blank)	9
Grand Total	148

Table 6: Presence of car guards on weekdays in Camps Bay

Row Labels	Count of No.
Always	50
Frequently	26
N/A	1
Never	32
Seldom	27
(blank)	12
Grand Total	148

Table 7: Presence of car guards over weekends in Camps Bay

When asked whether interviewees paid illegal car guards, 61% indicated that they either sometimes or certainly pay illegal car guards (see table 9).

Row Labels	Count of No.
No	36
Sometimes	32
Yes	61
(blank)	19
Grand Total	148

Table 8: Do you pay illegal car guards.

From the 63% of people, in Table 9, who indicated that they do pay the illegal car guards, the amounts were pretty evenly split of who pays under R5 and who pays more than R5 which can be observed in Table 10.

Row Labels	Count of No.
Less than R5	48
More than R5	51
(blank)	49
Grand Total	148

Table 9: What amount do you pay the Camps Bay car guards?

4.1.6 Duration of parking by vehicles in Camps Bay

The interviewees were then asked about the duration of their parking events. Most people who parked in Camps Bay, parked either all day or more than 2 hours as tabulated in Table 11.

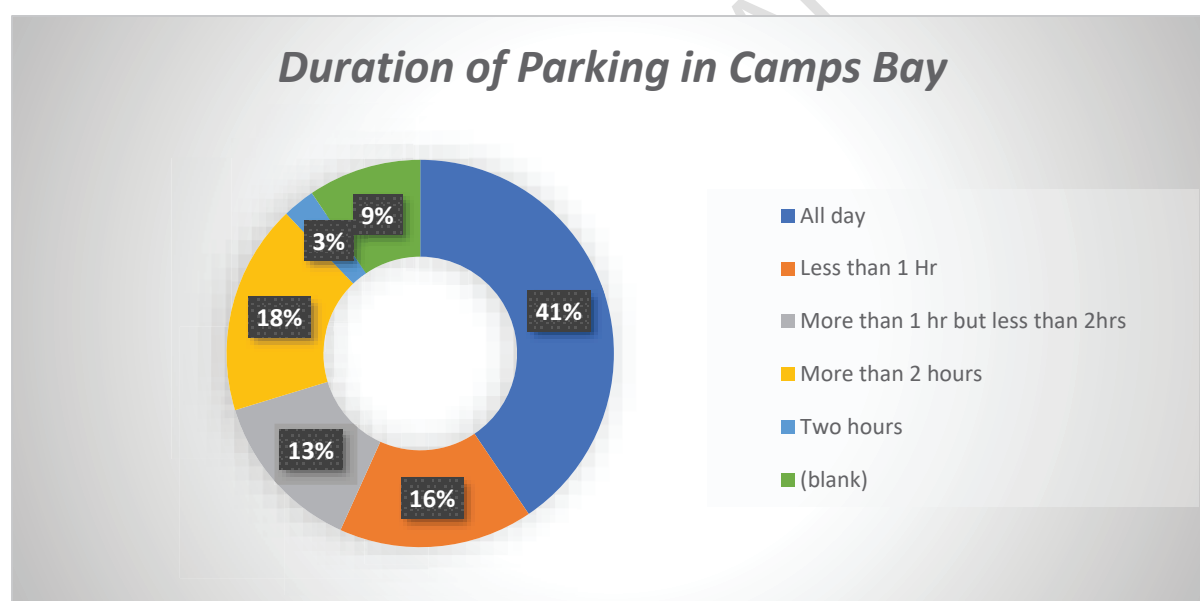


Figure 14: Average duration of parking in Camps Bay

4.1.7 Support of the CCT's on-street parking management plan for Camps Bay

When asked whether the parkers supported the CCT's parking management plan, the majority of people said no as shown in Table 10.

Row Labels	Count of No.
No	87
Yes	58
(blank)	3
Grand Total	148

Table 10: Do you support the CCT's Parking Management Plan

4.1.8 Electronic feedback for Camps Bay

From the electronic feedback, which as a reminder, was in the form of either an email or online questionnaire, the main question was CCT's plan for the implementation of parking management would be supported or not. The results of these submissions are shown in Table 11. When compared to the face to face questions, even though majority of parkers found it very difficult to find parking, they did not support the CCT's plan of formalised parking management.

Row Labels	Count of No.
No	20
Yes	7
(blank)	3
Grand Total	30

Table 11: Electronic feedback for management support in Camps Bay

4.1.9 Overview of outputs and results for Camps Bay

The majority of people who visited Camps Bay, visited the area for work purposes. They park all day, due to the fact there is were no formal parking marshals managing the area. This is also evident from the duration that the sample parked. Most people were found to have parked either longer than 2 hours or a full day. The fact that there are limited off street parking options available, increases the demand for on-street parking.

The sample indicated that parkers are almost always approached by illegal car guards. The likelihood increased over a weekend, which is understandable, because the area is recreational in use. The majority of people indicated that they paid car guards and generally, although evenly split, the most people paid the car guards more than R5. With an average

property price of R15.4 million, it could be to assume that parking prices for parking, if implemented, would be in the area, based on the cost of land in the area.

An interesting finding was that, despite parking not being readily available and the constant presence of informal parking marshals, people were opposed to implementing parking management.

For Camps Bay what has been found to be significant influences on parking:

- The availability of off-street parking options.
- The presence of illegal car guards
- The origins of the parkers
- The land-use characteristics.
- The demand for parking and the availability of parking bays.
- The duration of how long the person parked on average.

Interestingly, the average property price in the area didn't have any significant influence on parking.

4.2 Durbanville

Durbanville was a rural area with numerous farmlands and winelands. Over the past 15 years the area boomed and expanded (Kainos Properties, n.d). With this expansion, certain areas were kept exclusive with high property value and other areas became more affordable, but still only affordable for middle to high income owners. The area has sub areas which are Aurora, Durbanville Hills, Durbell, D'Urbnvale, Durmonte, Eversdal, Goedemoed, Kenridge, Sonstraal, Skoongesig, Uitzicht, Vierlanden, and Vygeboom.

4.2.1 Location and background of Durbanville

Durbanville district has excellent infrastructure. Numerous shopping centres and shopping villages in every neighbourhood were developed as well as a hospital. With this increase in economic activity, this attracted a lot of new low income jobs from outside areas.

There area has become denser over the past 15 years and is continuing to do so with the introduction of multi-storey developments.

Durbanville is a medium to high income residential area (Celsa properties, n.d.). The area is large in size and with the land use changes over time the area has becomes its own localised

mixed use hub. For that reason, the area was chosen to act as a proxy because in future managed residential areas will have the numerous of the same characteristics as Durbanville in its current state.

In addition, because of the distance that Durbanville is from other areas, more specifically low income areas, there is a high car dependency to get to Durbanville as the public transport services to the area is lacking. The operational transport services to the area are only Golden Arrow Bus Services and minibus taxis. Most times these minibus taxi services operate from the Bellville Public Transport Interchange and therefore most public transport users' needs to make a transfer.

Durbanville has little privately managed off-street parking areas that's leased purely for parking. The malls and major retail outlets, like Checkers and Spar, has off-street parking available, but this is privately owned and is thus reserved for their clients.

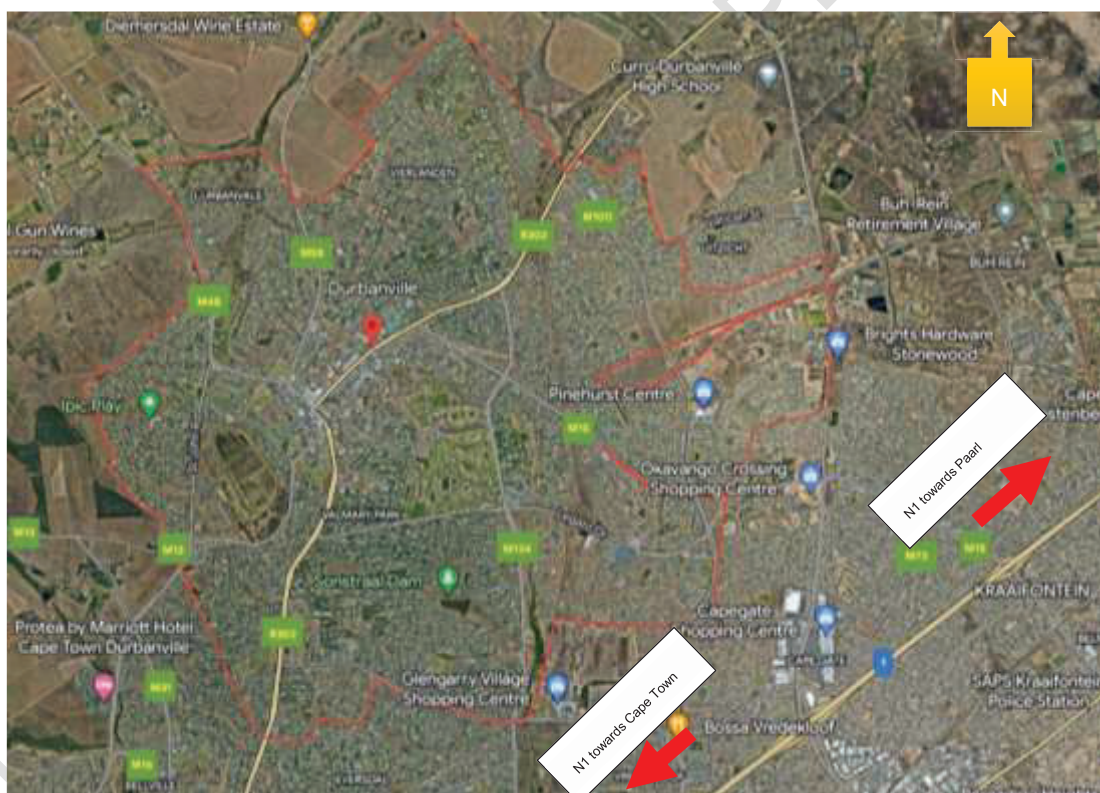


Figure 15: Locality map for Camps Bay (Source – Google Earth)

4.2.2 Sample that participated in the Durbanville surveys

There were a total of 399 people who partook in the surveys conducted in Durbanville. These people came from far and wide across the City of Cape Town metropolitan area. the areas of origin were Athlone, Belhar, Bellville, Big Bay, Black Hill, Blackheath, Bloemendal, Bloemhof,

Brackenfell, Claremont, Colorado Park, Crossroads, Delft, Durbanville, Eersteriver, Elsies River, Eureka Estate, Fisantekraal, Frymansfontein, Grassy Park, Gugulethu, Klein Roosboom, Kenilworth, Khayelitsha, Klipheuwel, Kraaifontein, Kuilsriver, Langeberg, Loevenstein, Maitland, Mfuleni, Montague Gardens, Moreesberg, Morning Star, Observatory, Paarl, Parklands, Parow, Pinehurst, Pinelands, Ravensmead, Rondebosch, Saldanha, Samora, Sonstraal Hoogte, Stellenberg, Strand, Tygervalley, Uitzicht, Visserhoek Plaas, Wellington, Wellway Park and Westbank.

From the areas above it is evident that participants from all over were captured and therefore the sample represented the context of a working day and weekend. The sample also shows that based on the areas that participated, participants from various incomes groups were captured.

4.2.3 Parking in Durbanville

More than 60% of parkers, visiting the area for work purposes, Table 12 shows how the land use has changed, over time, which has led to the provision of more employment opportunities. It can also start showing why there has been an outcry from local residents and councillors within the area complaining about the availability of parking.

Row Labels	Count of No.	Percentages
other	78	20%
reside	70	18%
work	249	62%
(blank)	2	1%
Grand Total	399	100%

Table 12: Reasons for visiting Durbanville

4.2.4 Demand for parking in Durbanville

a. Weekdays

With the 62% of parkers in the Durbanville area parking for works purposes, as shown in Table 12, it comes as no surprise that 73% of parkers found it (somewhat) difficult to find available on-street parking during weekdays between the core business hours of 8am to 5pm. This is shown in figure 16.

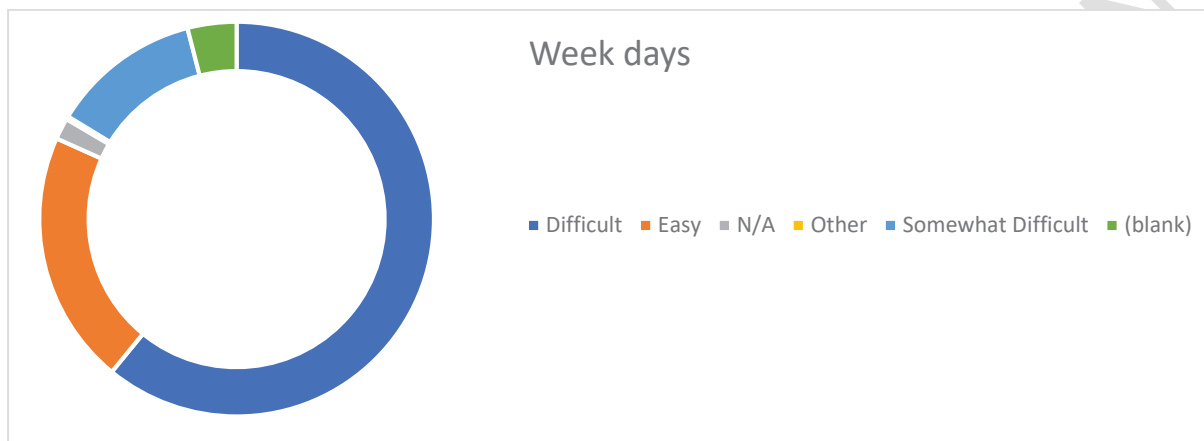


Figure 16: Parking availability in Durbanville, between 8am and 5pm week days

b. Weekends

The level of difficulty for finding parking in Durbanville decreases from 61% to 39% over the weekend. This comparison can be seen in Figures 16 and 17. In the same comparison, the ease of finding parking during the work week compared to the weekend, increases from 21% to 33% over weekends. This means that parkers found parking much easier over the weekend.

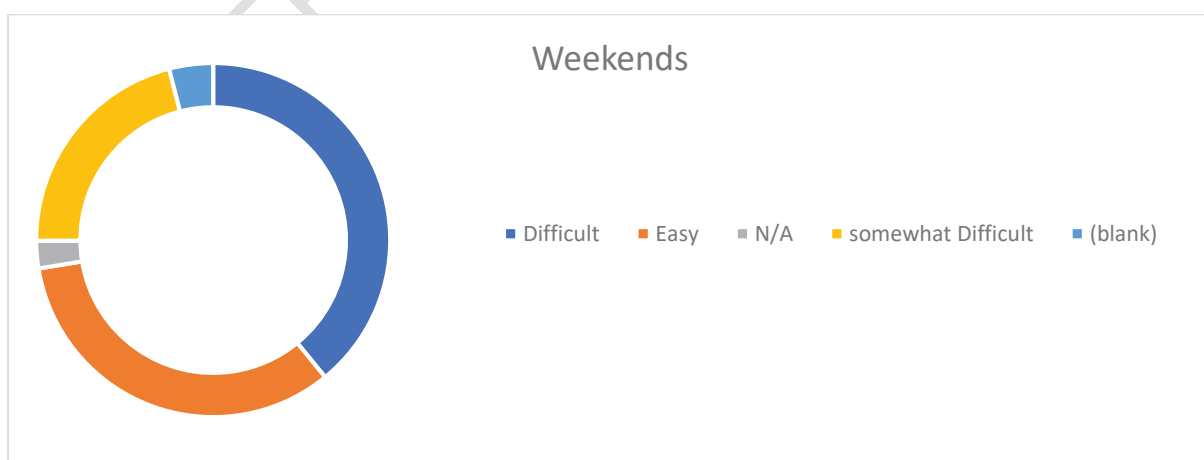


Figure 17: Parking availability in Durbanville, on weekends

4.2.5 Illegal car guards in Durbanville

From Table 13, the majority of people indicated that they never or seldom get approached by illegal car guards during the Weekdays.

Row Labels	Count of No.	Percentage
Always	83	21%
Frequently	64	16%
N/A	6	2%
Never	139	35%
Seldom	91	23%
(blank)	15	4%
Grand Total	399	100%

Table 13: Illegal car guards in Durbanville on Weekdays

Even over the weekend, there is a very low presence of illegal car guards (see Table 14). More than half of the parkers are seldom or hardly ever approached by illegal car guards over the weekends.

Row Labels	Count of No.	Percentage
Always	71	18%
Frequently	59	15%
N/A	3	1%
never	138	35%
seldom	96	24%
(blank)	32	8%
<i>Grand Total</i>	<i>399</i>	<i>100%</i>

Table 14: Informal Car guard presence over weekends in Durbanville

From the group of people who are depicted in Table 14 as frequently or always being approached by illegal car guards, 48% of them indicated that they sometimes or always pay the illegal car guards as shown in Table 15.

Row Labels	Count of No.	Percentage
N/A	2	1%
no	173	43%
Seldom	3	1%
sometimes	52	13%
yes	139	35%
(blank)	30	8%
Grand Total	399	100%

Table 15: Paying illegal car guards in Durbanville

Most people who paid illegal car guards paid, on average, under R5 as shown in Table 16. The amount of people paying above R5 was at 20%.

Row Labels	Count of No.	Percentage
less than R5	140	35%
more than R5	81	20%
N/A	12	3%
(blank)	166	42%
Grand Total	399	100%

Table 16: Average amount paid to car Guards in Durbanville

4.2.6 Duration of parking by vehicles in Durbanville

It comes as no surprise that with the majority of people parking in Durbanville for work opportunities, as shown in Table 12, is it most likely that the majority of parkers, would park their vehicles all day, as shown in Figure 18.

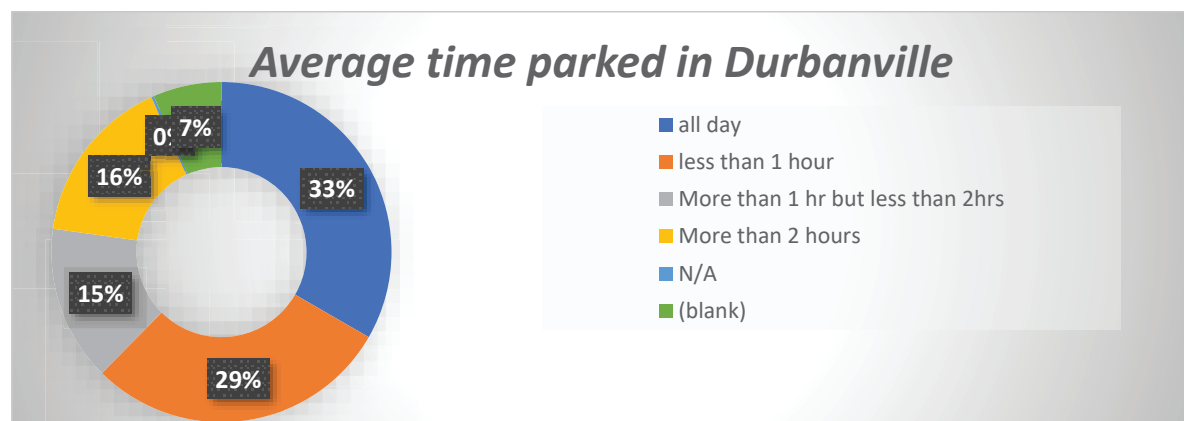


Figure 18: Average time parked in Durbanville

4.2.7 Support of the CCT's on-street parking management plan for Durbanville

Finally, when asked whether parkers supported the CCT's parking management plan, the results were almost fairly split with 59% of people not supporting the proposals and 41% of interviewees supporting the proposal (see table 17).

Do you support the CCT's proposal to charge motorists for on-street parking by using formal car guards		Percentage
No	237	59%
Yes	162	41%
Total	399	100%

Table 17: Support of the CCT's on-street parking management plan for Durbanville

4.2.8 Electronic feedback for Durbanville

The electronic submission was completely one-sided. There was a total of 48 parkers and from them 40 indicated that they do not support the CCT's proposal and plans to management on-street parking in Durbanville with formal parking marshals (see table 18).

Do you support the CCT's proposal to charge motorists for on-street parking by using formal car guards		Percentage
No	40	83%
Yes	5	10%
Not indicated	3	7%
Total	48	100%

Table 18: Electronic survey submissions for Durbanville

4.2.9 Overview of outputs and results for Durbanville

The location and background of Durbanville proved to be an advantageous area to use as a proxy for future parking management areas. The chances of managing low-income areas are very low. The apartheid era had significant effects with irreversible side effects on the spatial planning and the spatial pattern of South Africa and specifically Cape Town. It may be reversible but the costs of eradicating the distance between major CBDs and impoverished areas, which make up a major contingent of the workforce, is so uncouthly that it will take several more decades to even begin to make an impact. The racial profiling upon which planning was hinged led to racial and economic zoning which resulted in undeserved economic spatial patterns across the country.

Previously Disadvantaged Individuals were segregated outside the urban edge and were provided with limited resources thus having to seek opportunities far away from home and thus had to travel long distances, during early hours and returning home very late. Longer travel meant less leisure and family time thus leading to numerous socio-economic problems.

With the sprawling of CBDs, growth in car ownership, and increase in traffic congestion more businesses have located in residential areas. With these relocations, development soon follows and this has led to further growth of the CCT's urban footprint. Durbanville is a prime example of where this has happened.

Durbanville has created its own CBD hub, which has led to new employment opportunities, with limited public transport and heavier car, this has placed a massive burden on the on-street parking with people travelling from places as far as Paarl, Wellington and Mitchells Plain.

There is very limited off-street parking available in Durbanville, and if it is coupled with the fact that there is no formal parking management on-street, it is easy to see why the majority of the parkers, who are parking for work and employment purposes, park all day.

What was found was that it was very difficult to find parking during the work week and this the difficulty drops significantly over the weekend.

What was interesting to find was that there was a very low presence of illegal car guards. In hindsight, this is to be expected, because of the limited turnover of parking bays. Since numerous parkers are parking for the entire day, the car guards need to find alternative means of possible income. Furthermore, because there is a significant drop in the difficulty of finding parking over the weekends, bay occupancy is low and, therefore, the demand for car guards is low.

Interestingly, the majority of parkers either parked all day or parked for less than an hour, as summarised in Table 19.

Row Labels	Count of No.	Percentage
all day	133	33%
less than 1 hour	116	29%
More than 1 hr but less than 2hrs	59	16%
More than 2 hours	64	16%
N/A	1	0%
(blank)	26	7%
Grand Total	399	100%

Table 19: Majority of parking duration for Durbanville

What is interesting is that the parking is serving its purpose regarding turning over of bays. However, parkers are not obeying the timing restrictions in place and are parking all day it's due to the limited off-street parking availability in the area.

Although there was a fairly high number of people who supported formal parking management, the lack of illegal car guards indicated that the frustration and complaints received from the local residents, were mainly due to the vehicles that remained parked for the entire day.

For Durbanville, the significant influences on parking were found to be:

- Lack of public transport
- Off-street parking availability
- Presence of illegal car guards
- Land-use
- Duration of stay
- Type of business i.e. Commercial vs Retail

Less significant influence were found to be:

- Average property price
- Distance

4.3 De Waterkant

As previously mentioned, De Waterkant suburb was chosen as a proxy of an area that may be subjected to spill over of parkers evading the requirement of paying for parking in a CBD where parking management is implemented.

De Waterkant is located between the Cape Town CBD and Green Point although it may even be classified as a sub district of Green Point.

De Waterkant is a fashionable area with a very good mix of use, such as historic buildings, shops, restaurants, hotels and as of late, offices. The area is also known as the “pink district”, due to its numerous gay- and straight-friendly bars and restaurants.

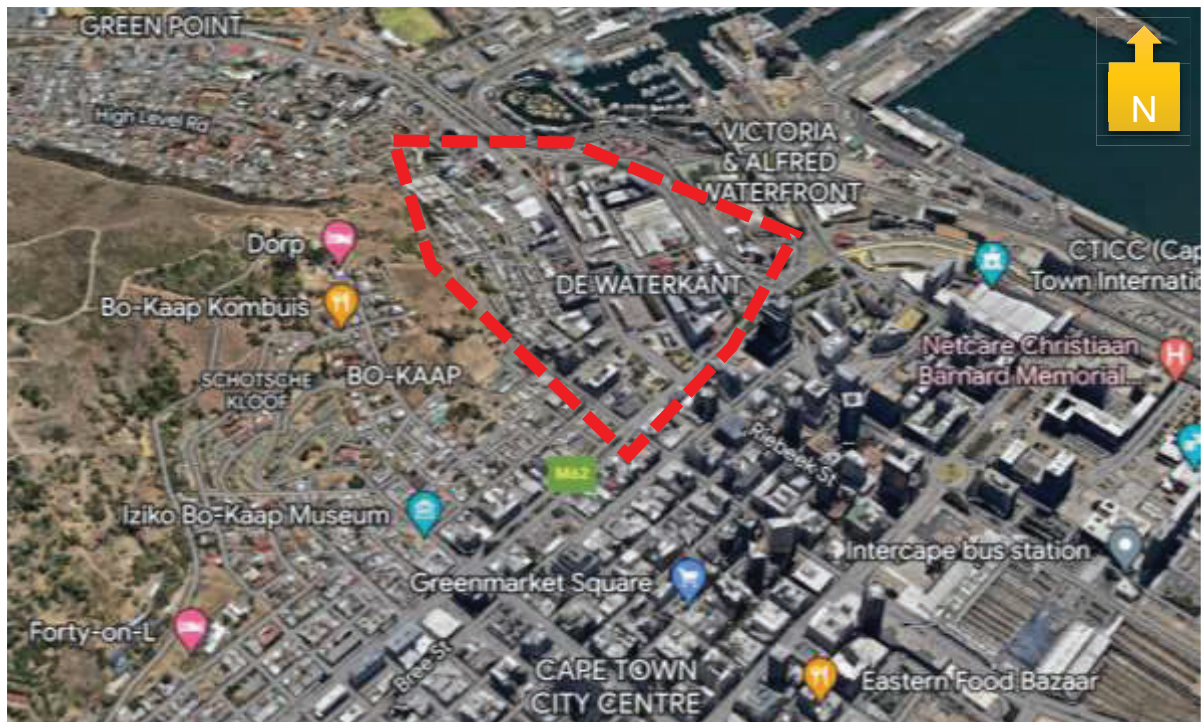


Figure 19: Locality of De Waterkant (Source: Google Earth)

The spill over of parkers in this instance is, due to both the expansion of the CBD and the deterioration of public transport forcing people to utilise private vehicles. With the Cape Town CBD requiring parkers to pay for parking, these parkers choose to park for free in the areas adjacent to the CBD where parking is free. This is why De Waterkant was an advantageous focus area for this study.

There has been an outcry from residents and councillors for the implementation of a parking management system and the implementation of residents' parking permits.

4.3.1 Sample that participated in the De Waterkant surveys

There were a total of 220 parkers that were interviewed in the De Waterkant on-street parking bays. Their origins were from Bellville, Blue Downs, Bo-Kaap, Bonteheuvel, Phoenix, Brackenfell, Brentwood Park, Cape Town CBD, Century City, Claremont, De Waterkant, Delft, Durbanville, Eersterivier, Elsies River, Gardens, Goodwood, Grassy Park, Green Point, Gugulethu, Hanover Park, Hout Bay, Khayelitsha, Kraaifontein, Kuilsriver, Langa, Lavender hill, Mandalay, Manenberg, Milnerton, Mitchell's Plain, Moullie Point, Napier Street, Northern suburb, Nyanga, Observatory, Paarl, Parklands, Table View, Parow, Phillipi, Pinelands, Plumstead, Ravensmead, Retreat, Ruyterwacht, Rylands, Somerset West, Samora, Sea Point, Skaapkraal, Southfield, Strand, Strandfontein, Table View, Tamboerskloof, Vredehoek, Walmer Estate, Waterfront, Woodstock and Wynberg.

From the areas above it is evident that participants from all over were captured and therefore the sample represented the context of a working day and weekend. The sample also shows that based on the areas that participated, participants from various incomes groups were captured.

4.3.2 Parking in De Waterkant

The overwhelming majority of parkers in De Waterkant parked for works purposes. Only 5% of parkers were found to be residents (see Table 20). There was also an amount of 15% that indicated that they are parking for other reason, which means that they parked for leisure and retail purposes. Already it can be seen why residents and Councillors would feel aggrieved.

Row Labels	Count of No.	Percentage
Other	32	15%
Reside	10	5%
Work	177	80%
(blank)	1	0%
Grand Total	220	100%

Table 20: Parkers of De Waterkant

4.3.3 Demand for parking in De Waterkant

a. Weekdays

Much like Durbanville, in De Waterkant it is very difficult to find parking during Weekdays. Some 75% of interviewees indicated that it is difficult to find parking in De Waterkant during weekdays, as can be seen in Figure 20.

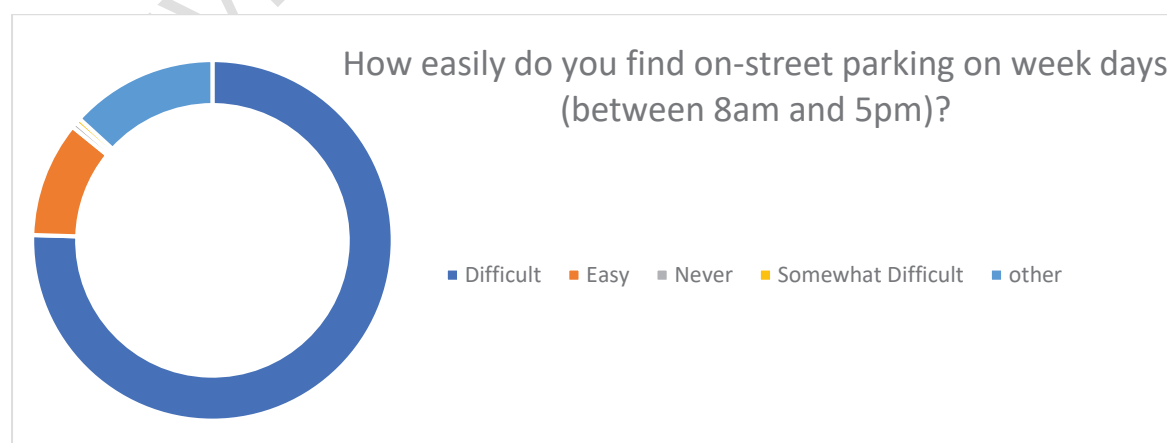


Figure 20: Parking availability in De Waterkant, between 8am and 5pm week days

b. Weekends

Half of the amount of parkers indicated that they found it easy to find parking over a weekend. Strangely enough, a fairly equal amount of people found it difficult to somewhat difficult to find parking over the weekends. The outcomes are summarised in Figure 21.

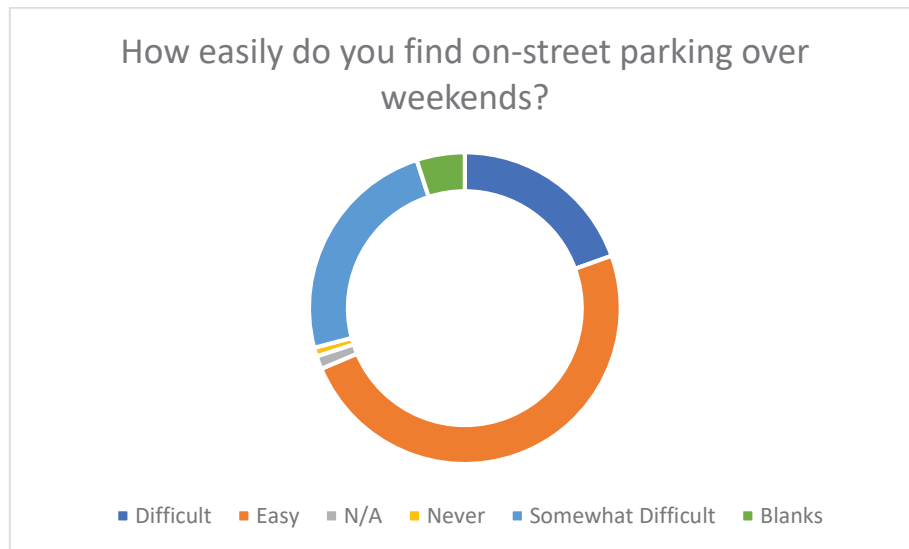


Figure 21: Parking availability in De Waterkant, on weekends

4.3.4 Illegal car guards in De Waterkant

Collectively the amount of parkers who were always or frequently approached by illegal car guards during weekdays is 34%. Collectively, the parkers who were seldom or never approached by illegal car guards was 65%. These results for weekdays are shown in Table 21 and the results for weekends are shown in Table 22.

How often are you approached by illegal car guards on weekdays?		Percentages
Always	55	33%
Frequently	2	1%
N/A	1	1%
Never	53	31%
Seldom	57	34%
Total	169	100%

Table 21: Informal car guard presence during weekdays in De Waterkant

How often are you approached by illegal car guards on weekends?		Percentages
Always	37	17%
Frequently	40	18%
Never	67	31%
Seldom	68	31%
Blanks	7	3%
Total	219	100%

Table 22: Informal car guard presence over weekends in De Waterkant

Majority of people (64%) either sometimes or always pay informal parking marshals, as depicted in Table 23. While 32% of parkers indicated that they did not pay the limited amount of illegal car guards.

Do you pay illegal car guards?		Percentages
No	70	32%
Sometimes	52	24%
Yes	88	40%
Blanks	10	5%
Total	220	100%

Table 23: Paying of illegal car guards in De Waterkant

The average amounts paid to marshals were equally split to people paying less than and more than R5 as shown in Table 24.

If yes, is the average amount:		Percentages
Less than R5	74	33%
More than R5	75	34%
N/A	7	3%
Blanks	66	30%
Total	222	100%

Table 24: Average amount of payment to De Waterkant illegal car guards

4.3.5 Duration of parking by vehicles in De Waterkant

It comes as no surprise that, due to the majority of parkers indicating that they parked for works purposes (see Table 20), that the average amount time parked by 54% of parkers was either longer than 2 hours or all day which, is show in Figure 18.

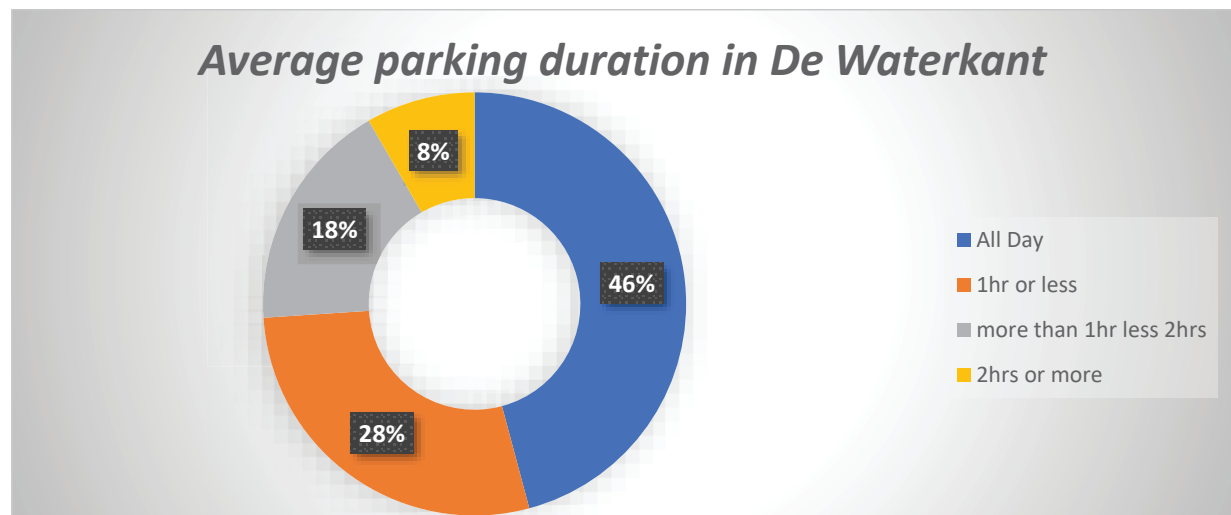


Figure 22: Average time parked in De Waterkant

4.3.6 Support of the CCT's on-street parking management plan for De Waterkant

When asked whether the interviewees supported the City of Cape Town's plan of implementing formal parking marshals in the De Waterkant, the results were evenly split of who supported and didn't support the proposal, as depicted in Table 25.

Do you support the CCT's proposal to charge motorists for on-street parking by using formal car guards		Percentages
No	111	50%
Yes	99	45%
N/A	1	0%
Not Indicated	9	4%
Total	220	100%

Table 25: Support for CCT Parking Management Plan in De Waterkant

4.3.7 Electronic feedback for De Waterkant

From the electronic feedback via email and the City of Cape Town's website, the results were also evenly split of who supported and didn't support the proposal CCT's proposal to charge motorists for on-street parking by using formal car guards, as depicted in Table 26.

Do you support the CCT's proposal to charge motorists for on-street parking by using formal car guards		Percentages
No	6	50%
Yes	6	50%
Total	12	100%

Table 26: Electronic feedback for De Waterkant

4.3.8 Overview of outputs and results for De Waterkant

When analysing the dynamics in De Waterkant, the City of Cape Town can use the outputs and results when considering implementing parking management in areas with similar land use characteristics adjacent to the CBD. Examples of unmanaged areas in the metro, which would also meet the criteria, would be areas such as Gardens, Kloof, and Green Point. With 80% of people parking for works purposes, the economic viability of local shops gets compromised, due to insufficient parking bay turnover.

In the De Waterkant area, there is limited off-street parking available in the area and even though most residents have to park on the street, an intervention is required. With public roads being shared space, the needs of all parkers are as per the requirements of the Parking Bylaw (2010) of the City of Cape Town.

The ease of finding parking over the weekends increases considerably as there are no workers or long-stay parkers present. With the De Waterkant area only spanning 0,3 square kilometres, it is quite easy to park all day and walk into the Cape Town CBD. Without timing restrictions and enforcement, this will remain an issue.



Figure 23: Average sale price in De Waterkant

In 2019, the average sale price of properties in De Waterkant sold for R4 million as shown in Figure 23. So despite the high property values, the property price has a very low correlation in defining what parking tariffs would be. It would appear that only if a resident permit plan was implemented, then the exclusive use of the parking would need to be at a higher premium. The area is quite steep in some areas so this may impede the ability of people walking. However, as can be seen from the amount of people staying all day, it does seem that people are quite comfortable parking in De Waterkant and walking into the Cape Town CBD.

Both from the online submissions and the infield surveys, the results for supporting the City of Cape Town's plan of implementing parking management service with formal parking marshals, were split 50/50.

For De Waterkant, the most significant influences on parking were found to be:

- Off-street parking availability
- Presence of illegal car guards
- Land-use
- Duration of stay
- Proximity to CBD
- Availability of residence off-street parking
- Non-motorised transport facilities in the area and walkability of the area.

Less significant influences on parking were found to be:

- Average property price
- Lack of public transport

5. Findings of the study and outcomes

In all 3 areas, the majority of parkers were found parking for works purposes and the vast majority in all 3 areas were parking all day.

Even though the sample size was not a representative sample for the recreational area of Camps Bay, it was as difficult finding parking over weekends as it is over weekdays in the absence of managed parking. There is always a presence of informal car guards. Interestingly, in both De Waterkant and Camps Bay, where the average house prices are higher, there was a high presence of informal car guards. The majority of people that paid car guards paid higher than R5 whereas in Durbanville the majority paid less than R5. This could mean that when given the option to pay, people would associate a higher premium with parking in a higher-valued area than a lower-valued one.

When considering the question of when to manage parking, based on both the literature and the surveys, it is clear that certain criteria need to be considered before management is implemented. From the surveys, it was clear that, despite the massive frustration experienced by the lack of parking availability in unmanaged high-demand areas, as well as the frustration of informal car guard presence, the majority of the outcomes showed that the public did not support the CCT's on-street parking management proposal.

Based on the public input, it is therefore fundamental that the implementation of parking management gets implemented on a planning rationale, rather than a public participation based on a list of identified criteria or indicators. The implementation of parking management should be used as a travel demand management and transit-orientated development tool. This should be done once the key indicators have been considered.

What has been learned is that land use changes are a key trigger for parking demand changing. Land use has a direct relationship with managed parking. When considering De Waterkant and Durbanville's land use changes, it can be seen that the more land use moves away from residential towards commercial and business, thereby attracting workers to an area the more competition there is for available parking. This results in the need for long-term parking, which reduces the turnover of bays, which reduces the economic viability of businesses. One of the major outcomes learned from the study is that in the 2020 Revised Parking Policy, one of the considerations in setting parking tariffs is the commercial cost of land and the average property prices in the area. People living in a certain area are willing to pay more than people living in areas where the average property price is lower. Therefore the cost of parking may also vary from area to area. Historically, in the City of Cape Town, this

has been used and, therefore, there's a difference in the on-street parking prices in Bellville CBD when compared to Cape Town CBD.

Due to the Apartheid Spatial segregation policies, where the poorest people were displaced far away from the CBD and other work opportunities in the more lucrative recreational areas, it is better to understand the origin of parkers coupled with their buying power and need for parking before setting tariffs at the destination. In many instances, with inadequate public transport services increasing the need for private vehicle use, it could be considered a further punishment to impoverished areas, not being serviced with adequate public transport services, therefore, having to incur the increased costs of utilising private vehicles. Furthermore, there is the burden of paying higher on-street parking costs, because the destination is affluent areas with good public transport services and high property values. With better public transport services, in the destination areas, a solution would be to create park-and-ride or off-street parking on the edge of the CBD.

5.1 Why should the City of Cape Town Manage Parking

The CCT should manage parking for the following reasons:

- 1. Using parking to increase the viability of public transport and reducing car dependency, congestion, and CO2 emissions.**

This in itself may be a challenge as it drives another “Goldilocks” effect. Essentially, to make PT more viable alternative revenue streams are required. Parking revenue is one of those streams. So as the level of service for public transport increases the premium for parking should be increased to force people onto PT.

In new developments where the LOS of public transport is acceptable, some of this development is encouraged to reduce the requirements for developers to provide off-street parking which would mean they would be able to build more housing units which in turn would increase rates and services income to the City which increases service delivery.

If parking requirements do increase the municipality can implement on-street parking for residents and charge a permit fee, which would also increase revenue to increase the viability of PT.

The origin is as important as the destination. If there are limited modal choices from the origin areas, then people have very little choice but to use their private vehicles. When people are

using their private vehicles for work, there needs to be a long-staying stay parking supply such as on the fringes of areas and off-street parking available.

Indicator 1: Public Transport Level of Service

2. Controlling parking fees to increase/decrease occupancy in low LOS PT areas.

As earlier mentioned, in certain areas the value of space is higher than in others for example, people in Camps Bay were prepared to pay a much higher premium for parking. Therefore in certain areas, parking fees should be higher than in others.

The problem for municipalities is that changes in tariffs come with outcry from members of the public which means that politically it is not easily achieved. If there are no alternatives such as high LOS public transport then it would negatively affect car dependant people working in certain areas.

Indicator 2: Parking occupancy

3. Understanding the Peak Times People Park and Duration.

Understanding the parking requirement of an area would mean breaking up the area into sections. There may be high turnover areas that are close to businesses where people wish to park for up to 2 hrs maximum. Then you need to create areas where people can park all day. This is often done in off-street areas however if these are privately operated then the incentive of providing cheaper parking on the outskirts of an area reduces. The municipality should charge different rates within an area for different bays at different durations to ensure that all reasons for parking are adequately serviced. Long stay bays on the outskirts of the CBD.

In addition, also understanding the influx of informal car guards can assist in when to manage them as these are implemented with regulation.

Indicator 3: Parking Duration

4. Land use

It was learned that as the land use of an area changes the parking requirements of an area change. For example, in an industrial area, the requirement for on-street parking bays is very low. However, as an industrial area changes to maybe business parks, then people would

need to be able to park when visiting the new business types. This is also evident in a residential area, as shopping centre or shops open, this creates job opportunities.

Land use has a direct effect on why parking needs to be managed. As shown in Durbanville, as the area became denser, the competition for parking increased.

Land use changes were an important aspect as an indicator of when an area needs to be considered for management. However, in determining the operational characteristics and area needs, it is important to determine what type of businesses make up the majority of an area. An example would be that if the area is mainly retail, then shorter timing restrictions are required whereas if the area is mostly business, then the parking need would be long-term parking.

Indicator 4: Land use changes

5. Revenue

There is no doubt that another reason why parking should be managed is to increase revenue. This should not be one of the primary reasons why parking is managed as it could have a negative effect where the business viability in an area is decreased by parkers using going to alternative areas where parking is cheaper or free such as some malls.

Instead, the revenue should be a product of efficient use and management of parking and utilized to increase PT rather than being used as a tax to increase the municipality's revenue.

Indicator 5: Revenue

6. Conflict over quantity and availability as well as maximising supply and demand

Often, certain areas limited space and availability of parking bays. When this happens pricing could be used as a deterrent. Again alternatives and PT will remain an issue. However, the biggest issue will be traffic congestion as vehicles circle the blocks and dwell for parking to become available.

In some instances geometric changes could be applied to increase the availability of parking, for example, a 2-way road could be changed to a one-way road, and the other lane used as parking.

What has also been learned was that the absence of off-street parking has a detrimental effect on the use of on-street parking. Ideally, the City of Cape Town would lease out these areas to private entities who would manage them and pay the City of Cape Town a monthly rental.

Indicator 6: Monitor and control supply and demand

7. Informal car guards

The most overwhelming information provided by the study was what could be learned from the observation of the behaviour of illegal car guards. By only observing the illegal car guards, so much information could be extracted. If there are illegal car guards present, then already it is known that it may be an area of high demand and high bay turnover. If these car guards are present all day, then it has been learned that bays are being turned over quite well. If their presence is only in the early morning and end of the business, then what was learned was that vehicles are parking for long periods or all day. The presence of these illegal car guards is therefore a key indicator.

Indicator 7: Informal car guards

6. Recommendations

The recommendations are split into 2 parts. The first sections will deal with the recommendation of the indicators that has been established and the second part will apply the indicators to the 3 study areas and make recommendations base on the outcomes of the survey results.

It should be noted that this study was aimed at determining indicators that should be considered. In applying those indicators in section 6.2, observations and brief desktop studies were done once these indicators were identified. A further study be recommended to assist the CCT in determining a formula or matrix of the thresholds of the identified indicators. An example of such thresholds would be a detailed analysis of PT LOS and then determining what LOS would be adequate. This could be done for each indicator and possible a formula developed the identified indicators into account and determines when management should be implemented.

6.1 Recommended indicators

It is recommended that the 7 identified indicators be used to assist the CCT in determining when to implement formal managing parking. It must be understood that all indicators will not be relevant to all areas and that a combination of indicators may be more applicable.

Indicator 1: Public Transport Level of Service

Municipalities are responsible for modelling and surveying transport model choices and travel patterns. It is recommended that once the origin destinations by modal choice are known, then the vehicle modal choice option be used to further model parking supply verse the demand generated by the aforementioned model.

It is then further recommended that the above outputs be used as a Travel Demand Management and planning tool. To elaborate, if the demand for private vehicle usage is high but the supply or availability of parking is low, then the premium for using the bays should be a higher cost. If an adequate level of service for public transport is met, then management should be implemented. The LOS criteria should be set by the CCT. Management should vary across areas and should include ride-along transport routes to provide the users with adequate opportunities to use public transport, as LOS varies between the O-D.

Indicator 2: Parking occupancy

It is recommended that a monitoring system be implemented in unmanaged high-demand areas, that can monitor occupancy and duration, and this be cross subsidised from the revenue from contracts of managed areas. To elaborate, it is recommended that the City of Cape Town include line items for parking management sensors installed to monitor the occupancy of unmanaged areas or identified expansion areas.

This can be in the form of manual surveys or a sensor system. An example of this would be that once a parking occupancy hits 85% for 85% of the day then management should be implemented. Municipalities would determine what the percentages of occupancy are as this would vary. It is essential though that an upper and lower limit of occupancy is determined because to vary this occupancy, you would vary the prices. The higher the price the more likely the occupancy will decrease and vice versa. This balance is known as the Goldilocks effect.

Indicator 3: Parking Duration

It is recommended that the same monitoring system be as indicated in the indicator to be used to determine the duration that vehicles are in a bay. This will allow the municipality to also get an understanding of the types of businesses in an area and also better implement more accurate timing restrictions. In contracts where areas are already managed, it is recommended that the City of Cape Town include line items for parking management sensors installed to monitor the occupancy of unmanaged areas or identified expansion areas.

Once the majority of bays are found to be parking more than 2 hours the CCT would know that the demand is for all day parkers. The City can thus adapt strategies of when to allow short-stay and long-stay parking.

Indicator 4: Land use changes

The study has found that land use has a significant impact on the demand for parking bays and the demand for the management of parking bays. This has a direct impact on the viability of local businesses. It is recommended that land use change percentages be tracked in the CCT's Development and Land Use Application Management Systems. It is further recommended land use triggers be identified as percentages and once those percentages have been exceeded then a parking plan be implemented.

It is also recommended that the CCT influence development and car dependency by changing land use standards such as reduced parking requirements where there is access to on-street parking which will allow the CCT to increase revenue from rates and services due to more units, and increase parking revenue with on-street parking permits.

Land use changes play an important role in the supply and demand of parking bays. As business and retail expand, so should the parking supply. If municipalities intend to limit the land use changes to more residential then the requirement for off-street parking bays should increase.

As mentioned previously, past parking management is usually implemented due to public outcry, however, if the municipality implements adequate tracking tools of the indicators identified further below, then the demand and supply becomes a planning and TDM tool.

With formalised parking in place, there is very little demand for illegal car guards. This is not the primary purpose of parking management but rather an added benefit of parking management. Monitoring the behaviour of illegal car guards does provide good information but again, if the implementation of managed parking is used as a planning tool then there would be very little opportunity for illegal car guards to operate.

Parking should be managed when certain indicators have been met targets, which are set by municipalities/authorities, who are responsible for managing parking. This enables parking to be used as a TDM planning tool, to cap supply and demand and encourage the turnover of parking bays.

Indicator 5: Revenue

It is recommended that the revenue from parking be ring-fenced to improve the overall standard of public transport as this has a direct impact on parking requirements.

Tariff prices need to be flexible across an area and from area to area. The premium for parking in certain areas needs to be higher than in other areas. Furthermore, management requirements can be dropped in certain areas to ensure contracts remain viable.

The CCT is encouraged to look at programmes such as EPWP where areas of lower revenue are managed in-house and thus don't have the contractual inflated costs by contractors. In this way, a lower premium can be implemented in certain areas but will increase the revenue pot. This revenue should be used to increase PT in other areas to increase the LOS of PT

which therefore means the tariff associated with that parking will increase resulting in higher revenue across the network.

Indicator 6: Monitor and control supply and demand

The monitoring system will provide several bays and will give the City understanding of where improvements can be made. The City also reserves pockets of land for later utilization of parking.

It is recommended that parking tariffs be based on supply and demand rather than property values or the premium of land in a particular area and it is recommended that timing restrictions be allocated to all areas as the first form of management. This will require Law Enforcement to issue fines and penalties when these restrictions are contravened.

Indicator 7: Informal car guards

If there are informal car guards present then this will be an indication to the City that parking demand is growing. Understanding the times that they are operating can also advise the CCT on whether a short-stay or long-stay parking is happening. The information can be received by surveying parkers regularly with questionnaires or by staff monitoring areas.

6.2 Applying the 7 indicators to the selected areas and making

Indicator 1: Public Transport Level of Service

Camps Bay is serviced by MyCiTi routes 106 and 107. The headways are approximately 14 minutes in the peak and 25 minutes in the off-peak. There are also 2 routes, 108 and 109, which pass through Camps Bay from Hout Bay. It was observed that the area is also serviced by various minibus routes and although a survey of PT did not form part of this study, the information was enough to determine that adequate LOS has been achieved, so it is recommended to implement parking management.

Durbanville was observed to only have minibus taxis and Golden Arrow bus services operational in the area. The observations showed that it was not adequately serviced in the peak and the off-peak headways were even worse. A very high car dependency was observed in the area. Based on the observed PT LOS as an indicator, Durbanville would not be recommended for parking management.

De Waterkant is serviced by 3 MyCiTi routes 108, 109 and 118. Alfred stop in De Waterkant has the 108 passing at 6.21am, the 109 at 6.16am and 118 at 6.32am. The headways are between 5 and 10 minutes. It was observed that the area is also serviced by various minibus routes and although a survey of PT did not form part of this study, with the observations made, the area has an adequate PT LOS. Parking Management of the area would therefore be recommended.

Indicator 2: Parking occupancy and Indicator 3: Parking Duration

In Camps Bay it was surveyed that most parkers were workers in Camps Bay and parked for the entire day. There were 2 times more parkers parking all day compare to parking less than 2 hours. It was difficult finding parking on week days and weekends. It would be recommended to implement parking management in Camps Bay.

In Durbanville many people parked for works purposes. It was found that it was much easier finding parking over a weekend than a week day. Only 60% of people found it difficult to find parking on a week day. Interestingly the split between parkers parking more than 2 hours and less than 2 hours was fairly equal. The split between people who supported the CCT's plan of implementing parking management was also equal. At this time, Durbanville would not be recommended for parking management.

In De Waterkant the vast majority of parkers parked for works purposes. It was surveyed to be very difficult to find parking over weekdays but easy to find parking on weekends. There was an even split of people parking all day and people parking less than 2 hours, which means there is competition between all day workers and parkers visiting businesses/retail in the area. The split between people supporting the CCTs implementation of management was slightly higher than those not in favour. It would be recommended to implement parking management in De Waterkant.

Indicator 4: Land use changes

In Camps Bay it was observed that no major land use changes have taken place over the past 10 years. A simple desktop study of the area looking at the development and densification changes indicated this. Based on the observed land use changes, parking management would not be recommended for Camps Bay.

In Durbanville the area has become a lot more developed and dense. The area has therefore produces more parkers over the years. In De Waterkant there has not been considerably

higher development but the land use has changed to a higher percentage of business and retail use which are attracting parkers to the area. Based on the land use changes Parking Management would be recommended for Durbanville and De Waterkant.

Indicator 5: Revenue

In Camps Bay and De Waterkant most people were prepared to pay informal car guards more than R5. With majority of people parking all day and parking being difficult to find in both these areas, the premium on parking in these areas would therefore be higher. Both areas also have adequate PT so this would further recommend that the premiums for parking in these areas are higher. The CCT charges 2 rates per 15 minutes of parking. A high demand area rate and a low demand area rate. It is recommended that parking management be implemented in these areas at the CCT's higher demand tariff, item A1.1.1, on its Council Approved Tariff Schedules.

In Durbanville the majority of people who paid informal car guards paid less than R5. This indicates that the Durbanville premium associated with parking is low. The recommended tariff rate for the area would be the lower demand tariff, item A1.1.2, on the CCT Council Approved Tariff Schedules.

Based on the CCT's tariffs, there are different prices set for different occupancy levels however in a discussion with the Manager of Network Management in the CCT, who is responsible for Parking Management, the rates have never been altered by occupancy as the CCT does not have adequate data to inform such changes. It is recommended that for an area, a sample of bays are chosen based on a statistical sample size, and these bays are regularly surveyed in order to determine the occupancy and vary the tariff accordingly.

Indicator 6: Monitor and control supply and demand

In Camps Bay, De Waterkant and Durbanville the majority of parkers were parking for work purposes. Most of these parkers also parked for the entire business day. In De Waterkant and Camps Bay there is very limited space and therefore you can't increase the supply of parking bays. This means that there is parking occurring in residential streets. It is recommended that a residential parking permit be implemented in De Waterkant and Camps Bay, during working hours during on week days. It is recommended that for all 3 areas, parking management is implemented and that cheaper parking be implemented on the outskirts of the CBD's to allow vehicles to park for longer hours at a lower cost.

Indicator 7: Informal car guards

In Camps Bay, most times, there was a presence of illegal car guards. Over the weekends there was a higher presence as this was when most people would visit for recreational purposes and have shorter stays than the all-day parker's weekdays. This was heightened by the fact that the majority of people paid car guards and paid them more than R5. Based on the above it is recommended that formal parking marshals be appointed.

In Durbanville the majority of people indicated that they did not pay informal car guards. The majority of people also indicated that they were not approached by informal car guards. There seemed to be only pockets of areas where there were car guards and these could be considered to be the areas of high demand. This does provide indication of where the high demand and occupancy areas are most likely to be. It is therefore not recommended to implement parking management.

In De Waterkant there was rarely a presence of informal parking marshals. Even though there was a slightly higher presence of informal car guards over weekends, the majority of people didn't find a presence of informal car guards. This is also because the majority of parkers were parking all day. The high demand for parking and absence of informal car guards suggests that there is minimal turnover of bays. Using car guards as an indicator, Parking management is not recommended for De Waterkant, however the absence of car guards linked to the other indicators would suggest a parking intervention is required.

Summary

Table 27 shows the summary of the survey outputs, tested against the indicators. The results recommends that parking management be implemented in De Waterkant and Camps Bay. Further triggers needs to be reached in Durbanville before parking management should be implemented.

Indicators considering Parking Management Implementation	Camps Bay	Durbanville	De Waterkant
Indicator 1: Public Transport Level of Service	YES	NO	YES
Indicator 2: Parking occupancy	YES	NO	YES
Indicator 3: Parking Duration	YES	NO	YES
Indicator 4: Land use changes	NO	YES	YES
Indicator 5: Revenue	YES	YES	YES
Indicator 6: Monitor and control supply and demand	YES	YES	YES
Indicator 7: Informal car guards	YES	NO	YES

Table 27: Summary of survey against indicators

7. Conclusion

The study set out to determine why and when to manage parking. The study further aimed to develop key indicators to be considered before implementing an on-street parking management system in Cape Town.

When looking at the literature to determine why other countries implemented parking management, it was found that the main reasons why the CCT should manage parking was to increase the viability of public transport, for parking bay turnover to increase business viability, and to reduce traffic congestion and CO2 emissions, to better manage and understand land use changes and the effects on parking requirements, to manage conflict over quantity and availability as well as maximising supply and demand. Although part of the world has implemented parking management to increase revenue, the efficient use of parking is more linked to ensuring sustainability across the area locally and metro-wide, and therefore the revenue should be a result of proper and effective management rather than the main aim.

This led to the development of a list 7 key indicators that the CCT should closely monitor in an effort to know when to management parking. Developing what the exact details of these thresholds are, was not part of this study but this would definitely be recommended as a further Thesis.

- Indicator 1: Public Transport Level of Service
- Indicator 2: Parking occupancy
- Indicator 3: Parking Duration
- Indicator 4: Land use changes
- Indicator 5: Revenue
- Indicator 6: Monitor and control supply and demand
- Indicator 7: Informal car guards

Certain indicators have been determined, and that if monitored closely, will give us a more viable parking network. It was found that these indicators will vary across areas and certain indicators may not apply to all areas.

It was found that understanding parking requirements goes hand in hand with planning PT routes and the viability of those routes are certainly affected by the supply, demand, and cost of parking.

When surveyed areas were tested through the indicators, the outcomes were that management intervention is required in De Waterkant and Camps Bay. The Management in Durbanville was not recommended as certain triggers were not met.

One of the shortfalls were that the Camps Bay sample size only had a confidence interval of 75%. Although this did not have adverse effects on the outcomes of the recommendations, it would have been more accurate to conduct more surveys for Camps Bay.

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9. Appendices

Appendix A: Survey Questionnaire

COMMUNITY ASSESSMENT FORM

Parking Management Plan Comment Form

Brief Background

- CCT administers the management and regulation of on-street parking.
- The City contracts formal marshals to collect and manage parking on behalf of the City.
- Public parking is intended to assist the public in their daily business and provide access to business opportunities.
- On-street parking, within central business districts, (CBD) aims to facilitate short-term parking within short distances of places of business in order to stem economic viability of an area.
- Along highly trafficked recreational and high tourist attracting destinations, the availability of parking and turnover of bays is becoming a challenge.
- The absence of parking management leads to an increase in informal car guards which in some cases, may lead to anti-social behaviour.
- In some areas the demand for parking has increased to a point where urgent intervention is required. This intervention is through formal parking management charged as a parking tariff.
- Due to the increase in the demand, decrease in availability and time restriction not being adhered to, the City is proposing to formally manage on-street parking.

Area to comment on (please tick applicable areas)

Sub Council 7		Sub Council 14		Sub Council 19		Sub Council 20	
➤ Durbanville	☐	➤ Camps Bay	☐	➤ Muizenberg	☐	➤ Kenilworth	☐
	☐	➤ Cape Town CBD *	☐		☐	➤ Rondebosch	☐
	☐	➤ Kloof and Gardens	☐		☐	➤ Newlands	☐
	☐	➤ De Waterkant	☐		☐		☐

* Only Areas that are not currently being managed

- Reason for visiting selected areas? Reside: _____ Work: _____ Other: _____
- On a scale of 1 to 3: (1) Easy, (2) Somewhat difficult, (3) Difficult
 - How easily do you find on-street parking on week days (between 8am and 5pm)? _____
 - How easily do you find on-street parking over weekends? _____
- How often are you approached by informal car guards?
 - Weekdays: Never _____; Seldom _____; Frequently _____; Always _____
 - Weekends: Never _____; Seldom _____; Frequently _____; Always _____
- Do you pay informal car guards? Yes _____ No _____ Sometimes _____

If yes, is the average amount: less than R5 _____ More than R5 _____
- How long do you park, on average?

Less than 1 Hr: _____ More than 1 hr but less than 2hrs: _____ More than 2 hours: _____ All day: _____
- Do you support the City's proposal to charge motorists for on-street parking by using formal car guards?

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The City of Cape Town undertakes not to share, communicate or distribute any of your personal information to third parties unless we have your permission or are required by law to do so. All information collected will solely be used for the purpose of informing you of any City of Cape Town related activity or information happening within your ward. All information shared with the City of Cape Town is given on a voluntary basis.

Reference No.: IN / DD / MM / YYYY / NO

Any other comments/questions/proposals related to Parking:

Participant's details:

Name		Surname	
Tel. (optional)		Cell (optional)	
E-mail			
Area of Residence			

If/when applicable:

Survey Administered By: _____	Date: _____	Signature _____
Captured By: _____	Date: _____	Signature _____
Verified By: _____	Date: _____	Signature _____

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The City of Cape Town undertakes not to share, communicate or distribute any of your personal information to third parties unless we have your permission or are required by law to do so. All information collected will solely be used for the purpose of informing you of any City of Cape Town related activity or information happening within your ward. All information shared with the City of Cape Town is given on a voluntary basis.

Appendix B: Ethics Clearance Form



CITY OF CAPE TOWN
ISIXEKO SASEKAPA
STAD KAAPSTAD

Date : 8 March 2022
To : Director: Policy & Strategy
Reference : PSRR- 0439

Research Approval Request

In terms of the City of Cape Town System of Delegations (May 2019) - Part 29, No 8 Subsection 4, 5 and 6

"Research:

- (4) To consider any request for the commissioning of an organizational wide research report in the City and to approve or refuse such a request.
- (5) To grant authority to external parties that wish to conduct research within the City of Cape Town and/or publish the results thereof.
- (6) To after consultation with the relevant Executive Director: grant permission to employees of the City of Cape Town to conduct research, surveys etc. related to their studies, within the relevant directorate

The Director: Policy & Strategy is hereby requested to consider, in terms of sub-section 5, the request received from

Name : Imeraah Frydie
Designation : Masters candidate
Affiliation : University Cape Town & City of Cape Town official
Research Title : "Why and when to manage parking – an exploration of what the key indicators are to be considered before implementing an on-street parking management system."

Taking into account the recommendations below (see Annexure for detailed review):

Recommendations

The CCT via the Director: Policy & Strategy grants permission to Imeraah Frydie in his capacity as CCT employee and a Master of Science in Engineering candidate (Civil Engineering) in the Faculty of Engineering and the Built Environment at the University of Cape Town, to conduct research subject to the following conditions:

- Adherence to the scope and scale of the research;
- Approval for CCT data usage is provided for this research report only to facilitate University ethics clearance, and any future publications, presentations and articles requires supplementary approval;
- Data provided remains the Intellectual Property (IP) of the City, cannot be sold or shared with any third party and is only for use in this research;
- That the data provided complies with the Protection of Personal Information Act (No. 4 of 2013);
- POPIA stipulations to be strictly adhered to, regarding the use, management and storing of City data;
- All the contributions from officials should be acknowledged and inputs to be anonymised and referenced by functional role in CCT, and the conditions of anonymity be adhered to in the research report;
- Clear acknowledgment in the report that the researcher's analysis derived from the documents, interviews and data are not regarded as official CCT policy;
- All relevant City documentation, data and inputs to be referenced appropriately;
- That the Director: Revenue, Director: Transport Planning & Network Management and Assistant Chief: Traffic Operations closely monitor the use/analysis of the data;
- Recommendations to and addenda to this approval may be submitted when possible indications of further support from CCT departments/sections are received.
- City branding and logo not being used in the research report;

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• Researcher and staff member to familiarise himself with the City's requirements and Standing Operating Procedures) related to permission to undertake research and use and management of research (via City Web) • Submission of the completed research report to the Executive Director: Urban Mobility; Director: Policy & Strategy Department and the Manager: Research Branch, Policy & Strategy Department, within 3 months of completion of the research report.	
Delegated authority:	Acceptance by Applicant:
Approved ☒ Comment: _____ Not Approved ☐ Comment: _____ Hugh Cole: Director: Policy & Strategy: Hugh Cole Date: _____	I, _____ confirm that I agree to abide by the conditions as stipulated above. Imeraan Frydie Digitally signed by Imeraan Frydie Date: 2022.03.11 11:21:28 +02'00' Applicant: _____ Date: _____
CCT departments: No interviews or data to be provided without proof of acceptance of the conditions under which the research permission is granted.	
Kindly return signed copy to sivuyilevuyo.rilityana@capetown.gov.za	