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Eikestad Parking PPP

Feasibility Study

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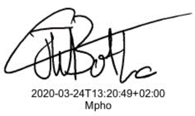
SMEC Company Details

Approved by	JW Botha Pr Eng			
Address	65 Riebeek Street			
	Cape Town	South Africa		8001
Telephone	+27 (0) 21 417 2900		**Website**	www.smec.com
Email	Cobus.botha@smec.com			
Signature				

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List of Abbreviations

Acronym	Definition
ARR	Accounting Rate of Return
BBBEE	Broad Based Black Economic Empowerment
BEE	Black Economic Empowerment
BER	Bureau for Economic Research
BOO	Build-Own-Operate
BOOT	Build-Own-Operate-Transfer
BOT	Build-Operate-Transfer
CBD	Central Business District
CITP	Comprehensive Integrated Transport Plan
CPI	Consumer Price Index
CWD	Cape Winelands District
D&C	Design and Construct
D/E	Debt/ Equity
DB	Design-Build
DBF	Design-Build-Finance
DBFM	Design – Build – Finance – Maintain
DBFMO	Design – Build – Finance – Maintain – Operate
DBFO	Design – Build – Finance – Operate
DBSA	Development Bank South Africa
DCMF	Design – Construct – Maintain – Finance
DSAR	Debt Service Reserve Account
DSCR	Debt Service Cover Ratio
EIA	Environmental Impact Assessment
ESD	External Service Deliverer

GLA	Gross Leasable Area
IDP	Integrated Development Plan
IRR	Internal Rate of Return
JIBAR	Johannesburg Interbank Agreed Rate
LETRP	Large Employer Trip Reduction Program
LLCR	Loan Life Cover Ratio
LOS	Level of Service
MRA	Maintenance Reserve Account
MSA	Municipal Systems Act
NMT	Non-Motorised Transport
NPV	Net Present Value
O&M	Operate and Maintain
ORA	Operational Reserve Account
PH	Peak Hour
PP	Private Party
PPP	Public Private Partnerships
PPPFA	Preferential Procurement Policy Framework Act, 2000
PSC	Public Sector Comparator
PT	Public Transport
RA	Risk Adjusted
RDP	Reconstruction and Development Programme
RFP	Request for Proposal
RFQ	Request for Quotation
SDA	Service Delivery Agreement
SDF	Spatial Development Framework
SMME	Small, medium and micro-enterprises
SPV	Special Purpose Vehicle
TA	Transaction Advisor
TA	Treasury Approval
TOD	Transit Orientated Developments
VAT	Value Added Tax
VFM	value-for-money
WACC	weighted average cost of capital
WC	Western Cape

1 Introduction

1.1 Background & Purpose of the Study

Stellenbosch experiences major congestion in the CBD and other parts of the city. In addition, the Comprehensive Integrated Transport Plan indicates a need for sustainable transport, that amongst other factors, requires a reduction in traffic congestion and an increase in modal shifts, such as public transport and/or non-motorised transport.

There are currently a number of projects and solutions defined with the aim of reducing the congestion and improving modal share in Stellenbosch. These are: the widening of the R44, R304, R310, construction of the western by-pass, construction of the link between Techno Park and Adam Tas, parking solutions, TOD developments, NMT infrastructure and public transport enhancement. These solutions are costly. Thus, these solutions should be seen as an integrated and comprehensive package to solve the congestion issues in Stellenbosch. This study is a focus on the feasibility of parking initiatives, though an external mechanism for the Stellenbosch CBD, while taking into consideration what the other proposed solutions and designs may have on the demand for the proposed parking initiatives.

A pre-feasibility study and demand investigation was conducted for parking in the Stellenbosch CBD and Techno Park in 2021. Due to the section 78(4) resolution in 2019 on the matter, the preferability was developed to assess the possibility of a parking gauge facility, as a possible external mechanism project, while at grade parking facilities would be done through an internal mechanism. As part of that study the following was recommended:

- The Eikestad Parking Garage should be considered as a viable option as a PPP contract and could further be considered to be registered with National Treasury as a possible PPP project, so that a feasibility analysis of the possible PPP project can be done through an appointed transaction advisor.
- The analysis of the techno park parking needs clearly identified the need for additional parking. However, due to the parking utilisation and the nature of the space time needs for the Techno Park demand, as well as the willingness for employees of Techno Park to pay for parking, it resulted in the feasibility of a parking garage being unfavourable. However, based on the same considerations, an at-grade facility located as per the concept designs, returned a sustainable financial assessment.
- It was recommended that the at-graded facility be developed into a formal project and the designs and construction of the facility move forward internally with the municipality.

Based on the above, SLM registered the Eikestad Parking Garage with National Treasury as a possible PPP project and appointed the Transaction advisor as per phase one of the PPP project cycle.

1.2 Project Deliverables

The aim of this study, as defined in the inception report, is to plan, manage and facilitate the development of a multi-story parking facility for the CBD of Stellenbosch Municipality as a PPP project. Essentially, to identify the need and demand for additional parking in the CBD and assess the possibility of the project as a PPP project through phases 1, 2 and 3.

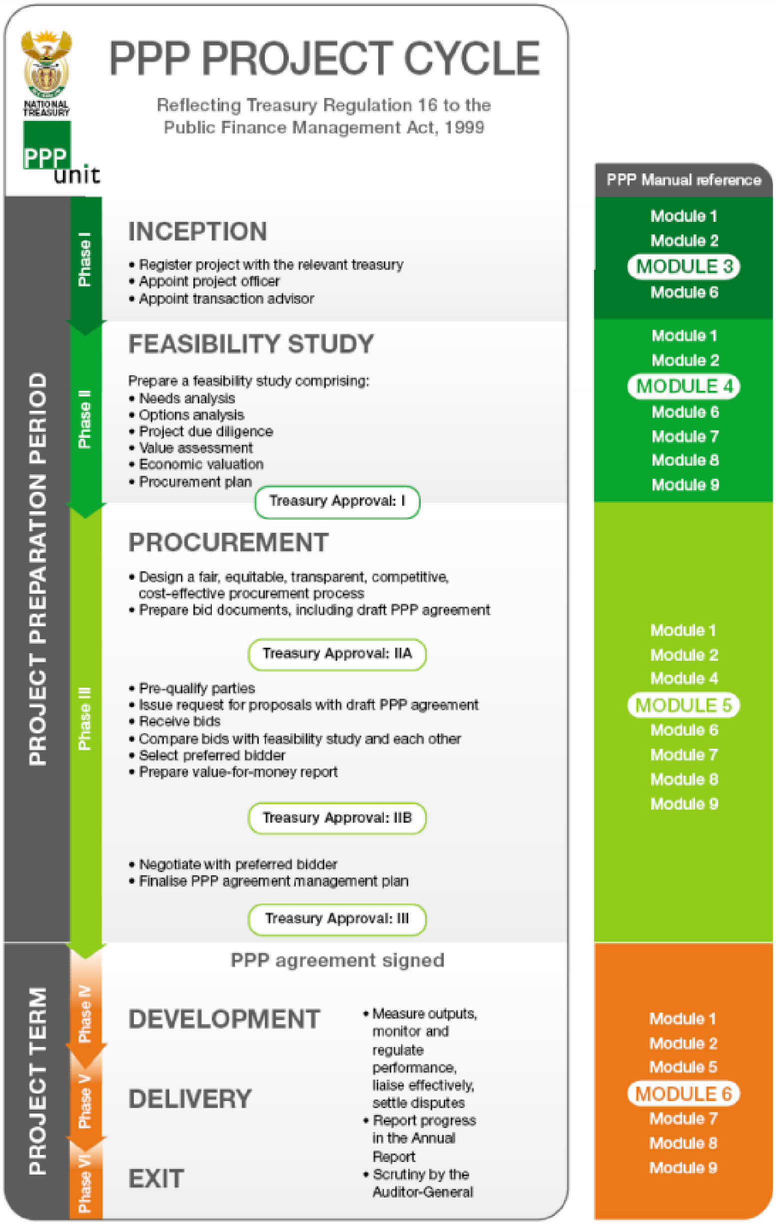


Figure 1-1: PPP Project Cycle

This phase of the project is phase 2: The feasibility study. The following specific tasks were identified as part of this phase of the project:

- Needs Analysis
  - Project objectives
  - Available budgets, institutional environment

    - Project duration
- Options Analysis
    - Analyse the Spatial Development Framework of the Stellenbosch Municipality and identify those developments that will increase the demand for parking;
    - Identify measures and systems that will reduce the demand for parking in the CBD's, namely: park- and ride systems, shuttle routes, public transport systems, etc.;
    - Analyse the influence of the University's policies, parking provision and public transport systems on the CBD of Stellenbosch especially, and thus the demand for parking;
    - Identify projects and policies that will increase the demand for parking namely: the pedestrianisation of certain streets, as well as the elimination of parking to increase street capacity;
    - Identify specific parking requirements for the envisaged Eikestad Mall parking facility;
    - Determine specific parking shortfalls for the horizon years of 2023 and 2028;
    - Compile the Future Parking Needs Plan;
    - Assess the accesses to the facilities;
    - Options, risk and financial assessments; and
    - Suitability as a possible PPP (Public Private Partnership).
- Value Assessment
    - Develop PSC (Public Sector Comparator) models.
    - Develop Risk adjusted PSC models.
    - Develop PPP reference and Risk adjusted PPP reference models.
    - Assess the project affordability and value for money.
- Economic Valuation
- Procurement Plan

The parking study focused on providing parking facilities for the Stellenbosch CBD (on identified locations in the CBD). The key plan of the Stellenbosch CBD is indicated in Figure 1-2.

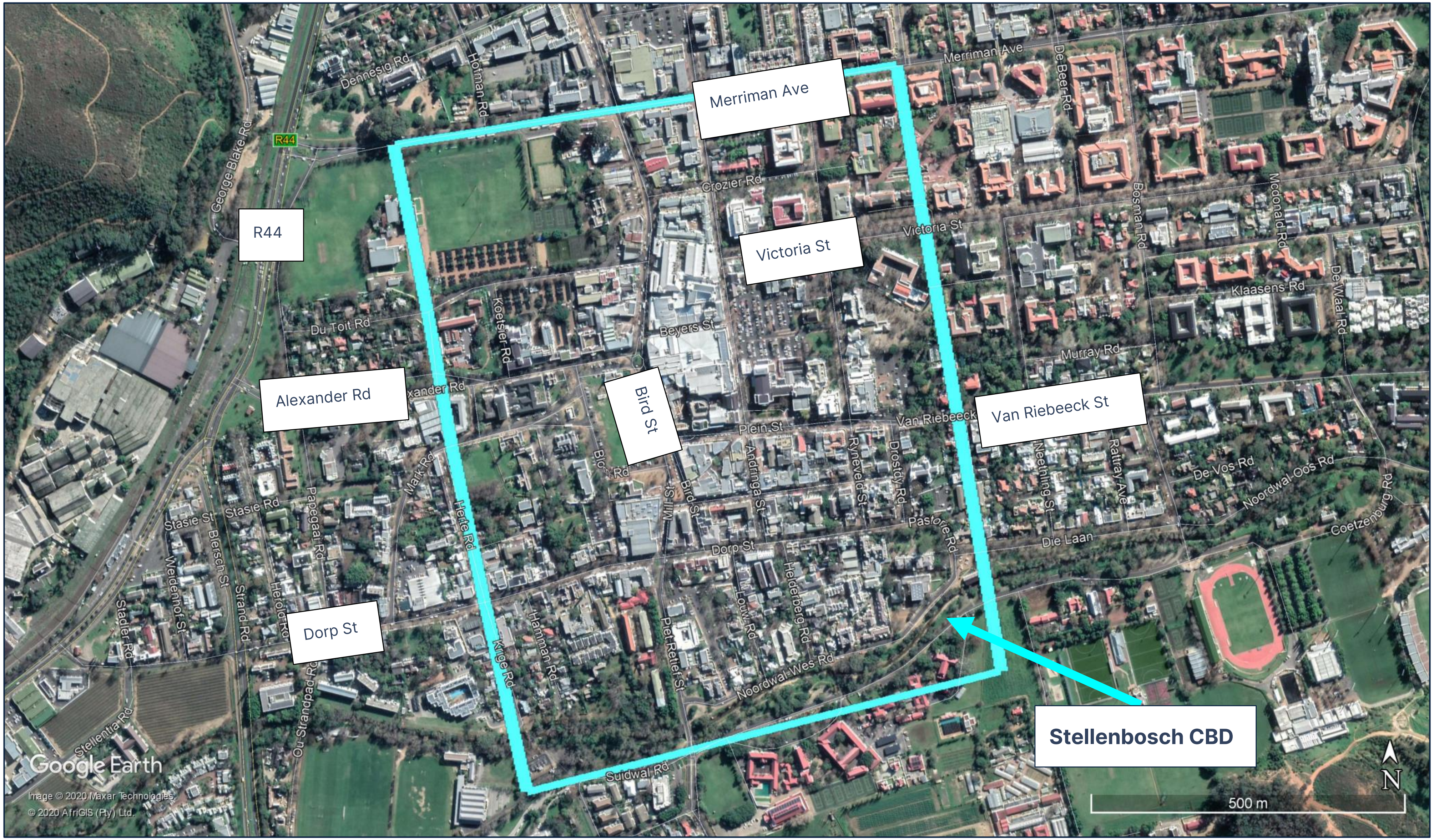


Figure 1-2: Stellenbosch CBD Parking Study Area (source: Google)

1.3 Approach and Methodology

The methodology involved was to identify the need, demand, develop functional concept designs, assess the impact on accesses of these concepts, test the affordability and the possibility of possible PPP project and proposed recommendations regarding the possible solutions and parking facilities. The methodology is defined below in five (5) phases.

<u>Phase 1: Needs Analysis</u>

This phase was the review of the needs for sustainable transport and improved transport in Stellenbosch. These sections included a review of the following documents:

- CITP and DITP
- Section 78(1-3) submission reports
- SDF
- Provincial Sustainable Transport Programme.
- Budget Allocations

Based on the findings and needs identified in these documents, the need and available budgets, that can identify additional parking facilities in Stellenbosch.

<u>Phase 2: Demand Analysis</u>

The Demand Analysis phase is done through assessing the existing congestion levels in Stellenbosch and at existing parking facilities in Stellenbosch, as well as surveys of all public parking facilities in the CBD. The surveys conducted were both actual counts, as well as preference surveys.

The survey results were used to determine the following:

- Analysis of parking data to determine total demand:

  Parameters, such as: the peak time, parking accumulation, parking saturation, parking duration, peak parking ratio, parking turnover and parking index have been calculated from the surveyed information and have been used to calculate the number of parking spaces proposed for the envisaged Eikestad Mall parking facility; and

- Analysis of other factors that may influence the parking demand:

  Once the parking demand was calculated based on the surveys, other factors, such as: the Spatial Development Framework, public transport interventions, Stellenbosch University parking policies, pedestrianisation of streets in the CBD, etc. have been used to adjust the calculated parking demand figures for further use in the feasibility study.

<u>Phase 3: Concept Developments.</u>

Phase 3 is the development of workable concepts. The project involved concept designs for the facilities proposed in the CBD. The concepts have been developed using the parking demands, historical and heritage significance, financial considerations, functionality and impact on the surrounding road networks. The concepts have been prepared in a 3D model and the impact on the road network have been assed using SIDRA and based on the level of service that the accesses have on the road network.

The concepts have been designed based on the demand for parking in the peak times, parking saturation, parking duration, peak parking ratio, parking turnover and parking index.

<u>Phase4: Options Analysis and Project Due Diligence:</u>

The options analysis and project due diligence was to ensure the following requirements of the PPP process is achieved:

- Environmental assessment - This process is to determine whether an EIA is required as well as outline specialist studies required, procedures that need to be followed as well as likely cost implications.
- Traffic study – a high level traffic investigation will have to take place around key identified nodes in the study area. The outcomes will be submitted for approval by the local municipal authority. During the traffic studies additional upgrades may be identified, in order to maintain the current LOS in the area where the facility site will operate.
- Desktop geotechnical investigation – A high level geotechnical investigation will be done on the proposed alignment, with the intention of identifying fatal flaws in the founding conditions of the alignment.
- Heritage study. A heritage investigation will be conducted for the site and surrounding areas that will dictate the updated concept of the facility.
- The legal consultant will examine the applicable legal and policy framework and produce a report listing the relevant policy, requirements and guidelines and legislation and outlining its relevance to the project.
- Socio-economic studies regarding BBBEE Targets in PPP Reference.

<u>Phase 5: Value Assessment:</u>

The value assessment was conducted though the following process:

- Affordability of the facility though conversional process:
    - PSC model development and assessment
    - Risk adjusted PSC model
    - Sensitivity analyses
    - Determine affordability and returns
- PPP reference model:
    - Develop PPP reference model
    - Risk adjusted model
    - Sensitivity analysis of the risk adjusted model
    - Determine affordability and returns
- Appropriate risk transfer:
    - Calculate the risk transfer to the PPP partner

- Value for money
    - Financial and technical Capacity
    - Cost
    - NPV

<u>Economic Evaluation:</u>

- Social accounting matrix
- Cost benefit analysis

2 Needs Analysis

The needs analysis of this project has been sectioned into five subchapters as indicated below. The purpose of this chapter is to define the proposed project and give a clear pathway to affordable solutions for parking in Stellenbosch.

2.1 Strategic Objectives

In accordance with draft document, Section 78(1) "Stellenbosch is experiencing severe traffic congestion due to various reasons including the undersupply of parking facilities. In an attempt to relieve the traffic congestion in Stellenbosch, the municipality embarked on a number of projects which include:

1. The improvement of NMT facilities.
2. The development of rideshare and public transport through the Large Employer Trip Reduction Program (LETRP) project.
3. The investigation into an Integrated Public Transport Network.
4. Possible TOD development.
5. The proposed parking projects have a strong alignment to the municipalities vision and objects."

Item 5 is the focus point of this study. In accordance with the 2016 CITP for Stellenbosch municipality, the Vision of the city is:

A sustainable transport system that provides for the basic mobility needs of individuals, supports a vibrant economy and operates seamlessly within and across the municipal boundaries.

With objectives to reduce congestion, increase safety, support a green municipality, good governance and to upgrade infrastructure to name a few. As part of the study, the draft section 78 report indicated that improved parking will:

- Improve safety by having safer and formal parking for motorists;
- Increase modal shift to NMT by parking centrally and walking to nearby amenities thereby reduced on-street parking needs;
- Increase the mobility town features, such as pedestrianised roads, etc;
- Reduce congestion and thus reduce C02 emissions; and
- Reduce circling traffic searching for open parking bays.

As a result, the objective of this project is to propose parking projects that will enhance the environment, human health and wellbeing and aid in a sustainable transport network.

2.1.1 Alignment to Government

The proposed project must contribute and or be endorsed and validated through the implementation of government and institutional policies. As a result, the proposed parking needs are endorsed through the CITP and IDP and are guided by the following principles:

- Compliance with the Department of Transport guidelines for parking requirements in terms of the Technical Recommendation for Highways TMH16 and 17.
- Compliance with the geometric and configurative requirements, as prescribed in the Department of Transport TMH 17.
- Compliance to the municipal zoning scheme.
- Improve parking services and quality of life of residents.
- Provision of parking on the periphery of the town centre to be still within walking distance from the centre of town or in association with a shuttle service if parking is provided outside of town.
- Financial sustainability.

In addition, the proposed parking project is in accordance with the provincial sustainable transport programme. Based on the above needs, a section 78(1) report was submitted and the council findings were as follows:

"Previously Council accepted the investigation into the problem of parking within a study required by the Municipal Systems Act (MSA) section 78 (1) process. The basic requirements of parking were investigated and a Section 78(2) report was submitted to Council on 28 March 2019 and the following outcomes were debated:

i) Aspects Reviewed

The above report has provided an overview of the extent of the parking service as identified in Chapter 1 of this report, considered the process that the Municipality must follow in terms of section 78(1) of the MSA, and then reviewed each issue listed by section 78(1). These include the costs and benefits of providing the service, the Municipality's capacity to provide the service, and international and local trends with respect to transport service provision.

ii) Conclusions

The conclusions reached from interviewing key municipal officials and considering each of the aspects required by S78 (1) are that the Municipality does not currently have the financial resources or organisational capacity to internally provide a public transport service. The major factors counting against it are the increased budget required to cover the establishment and recurring costs of the service, the significant increase in staffing that would be required and a national shift in the approach to sustainable transport.

Irrespective of the mechanism selected to deliver a parking service (internal vs. external), the Municipality should consider pursuing an alternative approach to parking facilities in and around the Stellenbosch and Franshoek CBD, based on the experience of other cities and towns. The experience of Boulder in the USA can be beneficial as it has become world renowned for its sustainable transport system, that stroke a good balance between non-motorised transport modes and the private vehicle.", Section 78(3), 9/11/2019.

The process the municipality has followed is as follows:

- Section 78(1) Commencement

12TH COUNCIL: 2017-09-27: ITEM 7.6.1

RESOLVED (majority vote with abstentions)

(a) that a Section 78 process be launched and that an internal parking service delivery increase be investigated through the Section 78(1) approach;

(b) that parking service delivery increase be based on the towns of:

i) Stellenbosch
ii) Klapmuts, and
iii) Franschhoek; and

(c) that a formal report be submitted to Council as required by Section 78(2), which will indicate the best way of rendering internal parking and any recommendations to a possible external method of rendering parking services.

Meeting: *Ref no:* *Collab:*	*12th Council: 2017-09-27* *17/2/3/6* *538693*	*Submitted by Directorate:* *Author* *Referred from:*	*Engineering Services* *D Louw* *Mayco: 2017-09-13*

Figure 2-1: Council Resolution on 78(1)

- Section 78(2) Resolution:
  - "16TH COUNCIL MEETING: 2018-03-28: ITEM 7.6.2
  - RESOLVED (nem con)
  - that this report be noted;
  - that Council notes the attached report on the providing of sufficient public parking;
  - that Council accepts that all the requirements of Section 78(1) in terms of investigating the feasibility of the provision of sufficient parking have been complied with;
  - that Council, in terms of the Municipal Systems Act, Act 32 of 200, as amended, Section 78(2), accepts the scenario to "after having applied subsection (1), a municipality may, before it takes a decision on an appropriate mechanism, explore the possibility of providing the service through an external mechanism mentioned in section 76 (b).";
  - that Council formally proceeds to the Municipal Systems Act, Section 78(3) process of exploring the possibility of providing the municipal service of parking through an external mechanism; and
  - that a report on the outcome of this investigation be provided to Council, upon the completion of a Section 78(3) exercise in order for Council to take a Section 78(4) decision."

The section 78(3) draft report identified the various explanations regarding the reasons for the use of an external service provider as per Table 2-1 below for the bulk parking garage:

Table 2-1: Section 78 (b) Descriptions, Source Draft Report Section 78(3)

Sect 76(b)	Service Delivery Option	Direct & Indirect Costs and Benefits	Capacity of current and Future Service Providers	Views of Local Community	Impact on Development, Job Creation and Employment Patterns	The views of organised labour
(b)(i)	Municipal Entity	The cost involved in this will be very similar to costs incurred by a private body utilising the MSA section 81 and will therefore be addressed under the “any other Institution” below	There is no capacity within Stellenbosch Local Municipality nor the Cape Wineland District Municipality to be a Bulk Parking Service of Bulk Parking Garages.	See item (b)(v)	See item (b)(v)	
(b)(ii)	Another Municipality	The parking is performed by or on behalf of the Municipality itself. This Scenario is therefore not seen as a solution in this case	The parking is performed by or on behalf of the Municipality itself. This Scenario is therefore not seen as a solution in this case	See item (b)(v)	See item (b)(v)	
(b)(iii)	An organ of state	There are no parts of any organ of state that provides and manages parking on behalf of municipalities.	There are no parts of any organ of state that provides and manages parking on behalf of municipalities.	See item (b)(v)	See item (b)(v)	
(b)(iv)	Community based organisation	Due to the very large capital needed to build a parking garage, there are no community organisation within	Current Community based organisations do not have the capacity to own and operate this kind of project	See item (b)(v)	See item (b)(v)	

		Stellenbosch that would be able to build parking and perform parking and management				
(b)(v)	Any other institution	Should Council decide to rather use an external mechanism for service delivery then the Private Sector would have to be asked to Build Own Operate & Transfer after a time such as 20 years (BOOT)then this would possibly be the only entity that would be capable to build and operate a service worth a few hundred of millions of Rand.	There are Private Entities that would have the capacity currently to BOOT this project and also their private entities that would in future have the capabilities to BOOT such a project	This matter has been addressed at several forums as such as: 1. Mobility Forum 2. NMT Working Group 3. IDP 4. University Rector/ Mayor Forum 5. University Department of Engineering Forum 6. Ratepayers Associations No objections were received when a proposal was made that an external Service Proved be	The impact on Development, Job Creation and Employment patterns will be similar for each option. There would be assistance for future development. There would be the creation of new employment in the view of jobs such as Managers, Clerks, Technical Staff and Law Enforcement	Meeting held on (##-##-####) to explain the proposed process

				approached to Build, Own, Operate and Transfer (BOOT) such a business.		

The basic assessment is that the initial estimated capital and no capacity within the municipality or other municipalities/ state owned entities that can build and operate this type of facilities.

The report on Section 78(3) recommended that council accepts that:

- Parking forms an important part of the total Mobility concept within Greater Stellenbosch Area and relates to other major parts such as: Traffic Flow, Public Transport (PT), Non-Motorised Transport (NMT), Transit Oriented Development (TOD), and Movement of Disabled Persons (normally seen as a primary part of NMT).
- That the municipality needs to provide enough public parking.
- That the continuous provision of road infrastructure for private vehicles is not sustainable.
- That the future demands of parking must also be advised on and provided for.
- That Council uses an approach where a private company is to be procured to provide a parking service to build, own, operate and transfer the entity to Council after a period of 20 years.
- That Council, in terms of the Municipal Systems Act (MSA), Act 32 of 200, as amended, Section 78(4), accepts that the method of providing parking be considered as follows:
  - Provision of open one level parking space needs, be performed on an internal mechanism.
  - Provision of multi storied parking space needs, be performed on an external mechanism.

Based on the council resolution, an external service provider is required for the operations of the bulk parking garage. The Bulk Parking Garage section 78(3) identified the following possible service delivery vehicles:

1. External Service Deliverer (ESD) via a Service Delivery Agreement (SDA) Utilising Section 81 to 84 of the Municipal Systems Act.
2. ESD via Municipal Entity Utilising Chapter 8A of the Municipal Systems Act Section 86B (1)(a) Private Company.
3. ESD via Municipal Entity Utilising Chapter 8A of the Municipal Systems Act Section 86B (1)(b) Service utility.
4. Utilising Chapter 8A of the Municipal Systems Act Section 86B (1)(c) Service utility Multi-Jurisdictional Service Utility.
5. Public Private Partnership as per the Municipal Finance Management Act Section 120 of the MFMA applies.

As a result of the council decision, external partners are considered, which include the need for a Feasibility Study of the concepts and which municipal service should be considered. The feasibility must include the number of years of the provision of services and impact the project will have on the municipality regarding staff and budgets.

PPPs by municipalities are governed by section 120 of the Municipal Finance Management Act 56 of 2003 (MFMA) and the Municipal Public-Private-Partnership Regulations, 2005 made under the MFMA. The Regulations give the following definition of a PPP:

"'public-private partnership" means a commercial transaction between a municipality and a private party in term of which the private party—

a) *performs a municipal function for or on behalf of a municipality, or acquires the management or use of municipal property for its own commercial purposes, or both performs a municipal function for or on behalf of a municipality and acquires the management or use of municipal property for its own commercial purposes;*

b) *assumes substantial financial, technical and operational risks in connection with—*

   (i) *the performance of the municipal function;*

   (ii) *the management or use of the municipal property; or*

   (iii) *both; and*

c) *receives a benefit from performing the municipal function or from utilising the municipal property or both, by way of—*

   (i) *consideration to be paid or given by the municipality or a municipal entity under the sole or shared control of the municipality;*

   (ii) *charges or fees to be collected by the private party from users or customers of a service provided to them; or*

   (iii) *a combination of the benefits referred to in subparagraphs (i) and (ii)."*

The requirements and procedures for PPPs in terms of the applicable legislation are set out in the Legal Assessment Report attached as Annexure A.

A PPP as the choice for the delivery of a public service is warranted by its nature as (Module 1: SA regulations for PPP's):

- Target public spending, principally on outputs to agreed standards.
- Using private sector financing and efficiencies.
- Allocating risks to the party best able to manage them.

A PPP is essentially a contract between a public sector institution and a private party in which the private party assumes substantial finical, technical and operational risk, Module 1: SA regulations for PPP's and MFMA Regulations.

There are two types of PPPs specifically defined:

- where the private party performs an institutional function.
- where the private party acquires the use of state property for its own commercial purposes.

A PPP may also be a hybrid of these types. Payment in any scenario involves one of three mechanisms:

- the institution paying the private party for the delivery of the service, or

- the private party collecting fees or charges from users of the service, or
- a combination of these.

Module 1 further defines a PPP as not being:

- a PPP is not a simple outsourcing of functions where substantial financial, technical and operational risk is retained by the institution.
- a PPP is not a donation by a private party for a public good.
- a PPP is not the privatisation or divesture of state assets and/or liabilities.
- a PPP is not the 'commercialisation' of a public function by the creation of a state-owned enterprise.
- a PPP does not constitute borrowing by the state.

2.2 PPP Models and Their Structure

2.2.1 PPP Delivery Model

2.2.1.1 Definition

There are many definitions of what a Public Private Partnership ("PPP") is. Typically, a PPP is a contract delivery model where a private party contracts with a government entity (public party), and where the private party has the responsibility to finance, design, construct, operate and/or maintain public infrastructure over a long contract term, e.g. twenty years.

There are two basic forms of PPPs, namely: a **user-charge PPP** (were project revenue is generated by means of tolls, or train fare for example) and a **unitary-payment PPP** (also called a service-payment PPP, where government pays a fixed monthly instalment for the availability of services).

2.2.2 In this regard refer to the definition of a PPP quoted above and referred to inthe guidelines of the South African National Treasury's PPP Unit Basic PPP contracting structure.

Figure 2-2 below shows a basic PPP contracting structure. On a typical PPP project, a government entity contracts with a private party special purpose vehicle ("SPV"), which is a company specifically established for the implementation of the project. The SPV's appointment includes full or partial financing or the project, and as discussed earlier, could include a combination of other responsibilities, such as: the design, construction, operation and maintenance of certain infrastructure over the contract term.

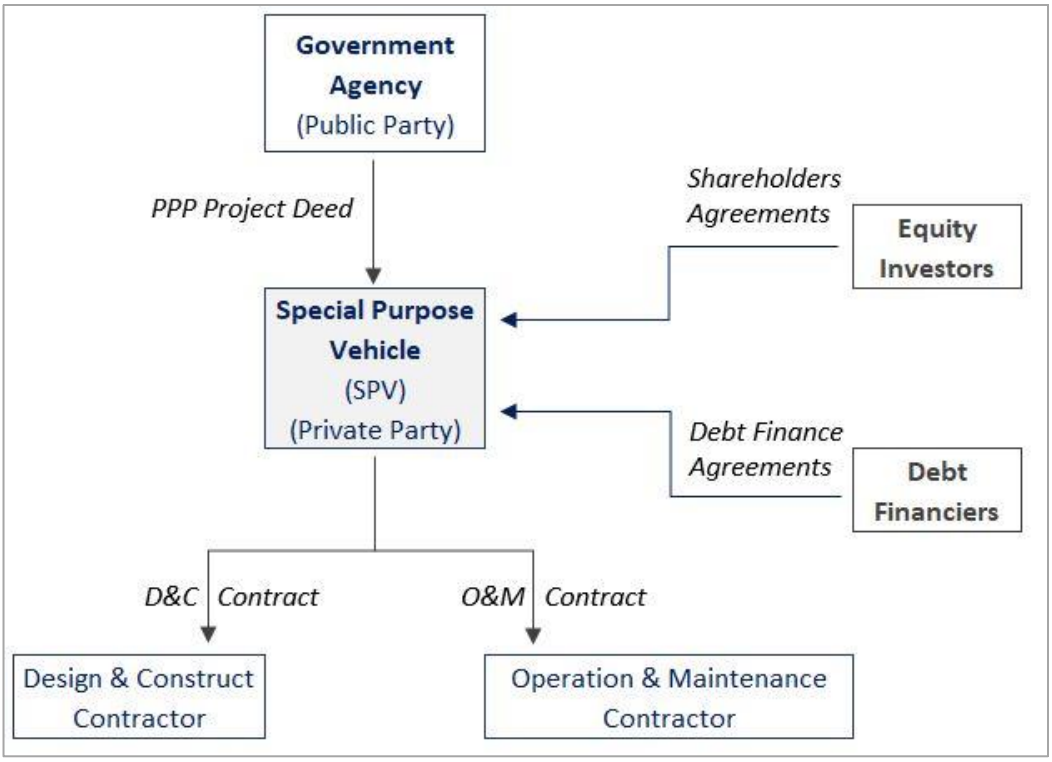


Figure 2-2: Basic PPP Contracting Structure

The SPV gets investors to invest equity into the project with the prospect of a return on their investment (over the course of the project term), from revenues generated by the project. Equity providers are the first to put their money into the project, but are also the last ones to take it out.

Further to the equity, the SPV may also borrow money from debt financiers. The debt finance is borrowed on a limited recourse basis, which means that the lenders can only have recourse to the assets of the SPV and cannot have recourse to government. It is only when the default or insolvency of the SPV's D&C (design and construction) or O&M (operation and maintenance) contractor causes the SPV to become insolvent, that the risk then falls back to government.

The SPV is therefore established to legally isolate the parent company from direct exposure to the financial risks associated with the project, because the lenders can only rely on the project revenues to secure a loan. The lenders are entitled to financial recourse before equity contributors can claim any returns or repayments, but because the equity contributors bear the highest risk, they correspondingly also 'stand to receive the highest potential returns'.

2.2.3 Advantage of using a PPP delivery model

A key advantage that is attributed to PPPs is that they achieve 'significant risk transfer from the government to the private sector'. It is true that much of the risk transfer that takes place with a PPP delivery model can also be achieved by traditional government-financed delivery models, however, government achieves extra risk transfer under a PPP that cannot be achieved under more traditional procurement models.

2.2.4 PPPs can achieve greater Value-for-Money

Better value-for-money ("VfM") is the principal rationale for using PPPs. On projects suitable for the PPP model, greater VfM can be achieved by fewer risk for government and/or lower cost to government of managing those risks over the project term. Section 120(1)(a) of the MFMA requires that a PPP must provide value for money to the municipality.

Some of the reasons why this can be achieved by PPPs, as opposed to other contracting models, are:

- The PPP contracting structure holds a high degree of risk to the debt financiers and equity investors and therefore it results in additional due diligence and monitoring by the private sector. This adds to the quality of risk assessments and planning that goes into a PPP project;
- Government tends to spend more time and effort into preparation of PPPs, because of the long-term nature of the projects. This includes better project scoping and risk assessment;
- For user-charge PPPs, private sector contractors might not have the financial capacity to absorb demand risk, but equity investors and debt financiers might;
- The SPV's private finance provides a cushion to government, guarding against the risk of contractor insolvency or default where the contractor's liability is limited or excluded;
- The SPV shields the government from contractor claims for additional time and/or money;
- The SPV administers the D&C and O&M contractors' contracts, thereby relieving the government from risks relating to poor contract administration in that regard; and
- On most PPPs the government only starts making payment to the SPV once the development phase is completed and services are in operation. This relieves the government from the risk of paying for infrastructure that might not be fit-for-purpose.

2.2.5 PPPs as a means of Financing

2.2.5.1 Private Finance

The cost of project capital is calculated by using weightings of the financing sources and their related costs, which is called the weighted average cost of capital ("WACC"). On a PPP project, the equity providers carry higher investment risks and therefore request higher rates of return than the debt financiers. Accordingly, the higher the share of equity, the higher the WACC and in other words, the higher the cost of financing.

The SPV's investors will seek to limit the equity as much as possible, because more equity means higher financing costs and therefore a lower chance of providing value-for-money to the government and a lower chance of winning the bid to contract with government for the proposed PPP. However, an increased debt-to-equity ratio increases financial risk to the SPV, because there is a limited supply of equity to absorb losses when project difficulties are experienced.

2.2.5.2 Public Finance

Governments can borrow finance more cheaply than the private sector. But to access the cheaper finance, governments need to borrow on a full recourse basis, and agree to repay the loan regardless of whether or not the net revenues generated by the project are sufficient to repay the loan. This is a lower risk to lenders and therefore the government pays lower interest rates than the private financiers on a PPP project.

In other words, the financing of a PPP project is more expensive than the financing of a project procured with a standard delivery model, such as a Construct-only model. The difference lies in the fact that the government carries the risk of poor project performance when using a standard delivery model.

2.2.5.3 Why use private finance?

While the higher cost of private sector finance will ultimately be passed on to government (or users), on a PPP project the government receives the benefit of the buffer that the private sector finance provides against the risk of contractor insolvency or default for which the contractor's liability has exhausted. There are also the added benefits of superior risk transfer and value-for-money.

2.2.5.4 Funding Source

It is important to note that a PPP delivery model is not a funding model. The funds used to pay for a PPP project still come from the government coffers. The private party provides a means of financing the project and the government needs to repay that money. On a unitary-payment PPP, the government's monthly instalment will include costs relating to the loan itself, interest, equity and return on the equity investment.

The PPP contracting model does not expand the funding available to Government. It only allows government to spread its payment obligations over a long period of time. The diagrams below compare the payment obligations of government on a typical traditional procurement with those on a unitary-payment PPP.

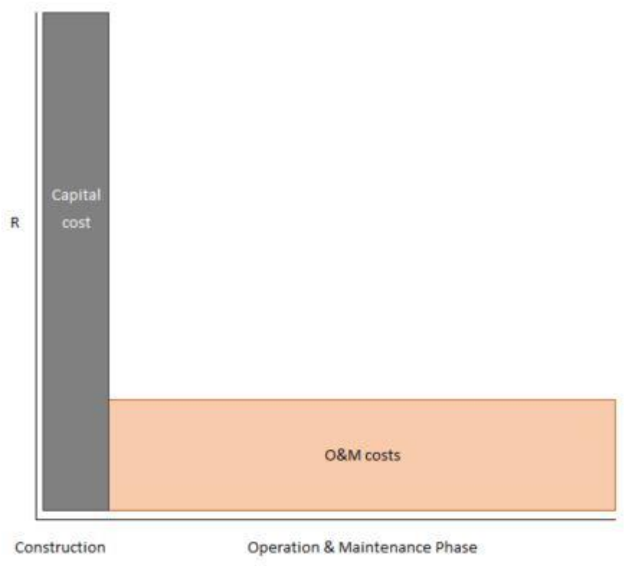


Figure 2-3: Traditional Procurement / Standard delivery model

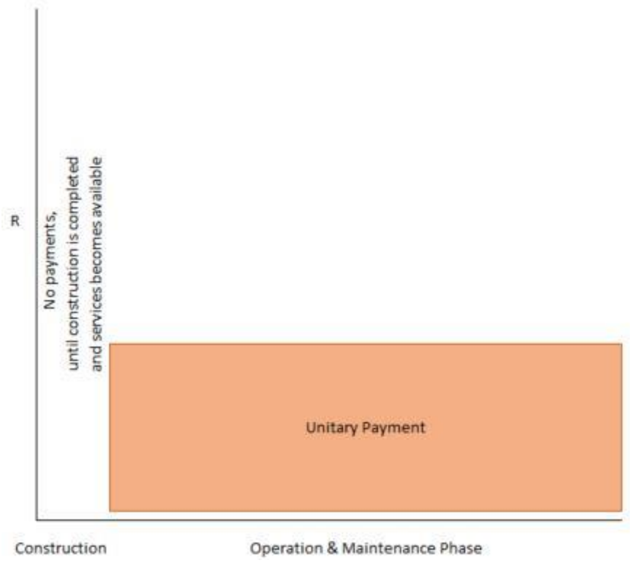


Figure 2-4: Unitary-payment PPP

It is only on a user-charge PPP, such as a toll road or parking garage project, where users pay for a service, such as the use of the road, that we can say that the PPP model expands the government's funding source.

When a procuring agency (e.g. a Municipality) sees a PPP as a funding mechanism instead of a financing mechanism, it could create a fiscal illusion whereby the Municipality leaves the PPP's costs and liabilities off its balance sheet and budgets for other projects. By the time the Municipality needs to start paying the unitary payment, it has over-invested its interests in infrastructure projects, with not enough budget to meet its contractual obligations.

A PPP delivery model should not be selected purely for reason of delayed expenditure. It should be selected when it is determined that the PPP delivery model offers better value-for-money for the specific project than a traditional procurement model.

2.2.6 Projects suitable for delivery as a PPP

If a PPP delivery model is used for an unsuitable project, then the government will not achieve value-for-money and will bear the brunt of the higher financing costs, without adequate benefits to justify those costs.

Projects likely to provide value-for-money using a PPP delivery method are those with some or all of the following attributes:

- **long term**. Contracts tend to be long-term (up to/or more than 20 years), and reflect an acceptance of whole-of-life cycle costing risk by the private party;
- **measurable service outputs**. Government service requirements should have measurable outputs that can be translated to a performance contract. Payment mechanisms are generally structured around these output specifications to provide incentives for achieving key performance indicators;

- **innovation**. The project is sufficiently complex to encourage innovative approaches (in design and technology) that can deliver value-for-money;
- **whole-of-life costing**. Full integration, under the responsibility of one party, of up-front design and construction costs with ongoing service delivery, operational, maintenance and refurbishment costs. This delivers improved efficiency through whole-of-life costing as design and construction become fully integrated up-front with operations and asset management;
- **market appetite**. The project creates a genuine business opportunity, which is likely to attract a sufficient number of private parties and create an effective and competitive bidding process;
- **opportunity for risk transfer**. A PPP project needs to be structured to achieve optimal risk allocation. Value-for-money is a key driver of PPPs and there needs to be scope to allocate appropriate risk to the private sector.
- **bundling of contracts**. In many cases, the provision of a service or capability by the public sector depends on a number of separate contracts with different contractors. PPPs provide an opportunity to combine related services and an asset into a single long-term contract;
- **non-core services**. Contracts are likely to include a requirement for a range of non-core services and support activities to be delivered that currently divert management and skilled staff in the public sector. These services may include accommodation availability, information technology outputs and many other services; and
- **complementary commercial development.** The commercial opportunities that may add value to the project and/or reduce service payments to the private party (where complementary to the project objectives).

Together, these characteristics can create cost savings for government in the competitive bidding process, while giving an opportunity for innovative service delivery and a viable opportunity to the private sector (where complementary to the project objectives).

While the presence of these characteristics will not always mean that PPPs are a viable or the most appropriate option, their presence does suggest that PPP options should be properly considered as part of any Procurement Options Analysis undertaken.

All South African Municipal PPPs governed by the MFMA and Municipal Public-Private Partnership Regulations are subjected to three strict tests:

- Can the municipality **afford** the deal?
- Is it a **value-for-money** solution?
- Is **substantial** technical, operational and financial **risk** transferred to the private party?

2.2.7 Other Matters to Consider

Apart from only using a PPP for a suitable project, the relevant institution should have the capabilities of supporting the PPP implementation; have sufficient resources to finance the preparation of the PPP project (procuring transaction advisory services, send staff on training etc.); and make the PPP attractive to potential private partners.

A PPP project comes as a high risk to the private sector and therefore there should be a good opportunity for the private sector to make money on the project. In other words, there should be value for money for the private party as well.

The types of contracts that exists as a PPP, according to service works global are as follows:

- Build-Operate-Transfer (BOT)

  A BOT model is generally used to develop a discrete asset rather than a whole network, for example a toll road. This simple structure provides the most freedom for the private sector partner during construction and the public sector bears the equity risk. This model's main disadvantages are that the transaction not for smaller project, projects less than R150mil, transaction cost are high and public sector bears equity risk.

- Build-Own-Operate (BOO)

  This is a similar structure to BOOT (below), but the facility is not transferred to the public sector partner. A BOO transaction may qualify for tax exempt status and is often used for water treatment or power plants. The public sector does not acquire the asset.

- Build-Own-Operate-Transfer (BOOT)

  The private sector builds and owns the facility for the duration of the contract, with the primary goal of recouping construction costs (and more) during the operational phase. At the end of the contract the facility is handed back to the government. This structure is suitable when the government has a large infrastructure financing gap as the equity and commercial risk stays with the private sector for the length of the contract. This model is often used for school and hospital contracts. These projects are only successful if the necessary finances are raised and if substantial revenues are generated during the operations phase.

- Design-Build

  The contract is awarded to a private partner to both design and build a facility or a piece of infrastructure that delivers the performance specification in the PPP contract. This type of partnership can reduce time, save money, provide stronger guarantees (as the work is with a single entity rather than a consortium) and allocate additional project risk to the private sector. However, the private sector does not then operate the facility.

- Design-Build-Finance

  The private sector constructs an asset and finances the capital cost during the construction period only. It does not operate the facility and or maintain the facility.

- Design – Build – Finance – Operate (DBFO)
  - Design – Build – Finance – Maintain (DBFM)
  - Design – Build – Finance – Maintain – Operate (DBMFO)

    Similar to BOOT, DBFO (and its variations) is more used in the UK for PFI (Private Finance Initiative) projects. The private sector designs, builds, finances, operates an asset, then leases or sells it back to the government, typically over a 25 – 30-year period. Public sector long-term risk is reduced and the regular payments make it an attractive option to the private sector. However, once the asset is constructed, government purchases/ lease the facility back from the private sector. The major risk is that the public sector then takes all ownership risk after the purchase.

- Design – Construct – Maintain – Finance (DCMF)

  The private entity creates the facility based on specifications from the government body and leases it back to them. This is generally the convention for PPP prison projects. Again, government takes ownership risk and must have operational capacity to manage the facility.

- O & M (Operation & Maintenance)

  In an O&M contract, a private operator operates and maintains the asset for the public partner, usually to an agreed level with specified obligations. The work is often sub-contracted to specialist maintenance companies. The payment for this contract is either via a fixed fee, where a lump sum is given to the private partner, or more commonly a performance-based fee. In this situation, performance is incentivized using a pain share / gain share mechanism, which rewards the private partner for over-performance (according to the agreed SLAs) or induces a penalty payment for work which has fallen short. This is based on an existing asset and does not involve construction.

The model identified by the council resolution based on section 78(3) was that of a Build Own Operate Transfer (BOOT), The benefits of this model were identified as follows for the municipality as described in section 78(3) report:

- The Municipality does not have the finances to build the facility, while the private sector does;
- The BOOT system is widely used in SA and encourages private investment;
- It has the potential to inject new foreign capital to the country;
- With this model and the concession ownership, there is ample time to transfer skills and know-how;
- Will allow for a faster construction and procurement phase;
- This type of system allows for financial sources from the municipality to be allocated to other priority projects;
- Releasing the burden on public budget for infrastructure development.
- A private company has the technical expertise and resources to manage and maintain such a project while training municipal staff.
- The financial, equity and operational risks are transferred to the private sector.

2.3 Budget

The 2021 Stellenbosch Bulk Parking Feasibility Study[1] investigated two types of parking facilities, namely a multi-story parking garage (as proposed for the Stellenbosch CBD) and an at-grade parking lot (as proposed for the Techno Park). The 2021 study found the at-grade facility not to be feasible and the full feasibility study therefore focuses on the multi-story facility that consists of between 3 and 4 levels, with a capacity of about 500 parking bays. This facility is termed the Eikestad Parking Facility.

2.3.1 Provision of parking in the CITP and Municipal Budget

The CITP for the period 2016-2020 included two parking projects, one for the CBD and the at-grade facility at the Techno Park. These two projects (TR042 and TR044) provided for a total cost of R120 million for both parking facilities.

In contrast, however, the reviewed Stellenbosch CITP for the period 2022-2026 excludes any financial provision for a substantial parking facility. The focus of the Municipality has shifted to a PPP process to address the need for parking in the CBD, specifically the Eikestad parking facility. The development of this parking area will also allow for the reduction of on-street parking areas making certain streets in the CBD more pedestrian and parking friendly. The 2022 CITP provides for two small parking area upgrades in Franschhoek (R700 000) and Stellenbosch (R800 000) for the 2022/23 year. Both facilities to be funded through developer charges.

2.3.2 Estimated Facility Capital Cost

The estimated facilities cost (exclusive of VAT) of the Eikestad Parking Facility is estimated as follows:

- Estimated construction cost: R99 439 000
- Smart Parking System R1 999 141
- Fibre Infrastructure R5 000

2.3.3 Estimated Facility Operational and Maintenance Cost

The operational costs associated with the Eikestad Parking Facility have been estimated at R1 246 000 per annum at 2023 levels. The maintenance costs (operational maintenance, aesthetic maintenance and structural maintenance have been estimated at R464 500 per annum at 2023 costs

2.4 Institutional Environment

The findings in section 78(1) found from the high-level investigation regarding the institutional environment that is required to operate the facility. Based on the needs of this facility, the positions required to manage a parking garage and the functions associated are as follows:

[1] Stellenbosch Bulk Parking Feasibility Study: Draft 1 dated 28 June 2021 under reference number RFP085.2020

- Facility Manager: The facility manager will manage the parking service, including procurement, maintenance and servicing, cleaning, insurance, accident administration, licensing and financial asset management.
    - Manager
- Marketing and communications: focused on publicising the parking service to the community to encourage service patronage, communicate service changes or updates and to distribute motorist information in a usable format.
    - Marking and Communications Manager
- Contract Management: All functions that are outsourced to external service providers will be contracted and these contracts need to be managed.
    - Project Manager from the municipality
    - Personal Assistant for the municipality PM
- Fare Management: The sale of tickets for the parking bays. This function is generally done through ticket machines and kiosks. However, a back-office team is required for lost tickets and or faulting tickets. In addition, a team is required for equipment maintenance etc. The fare management must ensure all methods of payment are available.
    - Kiosk operator(*2)
    - Parking attendant (depends on number of gates, one per gate) assume 2 gates,
    - Mechanical Maintenance technician *3
- Financial Management: Managing the various financial elements of the system including revenues (fare revenue, any grants or subsidy contributions from national or provincial government, municipal contribution, other system revenue) and costs (operating and capital costs). This function inhouse is done through the financial office within the municipality. Else this function will be managed by the accountants of the private partner.
    - Accountant
    - Bookkeeper
- Safety and Security: Ensures the safety of the motorist using the parking facility. This function requires a security team on the ground and as well as the use of technology to monitor the facilities and record safety and security issues.
    - Night and Day shift (1 per floor, shift 12hrs) assume 3 floors.
- Maintenance Team: This function is the general and periodic maintenance of the structure and equipment of the facilities.
    - Maintenance Manager
    - General worker *2 (can also be parking attendant in off peak times)
- Cleaning Team: Function is responsible for the cleanliness, removal of refuse and unwanted vegetation.

    - Can be parking attendants in off peak times.
- IT specialist: The IT services are to manage the IT equipment.
    - IT Technician

The above services are estimated for a multi-level parking garage. The staff requirements have a need of between +-20-30 Employees.

Capacity Requirements This section investigates the internal capacity of the municipality to accommodate the staff requirements should the Municipality operate the Eikestad Parking facility and when following the PPP route.

2.4.1.1 Internal Capacity analysis

The section 78(1) estimated that the municipality would need to employ between 35-40 staff to properly manage the parking facilities. The 2021/2022 annual report indicated that the municipality's approved organogram (approved on 25 October 2017 and augmented on 27 February 2019) has a total post complement of 1996. The actual posts filled by functional level was 1 185, which translates to an effective vacancy rate of 59.3%. Infrastructure services has 463 posts filled with 35 fully funded vacancies. The municipality as indicated in the section 78(1) report that the municipality does not have the ability to increase the staff capacity to accommodate this function.

In addition, based on the staffing requirements, the municipality doesn't have the ability to increase the capacity of other functions in the municipality as there are cross divisional positions required for this project.

In accordance with the section 78(1) reports stated that, "Section 78(1)(a)(iii) states that a municipality "must first assess the extent to which the re-organisation of its administration and the development of the human resource capacity within that administration as provided for in sections 51 and 68, respectively, could be utilised to provide a service through an internal mechanism mentioned in section 76(a)"

Section 51(g)(i) states that "a municipality must within its administrative and financial capacity establish and organise its administration in a manner that would enable the municipality to perform its functions through operationally effective and appropriate administrative units and mechanisms, including departments and other functional or business units."

Section 68(1) states that "a municipality must develop its human resource capacity to a level that enables it to perform its functions and exercise its powers in an economical, effective, efficient and accountable way…""

From the analysis above, the municipality has a vacancy of 856 positions or nearly 43%. This indicates that the other functions do not have the current capacity to re-organise staff to a parking service function.

Based on the above, the municipality will require an external partner.

For a possible PPP project to comply with the Treasury Regulations, a Project Officer will be appointed.

The roles and responsibilities of the Project Officer cover the whole PPP project cycle. Broadly, the Project Officer will:

- manage the planning, procurement and implementation of the Project on behalf of Stellenbosch Municipality, exercising delegated authority; and
- direct and manage the work of the Advisory Team and approve payments in terms of the Mandate Agreement entered into between Stellenbosch Municipality and the Transaction Advisor.

The detailed skills and competencies required of the Project Officer in order to successfully execute his role are detailed in the PPP manual.

It is the opinion of the Transaction Advisor that the Project Officer is performing the tasks expected of him in this position and is playing a continued crucial role in ensuring that the Project is proceeding on time, within budget and according to scope.

For Stellenbosch Municipality to successfully engage in the process of providing secure, safe and additional public parking, the Project Officer relies on the support of other municipal staff members with expertise in specific areas. The Stellenbosch Municipality Project team should be multi-functional. In addition to permanent team members of the PSC (Project Steering Committee), other specialist team members are included on an ad-hoc basis. This ensures that the expertise can be utilized in a focused manner when required within the parameters of the Project.

The following criteria were considered in structuring the Stellenbosch Municipal Project team:

- A knowledgeable, focused and committed team is a strong promoter for a successful PPP; and
- The team members have all been specifically appointed and have been given a job and role description for the Project.

The table below provides an indication of the core team members on the project and needs to be completed by the municipality before final submission to National Treasury for Treasury Approval I (TA I).

Table 2-2: Department Project team members

TEAM MEMBER	KEY FUNCTIONS	MUN TEAM MEMBER
Financial	• Assisting with extraction of costs from Department and DPW budgets required by the Advisory Team • Input into the construction of the Financial Model • Participate in the establishment of bid criteria • Evaluation of the bids received against the bid criteria • Participation in the negotiation process in order to ensure optimal financial structuring for the Mun • Provide in input into the Financial Model once the Project is in the implementation phase.	To be appointed
Human Resources & Labor Relations	• To provide an understanding of the current Human Resources policies and processes within Stellenbosch Municipality • To identify and co-ordinate future establishment needs • To assist with gathering staff related information such as post descriptions, space needs and operating requirements • Ensure the organization is able to deliver services in light of any changes as a result of the PPP implementation • Providing inputs into the HR consequences of outsourcing of non-core services • Managing the following possible scenarios: • Changes in staff circumstances • Managerial resistance • Staff uncertainty • Advise on engagement with trade unions • Ensuring, as far as possible, consensus with unions around labour relations issues • Participation in the establishment of bid criteria • Evaluation of the bids received against the bid criteria	To be appointed
Legal	• To assist with negotiations and review the Transaction Advisor appointment • To advise the Advisory Team of Stellenbosch Municipality legal obligations and existing contracts. • To participate in the Advisory Team's legal Due Diligence • Participation in the establishment of bid criteria • Assisting to ensure compliance with the legal elements of the procurement agreements • Participation in the drafting of appropriate procurement documentation • Evaluation of the bids received against the bid criteria • To actively participate in the negotiations with the Preferred Bidder prior to Financial Close • Legal advice to Stellenbosch Municipality on issues relating to the Project	Services
Technical: Facilities Management & Organizational Development	• To provide an understanding of the current facilities occupied by Stellenbosch Municipality • To identify and co-ordinate future needs • To identify and assist with the compilation of existing costs and expenses relating to services	To be appointed

	procured whether from Government departments or the private sector. • To assist with gathering staff related information such as post descriptions, space needs and operating requirements • Providing inputs into possible outsourcing of non-core services • Provide inputs around present Department assets • Participation in determination of the Output Specifications • Participation in the establishment of the bid criteria • Participation in the evaluation of the bids received against the bid criteria • To actively participate in the negotiations with the Preferred Bidder prior to Financial Close	
ICT	• To co-ordinate the ICT inputs into the Project • Establish a suitable electronic communications environment • Ensure that all external IT stakeholders are kept informed of progress • Ensure the safety of the information contained on the IT system (link with the security specialist deliverable) • Provide inputs into the ICT output specification • Participation in establishment of the bid criteria • Participation in the evaluation of the bids received against the bid criteria • Provide inputs into the possible outsourcing of non-core services	To be appointed
Communications	• To identify various stakeholders and develop an internal and external communication plan to disseminate information throughout the organization and externally. • To assist with media enquiries and to formulate appropriate responses	To be appointed

2.4.1.2 Project Office

As Stellenbosch consists of various directorates/ business units, a Project Office, through the Project Officer will co-ordinate the input from Stellenbosch Municipality with regard to aspects of the Project. This interaction and co-ordination entails:

- managing deadlines to ensure that the timelines of the Project Plan are met;
- managing the service provider to ensure the progress of the Project;
- liaising between the stakeholders and the service provider;
- highlighting "red-flags" as and when they arise;
- troubleshooting and providing ongoing solutions; and
- reviewing the reasonableness of the risk allocation and the managing of the risks inherent in the Project.

Beyond this, the Project Office must also:

- Ensure that capacity is created within Stellenbosch Municipality, through a skills transfer initiative. In this way, for example, Stellenbosch Municipality facility management personnel should develop the capabilities to take over from the facility management specialists at some point. Capacity can be built in other ways and consideration should be given to the potential areas for skills development.

- Build institutional memory - over the life of the concession the nature of the members within the Project Office will change, however, there needs to be some continuity. A knowledge management system has been created so that new advisors and Stellenbosch Municipality staff members are aware of the history of the Project.
- Engage with employees and provide them with on-going information about the process underway. This will create a sense of ownership and excitement amongst Stellenbosch Municipality employees. This type of communication will also raise the level of awareness about the PPP within Stellenbosch Municipality and relieve any misplaced anxieties.
- The Project is completed on time, within budget and to a standard expected by National Treasury.

2.4.1.3 Transaction Advisor

A transaction advisor was appointed.

2.4.1.4 Stakeholder Engagement for a PPP

The diagram below depicts the relationship between the Project Office and other stakeholders.

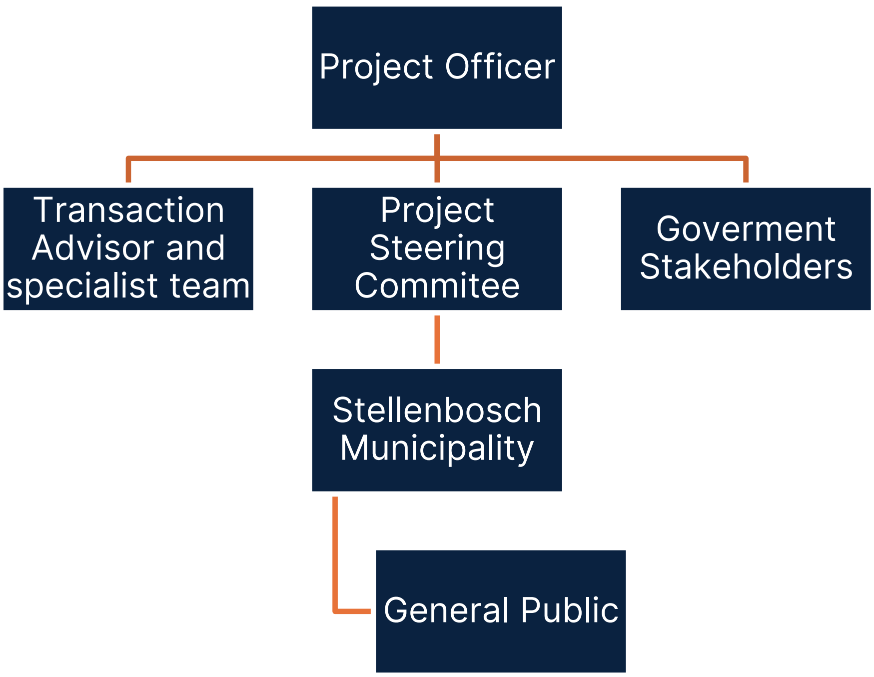


Figure 2-5: Interaction between the Project Office and other stakeholders

The Project Officer acts as the chair of the PSC. This committee acts as the interface between Stellenbosch Municipality, the Advisory Team and other Government stakeholders and the PPP Unit.

A number of different stakeholders have been identified, which may have a role to play in either the Feasibility Study phase or the procurement phase of the Project:

- Stellenbosch Municipality management and staff;
- Stellenbosch Municipality residents;
- Government representatives who will manage the transaction from a public sector perspective (Project Office);
- Service provider who will manage the transaction from the private sector perspective;
- Technical - or specialist team members and advisors from the public - or private sector (Project Office support);
- Advisors to the public sector on procurement processes (Advisory Team);
- External advisors from other Government departments on specialist areas such as PPP processes, security and ICT (i.e. the PPP Unit, NIA, SAPS, SITA);
- National, provincial and local government institutions as the relevant authorities in respect of certain Project approval processes, i.e. township establishment, environmental, heritage (Stellenbosch Municipality, DEAT and GDACE, SAHRA and GHRA);
- Partner in BBBEE financing instrument (DBSA);
- Regulatory authority relating to public finance management (National Treasury);
- Organized labour; and
- The general public, perhaps in the role as interested and affected parties in terms of any environmental and heritage processes.

A key success factor in the procurement of the Project is managing the interaction between these role players and ensuring proactive responses and decision-making. It is evident above that the Project Officer plays an integral interface role between the PSC, the Project Office and other stakeholders. In the preparation for the Project, the involvement and advice of National Treasury remains important to ensure the success of the Project.

The National Treasury plays a key role from a regulatory perspective in all financial and regulatory matters relating to Government and, in particular any project procured by way of a PPP in terms of Regulation 16.

The interaction with the National Treasury official ensures that the PPP Unit is fully informed on progress on the Project, especially budgetary and Affordability issues and that National Treasury is providing oversight to ensure adherence to the PFMA, without compromising the regulatory authority of National Treasury in respect of the Project.

2.4.2 Job Creation

The proposed project will create approximately 20-30 jobs in the operational phase and approximately 300 jobs during the construction phase for local labour. Moreover, post construction, in accordance with the economic analysis, the facility could create 0.61 jobs per R1million rand investment in the in the facility.

2.4.3 Environment Improvements

2.4.3.1 Background

An environmental scoping exercise serving as a due diligence process to evaluate the biophysical and socio-economic aspects of the proposed initiative was developed. It represents the starting point for understanding the potential environmental implications and sustainability aspects associated with the proposed Eikestad development.

This process equips the proponent and project team with essential insights required to make informed decisions about the project's future trajectory, ensuring a harmonious coexistence between the proposed Eikestad development and environmental and heritage protection.

The site is located between the Municipality’s offices on Plein Street, and the Stellenbosch University campus. The Braak, an historic green space, is located one block to the west, with the main shopping mall and densest shopping area facing Bird Street located between the site and the historic open space of the Braak. Along Van Reyneveld Street, a fine streetscape with a collection of historic buildings with cultural and religious associations in the old town abuts the site. An open green space with mature trees creates the interface between the site and the street edge. Therefore, the site occupies an interesting location between government, university, commercial and cultural nodes within the town of Stellenbosch. It is currently used as an at grade parking lot, one of the few open parking lots in this area. It is a well-used space, catering to shoppers, people visiting the nearby cultural and municipal facilities (municipality, library, Sasol Art Museum) as well as to students. In the evenings the Adam Smal Theatre at the University and other restaurant and bar venues nearby mean that the demand for parking extends beyond daytime uses only.

At present the site is tarred across its full extent. Some Turkish Oak trees have been planted on the raised kerbs between lengths of parking bays, and two boomed entries (to Van Ryneveld and Victoria Streets) exist. There is a temporary flower stand and some storage structures (more permanent) located along the Andringa Street edge of the site.

2.4.3.2 The proposed development

The Municipality aims to maximise its parking facility on the site and wishes to implement structured parking, together with the following architectural aims:

- Create direct access to the facility from both Victoria & Ryneveld Streets. No vehicular entrance point is proposed from Andringa Street.
- Create direct pedestrian access to the facility from the Eikestad Mall, Ryneveld Street & Victoria Street.
- Create a parking structure that sits on top of a half-basement with a recessed structure that elevates to 2 additional storeys.
- The building has to fit into a rich heritage context. The aim of this proposal is to create a building that will be secondary in its importance to the context. In order to achieve this the building mass has been pushed to the back and centre of the site.

- Create a forecourt. This will serve as a landscape pedestrian friendly area that will connect the different parking areas. The forecourt will include the main pedestrian access to the parking structure.
- Create a layout that connects with the rich heritage value of the immediate surrounding context. The single storey shops along Andringa Street are of a high historical value. The aim is to create a lower-level street façade that responds to these neighbouring buildings.
- Create a service zone to the southern side of the site. The aim of this is to create service access to the municipal buildings on the southern side.

2.4.3.2 Environmental Aspects Considered

The Scoping Report considered the following various environmental components that could potentially be impacted on by the proposed Eikestad development. The goal is to ensure that the project is developed with a full understanding of its potential effects on the biophysical and social environment and to implement mitigation measures to minimise adverse impacts.

- Biodiversity and Ecological Systems

  The site is located within a built-up urban area. As such, no impacts are anticipated on local indigenous flora and fauna, including habitats, endangered species, and ecosystems on and around the site.

- Water Resources

  No watercourses or wetlands are located on or near the site. No impacts on surface water bodies and water quality, including effects on watercourses, wetlands, rivers, have been identified.

- Air Quality

  No emissions or air pollution will be caused by the proposed development. As such, no impacts on ambient air quality, including greenhouse gas emissions are anticipated. The proposed parking structure will not negatively impact on ambient air quality and could potentially indirectly reduce the emission of harmful CO2 gases by reducing the driving time spent by motorists whilst searching for parking.

- Land Use and Vegetation

  No significant impacts on land use, vegetation cover, and changes to land patterns and use have been identified seeing that the land use will remain the same. The existing trees in the current parking area will however be lost. A tree survey must be carried out by a qualified service provider.

- Cultural Heritage and Archaeological Sites

  The identification of cultural heritage sites and identification of potential impacts on historical and archaeological resources has been carried out by a Heritage and Cultural Specialist. The key heritage-related impacts envisaged will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the old Drooge Rivier stream and so archaeological impacts are possible.

- Noise and Vibration

  An evaluation of potential noise and vibration impacts caused by the project and their potential effects on the surrounding environment and communities found that noise and vibration could potentially have a negative impact during the construction phase but less so during the operational phase of the development.

- Social Aspects

  Consideration of social factors, including the project's impact on local communities, public health, and well-being found that a public participation process is recommended as part of the Stellenbosch Municipality's Duty of Care and to ensure that the proposed development is aligned with the current cultural and historically sensitive surrounding area.

- Visual and Aesthetic Impacts

  An assessment of how the project may alter the visual landscape and aesthetics of the area found that strict architectural design parameters, as approved by the Heritage Western Cape, must be adhered to.

- Waste and Hazardous Materials

  An examination of waste generation, disposal practices, and the potential presence of hazardous materials found that the potential impact associated with waste will be negligible.

- Climate Change

  An analysis of how the project may impact on climate change found that sustainable green building design practices must be adhered to reduce the potential negative impact on climate change.

- Energy Use and Efficiency

  An assessment of energy consumption and opportunities for energy efficiency and renewable energy integration found that the proposed design must accommodate mechanisms for efficient energy consumption.

2.4.3.3 Legal and Regulatory Framework

Considering environmental legislation is paramount in any decision-making process that may have ecological consequences, the following environmental legislation has been considered during the scoping process in order to ensure that the proposed Eikestad development is in line with relevant legislative guidelines and requirements.

- **The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) as set out in the National Environmental Management Act (NEMA) (Act No. 107 of 1998), as amended.**
  It is crucial to note that the proposed development will not trigger any activities listed in the Environmental Impact Assessment Regulations of 2014 in accordance with the National Environmental Management Act (Act No. 107 of 1998), as amended. Therefore, it will not necessitate an environmental authorization for its implementation. Importantly, the development will not have any adverse impacts on terrestrial or aquatic ecosystems.
- **National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004), as amended.**

The site is situated within an established urban area, and consequently, the envisioned development is not anticipated to exert any adverse effects on endangered species or ecosystems, in accordance with the provisions outlined in the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as amended.

- **National Heritage Resources Act (NHRA) (Act No 25 of 1999), as amended.**
  The selected site for this development is situated within a culturally and historically significant landscape and comprises 18 separate erven (as well as requiring access across two different erven), and in combination the area of the site is 18 651,2 m^2. The development of this open site into one that has a structure thereon will constitute a "change in character", thereby triggering Section 38 (1) (c) (i) of the National Heritage Resources Act.
  The key heritage-related possible impacts will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the old Drooge Rivier stream and so archaeological impacts are possible.
  Accordingly, the proposed project aims to seamlessly integrate with the surrounding cultural and heritage landscape by adhering to stringent architectural design guidelines and parameters, as duly approved by Heritage Western Cape (HWC).
  A Notice of Intent to Develop (NID) has been prepared by the Heritage specialist which concludes that there is reason to believe the proposed development will impact on heritage, and therefore a Heritage Impact Assessment (HIA) will be required. At this stage, a Phase 1 HIA is recommended. In addition, the following studies would be prudent to include in an overall HIA:
  - A townscape and streetscape study.
  - A visual assessment at the scale of the block and surrounds.
  - An archaeological desktop study.
  - A tree survey.

  The NID; HIA and additional studies must be submitted to HWC for endorsement and subsequent approval.
- **National Water Act (NWA) (Act No. 36 of 1998), as amended.**
  The development will not invoke any water usage as defined by the National Water Act (Act No. 36 of 1998), and thus, it will not require a water use license or a General Authorization as per this legislation. The development will not have any adverse impacts on aquatic ecosystems.
- **National Environmental Management: Air Quality Act (NEMAAQ) (Act No. 39 of 2004), as amended.**
  The proposed development is not expected to release any emissions that could compromise air quality or induce air pollution, aligning with the standards delineated within the National Environmental Management Air Quality Act (Act No. 39 of 2004), as amended.
- **National Environmental Management: Waste Act (NEMWA) (Act No. 59 of 2008), as amended.**
  The proposed development will not necessitate the acquisition of any waste management permits or licenses under the purview of the National Environmental Management Waste Act (Act No. 59 of 2008), as amended.

2.4.3.4 Positive Environmental Impacts

The proposed parking facilities are expected to yield several positive environmental outcomes. Firstly, the facility will contribute to a reduction in the volume of vehicles circling in search of available parking spaces, thereby curtailing the emission of harmful CO_2 gases. This will also lead to a decrease in on-street parking demand, freeing up space for streetscape enhancements. The centralised location of the facilities is strategically designed to encourage the utilisation of Non-Motorized Transport (NMT), thereby further alleviating traffic congestion.

2.4.3.5 Possible sustainable future use of the Eikestad parking structure

In the event that it becomes necessary in the distant future, the proposed parking structure could potentially undergo re-purposing. Re-purposing is an innovative and sustainable strategy for maximising the utility of existing urban infrastructure. This transformation not only optimises land use but also contributes to a more dynamic and vibrant urban environment. Historically, parking garages have been dedicated to the singular purpose of vehicle storage. However, as urban centres evolve and respond to evolving transportation trends, re-purposing these structures has emerged as a practical and sustainable means of optimising urban space. The conversion of a parking garage into a multi-functional space has the potential to enhance the overall urban experience, advance sustainability objectives, and stimulate economic growth. Moreover, re-purposing a parking garage can significantly contribute to sustainability goals by reducing the necessity for new construction and fostering urban density.

2.4.3.6 Conclusion on Environmental Considerations

In conclusion, the Eikestad Environmental Considerations for the proposed development in Stellenbosch have been thoroughly examined to ensure that the project aligns with both ecological and heritage preservation. The Environmental Partnership conducted an extensive environmental scoping assessment to understand the potential ecological implications and sustainability aspects of the Eikestad development. This process is essential to make informed decisions and promote a harmonious co-existence between the development and environmental and heritage protection.

The project site is strategically located in the heart of Stellenbosch, surrounded by various key nodes, including government, university, commercial, and cultural areas. It currently serves as a vital parking facility for shoppers, visitors to cultural and municipal facilities, and students from the Stellenbosch University. The proposed development aims to maximise parking capacity and implement structured parking while adhering to architectural goals that respect the rich heritage context of the area.

The Scoping Report considered various environmental components, including biodiversity, water resources, air quality, land use, cultural heritage, noise and vibration, social aspects, visual aesthetics, waste and hazardous materials, climate change, and energy efficiency. Mitigation measures will be applied where necessary to minimise adverse impacts on these components.

The legal and regulatory framework has been considered, with specific attention to all relevant environmental legislation. The development of this open site into one that has a structure thereon will constitute a “change in character”, thereby triggering Section 38 (1) (c) (i) of the National Heritage Resources Act. No other Environmental or Water Use authorization is applicable to the proposed Eikestad development.

The project is expected to yield positive environmental outcomes, including a reduction in CO_2 emissions, decreased on-street parking demand, and the promotion of Non-Motorized Transport. Furthermore, the proposed parking structure could be designed with the potential for future repurposing, aligning with sustainability objectives and contributing to a more dynamic and vibrant urban environment. This adaptability allows for urban infrastructure to evolve and respond to changing transportation trends, fostering sustainability, economic growth, and reduced construction needs.

In summary, the Eikestad development project has been meticulously evaluated to ensure that it not only meets its functional goals but also aligns with environmental and heritage preservation principles, ensuring that it is a responsible and sustainable addition to the Stellenbosch community.

2.4.3.7 Recommendations

The following studies must be submitted to Heritage Western Cape for endorsement and subsequent approval.

1. The Notice of Intent to Develop (NID). This will confirm the requirement for the various stages of the HIA.
2. A Heritage Impact Assessment (HIA). The HIA will be submitted in two stages:
   - The Stage 1 HIA will be submitted to HWC for endorsement and will include design parameters that will have to be included in the design of the Eikestad parking structure.
   - The Stage 2 HIA will include the aforementioned design and must be submitted to HWC for approval. This can be undertaken by the successful developer/concessionaire, and not at this stage. The outcome of the Stage 1 HIA will be included as part of the set of conditions for the successful entity to incorporate and they would need to complete the Stage 2 HIA and acquire formal approval from HWC, before any construction can commence.
3. In addition to the NID and HIA, the following studies is to be completed and included in the HIA submission.
   - A townscape and streetscape study.
   - A visual assessment at the scale of the block and surrounds.
   - An archaeological desktop study.
   - A tree survey must be carried out by a qualified service provider.
4. The HIA must be subjected to a 30 day public participation period. The intention is to include this requirement as part of the broader public consultation process that will be undertaken.

2.4.4 Geotechnical Investigation

2.4.4.1 Background

A geotechnical investigation is required as part of the design process, and this draft report comprises a desktop study for the geotechnical aspects of this project.

This desktop report would serve as part of the background information of the geotechnical investigation report. The geotechnical investigation report will be updated with investigation data, laboratory test results, analysis and recommendations.

This geotechnical desktop study aims to determine the anticipated geotechnical characteristics of the in-situ soils and rock, as well as boundary conditions and potential fatal flaws as far as the desktop investigation level will permit. This study provides a baseline understanding for planning of further investigations and baseline design consideration. The tasks required to fulfil this objective are as follows:

- Assess the current on-site conditions;
- Review the potential geotechnical conditions from available sources;
- Reveal the variability of the in-situ soil and rock profiles;
- Reveal any risks or challenges to geotechnical investigation;
- Reveal potential fatal flaws to the specific site location for the intended purposes; and,
- Comment on the geotechnical feasibility of the proposed development.

The following standard practice codes and guideline documents in performing this study:

- Site Investigation Code of Practice, 1st Edition, South African Institute of Civil Engineering – Geotechnical Division, January 2010; and,
- Basis of structural design and actions for buildings and industrial buildings. Part 5: Basis for geotechnical design and actions. SANS 10160-5 (2010).

2.4.4.2 Limitations of the Assessment

The services performed by SMEC were conducted in a manner consistent with the level of care, skill and detail exercised by members of the geotechnical profession practising under similar conditions for the requirements of a geotechnical study (SAICE, 2010). This geotechnical desktop study report is based on data obtained from a limited number of sources, including geological records, topographic maps, aerial imagery, and geotechnical and geological literature available for the greater Cape Town region. The nature of geotechnical engineering is such that variations in soil and rock conditions may occur even where sites seem to be consistent. Variations in what is reported here will become evident during the detailed geotechnical investigations.

2.4.4.3 Study Particulars

Climate

Stellenbosch is characterised by Mediterranean climate conditions, comprising hot dry summers and cold wet winters. Climatic data (World Weather Online, 2023) indicates that the mean annual temperature in this region is 16.9ºC. The average maximum daily temperature varies from 28ºC in January and February to 17ºC in June-August. Corresponding minimum temperatures for these months are 16ºC and 7-8ºC, respectively. The mean annual precipitation is approximately 847 mm, falling mainly during winter. Precipitation is the lowest in February, with an average of 15 mm. The greatest amount of precipitation occurs in June, with an average of 183 mm. The average monthly temperature and rainfall distribution are illustrated in Figure 2-6.

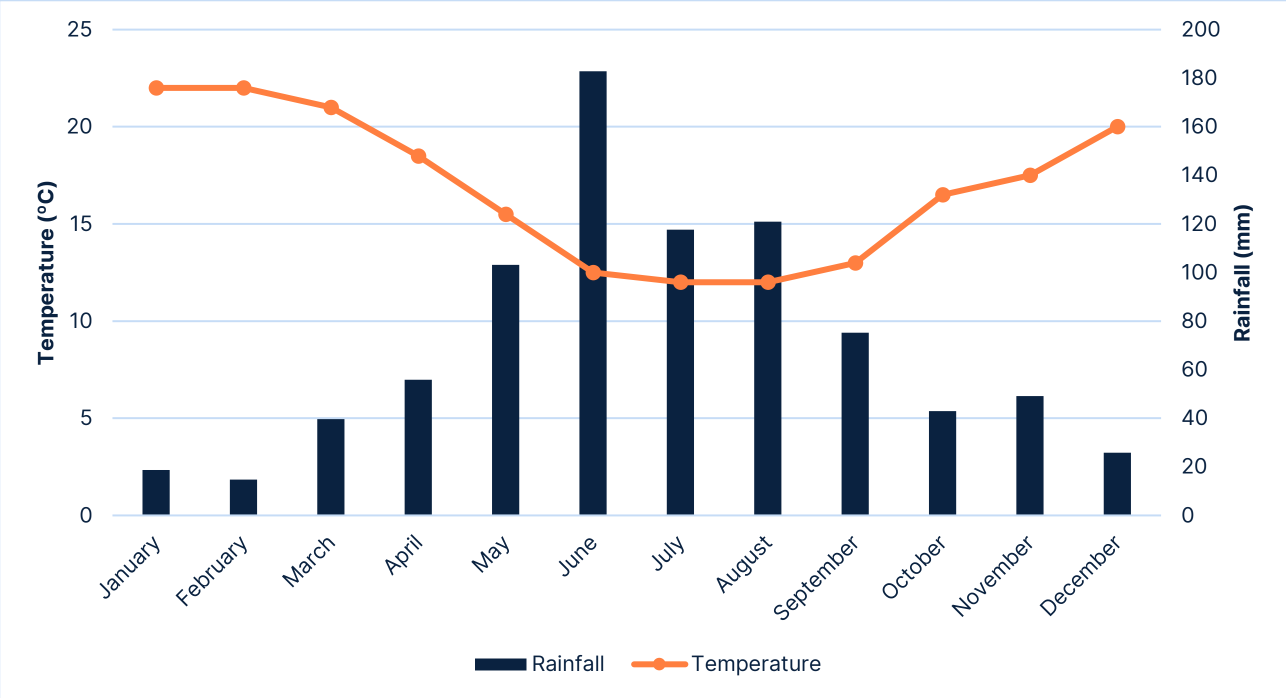


Figure 2-6: Summary of Climatic Data in Stellenbosch Region (World Weather Online, 2023)

The climate is a pivotal factor for geotechnical considerations as it determines the mode and rate of rock mass weathering and, thus, the formation of soils. Weinert (1980) developed the N-Value to differentiate between regions of similar weathering characteristics. The N-value for this region is between 2 and 5, indicating that although disintegration will happen, chemical decomposition will be the dominant type of weathering, resulting in the formation of thick residual and weathered profiles.

Figure 2-7: Regional Scale Site Location

Figure 2-8: Site Location within Stellenbosch

Topography, Drainage and Vegetation

The regional topography of the town is generally gently sloping to the west at an average gradient of approximately 2%, with the minimum and maximum elevation points at 95 m and 245 m above the mean sea level, respectively. The town of Stellenbosch is surrounded by higher topographical features such as the mountainous landscapes of the Hottentot-Holland Mountain range to the east and southeast at a regional scale, with elevation reaching up to 1 500 m above mean sea level, and the undulating agricultural hills to the north and west. The site is characterised by a relatively flat topography with an elevation of approximately 115 m above mean sea level.

The site is locally bounded by a southward flowing Eerste River about 1 km to the west and its tributary, Jonkershoek River, about 0.6 km to the south (see Figure 2-9). Stormwater management in the vicinity of the site is highly developed, however localised ponding of water is possible across the site due to a flat topography during heavy rainfall.

According to 1:1 000 000 SANBI vegetation map (2018), the study area is regionally characterised by the Coastal Renosterveld vegetation comprising hardy low shrubs, small trees and various grass varieties, including the renosterbos plant from which the vegetation type is named, and there is a notable lack of fynbos plants.

Regional Geology

A review of 3318 Cape Town, 1:250 000 Geological Series indicates that the site is largely underlain by the recent sediments of Quaternary Age mainly comprising alluvial terrace gravels (Figure 2-10). These sediments are underlain by the greywacke and phyllite of the Tygerberg Formation, Malmesbury Group.

The flat topography of Stellenbosch was formed by the large paleo-fluvial plain of coarse boulder alluvium eroded from the mountainous region to the east. The origin of the alluvium largely consists of the Table Mountain Sandstones that top the Hottentot-Holland mountains to the southeast but will also contain eroded sediments from the igneous plutons that underlie the sandstones and make-up the base of the surrounding hills and mountains. The igneous plutons in the region are part of the Cape Granite Suite and belong to the Stellenbosch Pluton to the east and the Kuilsriver-Helderberg Pluton to the west.

Regional Hydrogeology

The groundwater environment characterising the site comprises fractured aquifers associated with undifferentiated metasedimentary rocks of the Malmesbury Shale Group. The borehole yielding potential within these aquifers ranges between 0.5 L/s and 2.0 L/s (see Figure 2-11). Unconfined aquifers associated with the Quaternary deposits are also expected in the study area and will often form perched groundwater tables during high rainfall periods; this is anticipated along or near the drainage lines on the site.

The depth of groundwater obtained from the existing registered borehole database (National Groundwater Archive) in the vicinity of the study area indicates groundwater levels between 2 m and 26 m below ground level within the fractured aquifer. Groundwater levels within the quaternary aquifers may be shallower than these depths; however, local variances may exist at the site.

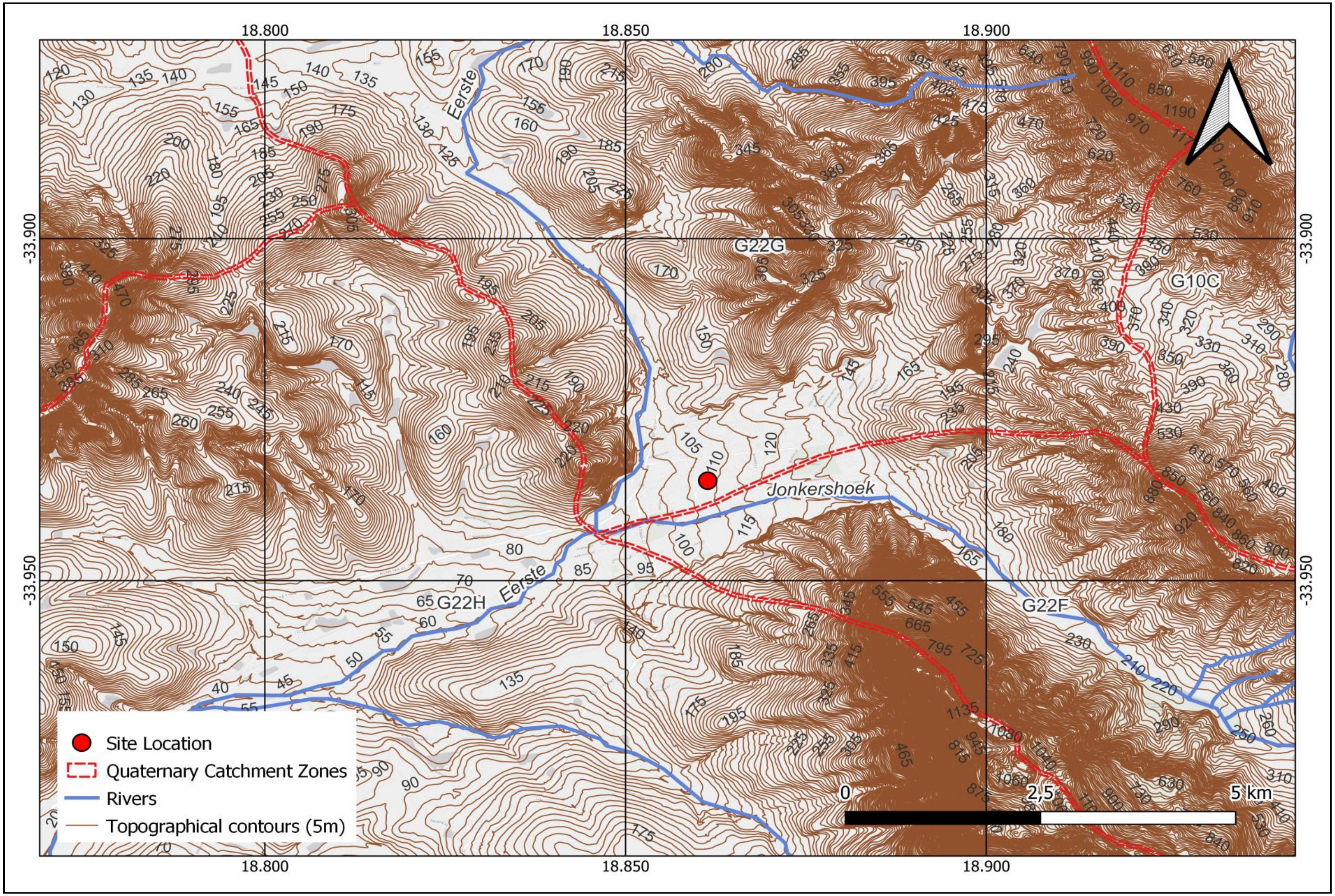


Figure 2-9: Topography and Drainage of the Study Area

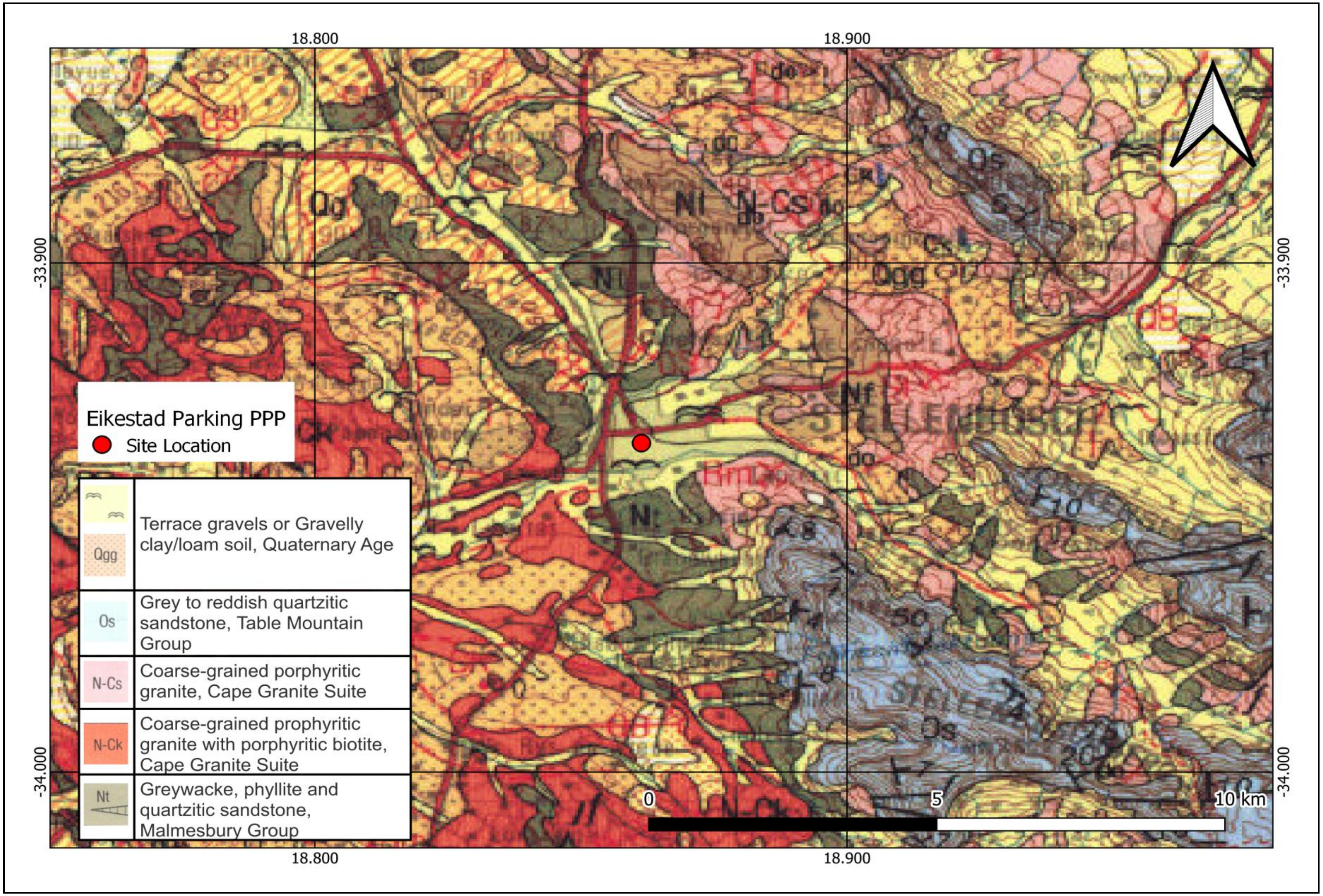


Figure 2-10: Extract of 3318 Cape Town, 1:250 000 Geological Map

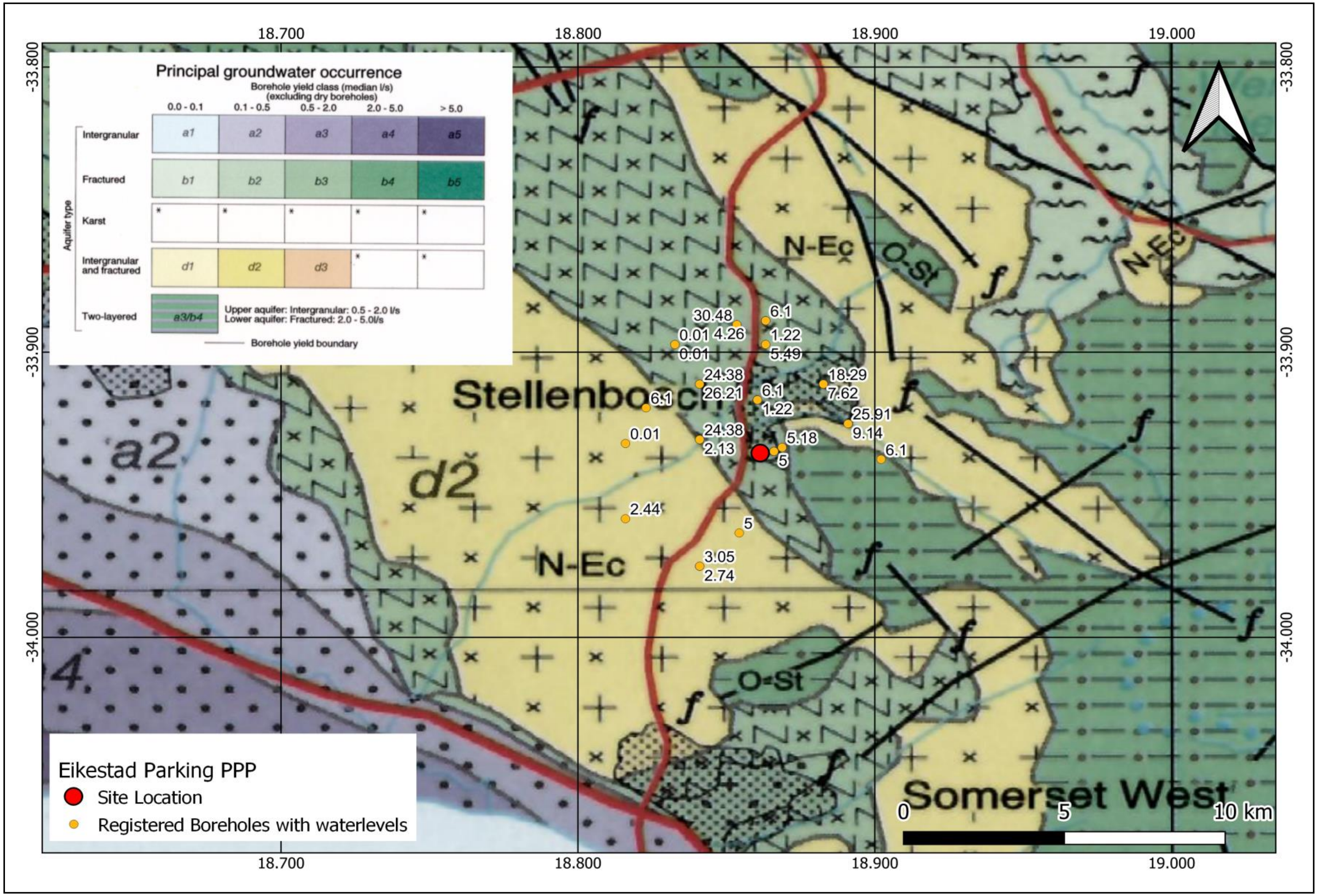


Figure 2-11: Abstract of 3317 Cape Town, 1:500 000 Hydrogeological Map with registered boreholes within 5 km of site location

Seismicity

South Africa is located on the African Tectonic Plate, which, compared to other tectonic plates, is relatively stable with low degrees of seismic risk. Much of the African Plate, except for the East African Rift Zone and localities of intensive underground mining, can be considered to have low seismic risk. This does not suggest that no seismic activity occurs but instead that the probability of activity is much lower.

Seismic hazard is represented by any particular area's peak horizontal ground acceleration (PGA): the greater the PGA, the more severe the potential seismic activity at the given site. Figure 2-12 provides indicative seismic risk across South Africa and the corresponding peak ground accelerations with a 10% probability of exceedance within a 50-year period. For design purposes, a baseline PGA in the range of 0.15g is considered applicable for the Eikestad Parking site (in line with Figure 2-7 and SANS 10160-4), which equates to a Degree VII ("Very Strong") classification on the Modified Mercalli Scale.

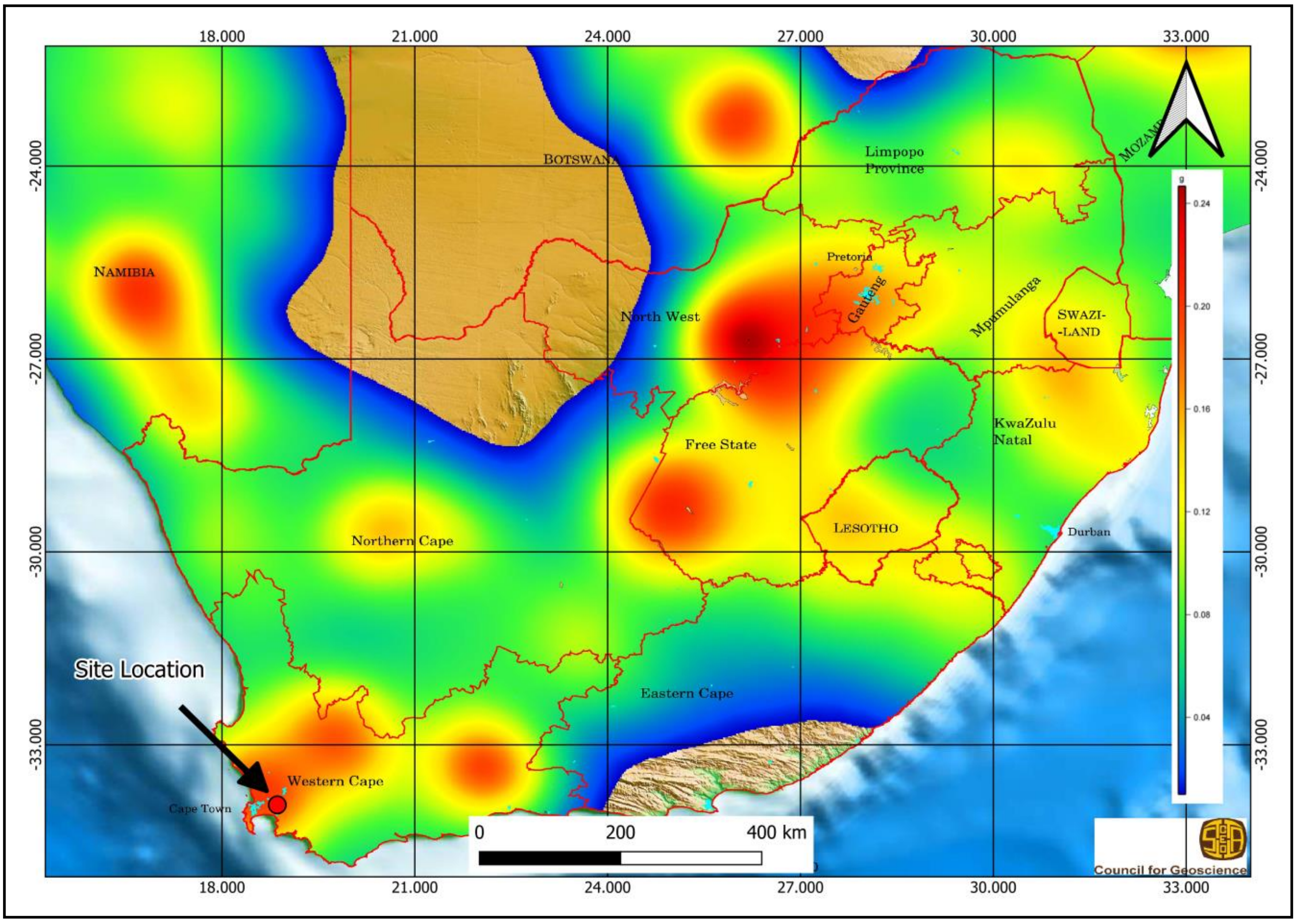


Figure 2-12: Seismic Hazards Map of South Africa (Council for Geoscience, 2003)

Previous Geotechnical Investigations

Three geotechnical investigations were completed in the area, two under the name of Vela VKE (former name of SMEC) in 2010 and 2011, and one investigation as SMEC in 2013. All three investigations were within 850 m of the current parking facility development as shown in Figure 2-13 below. In each respective case, these investigations were aimed at facilitating the design of multi-storey buildings (without a basement level). All recommendations were for shallow foundations within the boulder layer of the alluvial sediments. The archived reports were reviewed and summarised below to inform the geotechnical understanding of the current site and the anticipated geology.

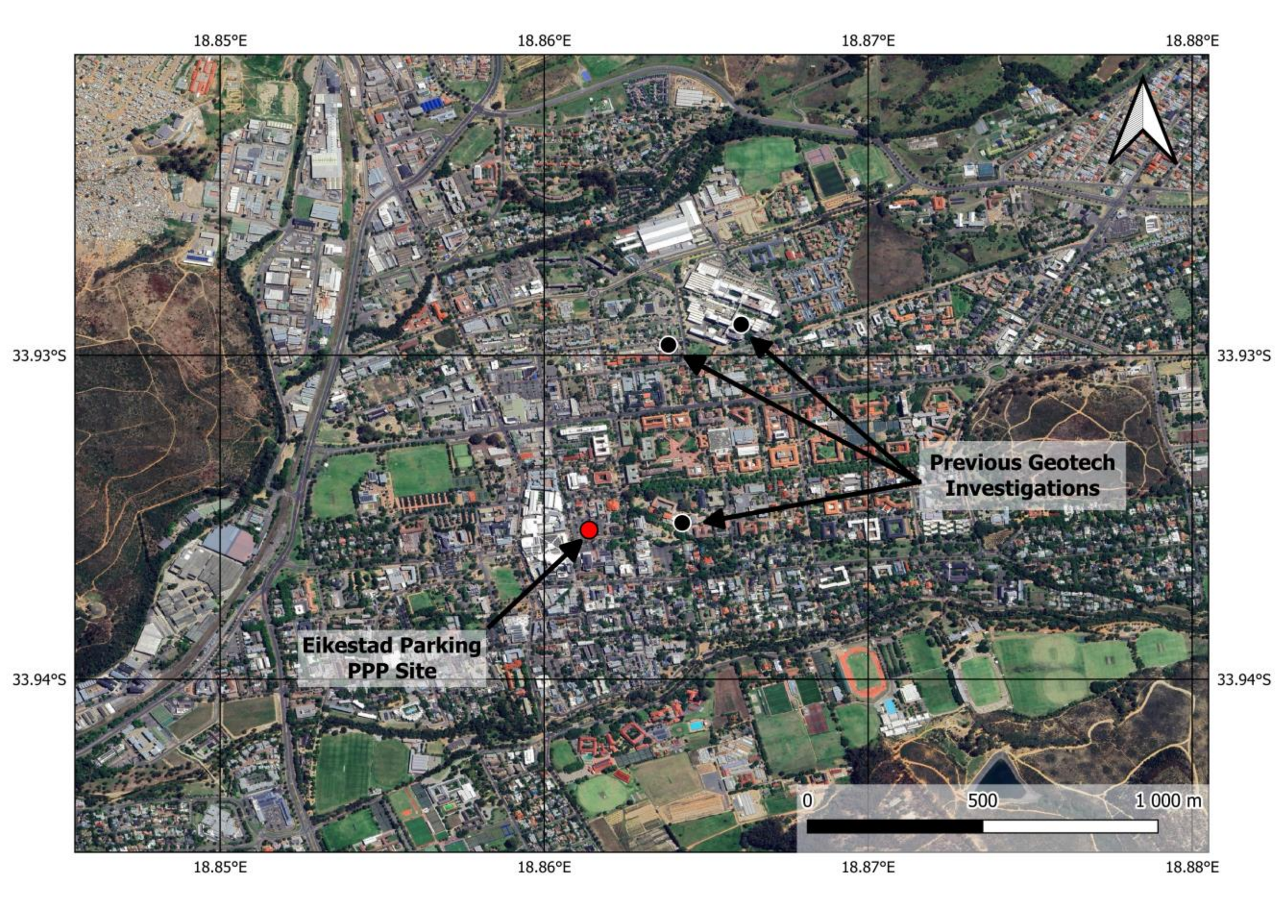


Figure 2-13: Site plan of site location in relation to previous investigations

Overall, the investigations comprised of trial pitting, laboratory testing and, in two projects, geophysical surveys to verify the geological conditions and geo-mechanical parameters. All uses of a TLB machine for trial pitting resulted in refusal on the boulder layers while one investigation used an 18-ton excavation to excavate past the boulder layer. The trial pits revealed a thin layer of transported sand or fill with a thickness of 0.2-1.0 m. This was underlain by the clast supported boulder layer with a matrix of sand that progresses to a clay matrix with depth. The boulder layer varied in thickness but generally the lower clay-rich boulder layer ended at a depth of 2.1-3.0 m below existing ground level (EGL). Underlying the boulder packed alluvium was a firm to stiff clay layer designated as the residual phyllite down to a depth of 2.8-4.0 m below EGL. This residual phyllite was shown to grade into very soft rock phyllite until the final depth of 5.0 m below EGL was reached, as required by the scope.

Geophysical surveys were conducted in two of the investigations in the form of continuous surface wave (CSW) tests to assess ground stiffness for settlement calculations. The CSW test results revealed consistency in ground stiffness until the soft rock bedrock of phyllite. This allowed for confidence in shallow founding on sandy boulder layer. The settlement calculations were within serviceability limits (<13mm) with minimal differential settlement calculated, given the allowable bearing capacity stated for each design.

Groundwater was only observed in one project located 850 m away from the current site. Groundwater was encountered at 1.5 m below EGL in the trial pit dug past the boulder layer with the 18-ton excavator. The other two projects did not encounter any groundwater as all trial pits refused on the upper part of the boulder layer. Based on this, it is presumed that groundwater at the site can be encountered as early as 1.5 m below EGL.

2.4.4.4 Site Assessment Results

Observations

A site visit was conducted by SMEC on Thursday, 26 October 2023. The objective of the site visit was to conduct a site walk-over of the project area with a view of assessing the current conditions and providing an accurate scope for the required geotechnical investigation.

The following observations were made during the site walkover:

- The site is flat terrain with a slight gentle gradient to the west;
- There is an existing paved open parking lot with a few small buildings;
- The boundary of the parking lot is surrounded by existing buildings on three of the four sides, with the Andringa Street separating site from the Eikestad Shopping Mall;
- Consideration to building stability and potential foundation movements will need to be given for the existing buildings depending on the proximity to the boundary of the basement level.
- Underground services were indicated by a number of man-hole covers (11 no. in total) identified on site.

They were not inspected thus the type of underground service(s) are unknown. However, wayleave applications and communications with service providers have revealed a number of different services in the proposed site footprint. As of writing this desktop study, the following services have been indicated: electrical cabling, stormwater pipelines, water pipeline (possibly for irrigation), and sewerage. The electrical cabling runs east to west in the southern half of site with a branch going south off site. These cables run just north of an electrical substation that is managed by the municipality. The stormwater pipeline has multiple branches and runs across the site. The water pipeline was a single line and enters from the east. It is potentially for irrigation as the line ends abruptly in the centre of the parking lot. The sewerage pipeline is relatively short and runs between two small buildings with a connection running west under Andringa Street. These two buildings are understood to be two public toilets that have been decommissioned and disused. No overhead electrical lines were observed but street/parking lights present would require underground cabling.

Figure 2-14: North entrance from Victoria St looking south into the parking lot.

Figure 2-15: View of parking lot from the northern side looking southwest towards the Eikestad Shopping mall.

Figure 2-16: View from northwest corner of the parking next to Andringa Str., looking southeast.

Figure 2-17: View of western side of the parking lot and Andringa str. (looking south).

Figure 2-18: View of electrical substation from the parking lot (looking south-southwest).

Figure 2-19: View of decommissioned public toilets on west side of the site (looking northwest).

Anticipated Geotechnical Conditions

Given the previous investigations and the reviewed regional information, the following geological profile is anticipated:

- 0.6 m (±0.4 m): Medium dense, fine sand (Transported/Fill)
- m (±0.6 m): Medium dense, boulders and cobbles in sand matrix progressing to clay matrix (Alluvium)
- 4.0 m (±1.0 m): Firm to stiff, clay. (Residual Phyllite)
- Below 4.0 m (±1.0 m): Very soft phyllite rock, occasionally recovered as dense gravel. (Phyllite)

Based on NGA data and previous investigations, groundwater/ perched water table is anticipated from a depth of 1.5 below EGL within the alluvial layer of boulders and cobbles.

Findings

This geotechnical study report highlights the anticipated geological and subsequent ground conditions, as well as boundary conditions and potential fatal flaws as far as the investigation level will permit.

The regional topography is flat with an overall very gentle gradient to the west. Climate data indicate that the area receives most rainfall between June and August during the cold winter months, with the summers dry and hot, especially over December to February. The seismicity study indicated a minimum PGA of 0.15g to be taken into consideration for design purposes.

Conceptually, the site is anticipated to be underlain by alluvial gravels and boulders of the quaternary sediments which in turn is underlain by the phyllite and greywacke of the Tygerberg Formation of the Malmesbury Group. Historical investigations in the vicinity of the site within the same geological zonation revealed the anticipated geological profile below:

- 0.6 m (±0.4 m): Medium dense, fine sand (Transported/Fill)
- m (±0.6 m): Medium dense, boulders and cobbles in sand matrix progressing to clay matrix (Alluvium)
- 4.0 m (±1.0 m): Firm to stiff, clay. (Residual Phyllite)
- Below 4.0 m (±1.0 m): Very soft phyllite rock, occasionally recovered as dense gravel. (Phyllite)

Based on the previous studies and NGA data, a perched ground water table is anticipated from 1.5 m below EGL within the alluvial deposits.

A site visit was conducted to assess the conditions across the site and geotechnical risks. The physical assessment of site conditions would help to firstly confirm elements of the desktop study findings but also to provide an accurate scope and specifications for the required geotechnical investigation. The scope and specification have been submitted previously for approval by Client.

The observations made during the site visit align with the elements of the desktop study findings, that is, general topography and indications of the potential underground services. Due to the paved and highly developed nature of the area, no natural ground was exposed to assess the geology but previous investigations in the area were drawn upon. A number of manhole covers were observed on site and the wayleave applications, and subsequent communications, have revealed existing underground services in the proposed site footprint including, but not limited to, electrical cabling, stormwater pipes, water pipe and disused sewerage line. Linked to these services is an electrical substation to the south of site and two small disused toilets to the west of site. There were also indications of telecommunication infrastructure running through the parking lot, but this has not been confirmed with the service provider as of writing this study.

It is important to note that all wayleave applications need to be completed and a ground penetrating (GPR) survey will need to be conducted prior to any intrusive investigations carried out. This is to ensure the safety of the contractors as well as the cost and time implications of damaging any underground services. The site has easy accessibility for investigation works and construction works, however appropriate plans will need to be arranged to block off sections of the whole of the parking lot so that pedestrians and cars are not in the way.

Recommendations

Based on the findings presented above, SMEC is of the view that the proposed parking facility project is feasible and from a geotechnical point of view, the project can be progressed to the geotechnical investigation stage. Cognisance must however be given of the risks identified in this study that have an impact on both the geotechnical investigations and the design and construction of the parking infrastructure.

The risk of striking underground services must be highlighted for the intrusive investigation works due to the variety of services present. However, the investigation can be accommodated within the site plan indicating the location of the underground services.

SMEC has previously submitted a scope and specifications document detailing the geotechnical works required and recommended that the geotechnical investigations be conducted based on the quantum of work and specifications contained in this document. In summary, the following scope of work is recommended:

- A ground penetrating radar (GPR) survey of the area to confirm the location of buried services;
- no. rotary cored boreholes to 12 m below EGL;
- Installation of piezometer standpipes for groundwater level monitoring;
- A Competent Engineering Geologist or Geotechnical Engineer on site to supervise investigation works and profile the boreholes according to the SIACE Guidelines of Soil and Rock Logging (2002); and,
- Laboratory testing of samples obtained from boreholes.

Note rotary core boreholes are favoured over other methods of investigation, such as depp trial pits excavated by 20 t excavator. The reasons for this include, inter alia:

- Boreholes will offer more information on the soil horizons at depth as well as the opportunity to monitor the long-term groundwater profile. This information is pertinent to the design of basement levels and deep foundations, as well as to the design of the building's waterproofing/ damp-proofing measures and to managing uncertainty during construction;
- Boreholes will also create less disturbance (and more localised) than test pits. This means the parking facility can be returned to normal operation with minimal rehabilitation of the pavement layers being necessary.

- Boreholes can also be located more strategically to avoid the risk of striking buried services.

Notwithstanding, if Client's budget does not allow for rotary core drilling at this time the above scope may be adjusted, but note we deem this disadvantageous in so far as gaining the requisite information to manage the risk of deep foundations, basement levels and shallow groundwater relevant to this site.

2.4.5 Health and Safety

The proposed facilities will increase safety on the streets due to a reduction in circulating traffic and a reduction in traffic congestion. It will reduce drive frustrations, which will have a positive effect on motorists within the CBD by reducing reckless driving. Due to the increased parking space, various streets may be altered to pedestrian streets, which will increase safety in these highly dense pedestrian areas in the CBD by reducing the conflict between motorists and pedestrians. The proposed facilities will be access controlled and thus have appropriate security consequently allowing safe areas for people to park, which will increase the safety of both the motorists and vehicles.

2.5 BBBEE & socio-economic outcomes

2.5.1 Purpose

The purpose of providing the Broad Based Black Economic Empowerment (BBBEE) inputs into the Needs Analysis is to list the BBBEE needs of Stellenbosch Municipality, which are sought to be addressed in the Project. The needs of Stellenbosch Municipality have been developed taking into consideration the applicable legal framework and the existing socio-economic conditions, which exist surrounding the Project site. Thus, the needs were determined taking into account the following documents:

- Stellenbosch Municipality Supply Chain Management Policy, Appendix 17 2021-2022
- The Preferential Procurement Policy Framework Act, 2000;
- BBBEE Act, 2003;
- Public Private Partnership Manual, 2004 (the Manual);
- Stellenbosch Municipality Integrated Development Plan, 2016 to 2020 (the IDP);
- Stellenbosch Community Development Strategy 2014
- National Treasury Municipal Service Delivery and PPP Guidelines

2.5.2 General

The proposed projects are located in the Stellenbosch CBD. The construction and management of the facility will have an impact on BBBEE in the municipal area through job creation and construction.

According to the code of good practice for BEE in PPP partnerships 2003;

"Government's policy objectives for BEE in PPPs are as follows:

- To achieve meaningful and beneficial direct ownership of substantial equity interests in the Private Party to a PPP Agreement by black people, black women and black enterprises;

- To achieve effective participation in the management control of the Private Party and its sub-contractors by black people and black women;
- To ensure that a substantive proportion of the Private Party's subcontracting and procurement is to black people, black women and black enterprises;
- To ensure effective employment equity and skills development in the Private Party and its sub-contractors throughout the PPP project;
- To promote positive local socio-economic impact from the project to the benefit of small and medium enterprises, the disabled, the youth, and nongovernment organisations within a targeted area of project operations;
- To create jobs; and
- For institutions of government to be represented in all PPP transactions by financial, legal and technical advisors who generally reflect South Africa's diverse population, and to build the professional skills and number of black people and black enterprises in these fields."

2.5.3 Legal Framework

2.5.3.1 PPPFA

Section 217(1) of the Constitution states that procurement by organs of states must occur within a system that is fair, equitable, transparent, competitive and cost-effective.

Section 217(2) of the Constitution provides that there should be an implementation of policies providing for categories of preference in the allocation of contracts and the protection or advancement of persons, or categories of persons disadvantaged by unfair discrimination. Section 217(3) of the Constitution further states that national legislation was to be enacted to prescribe a framework within which policies referred to in section 217(2) must be implemented. This national legislation referred to in section 217 of the Constitution is the PPPFA, which is discussed below.

Section 2(1) of the PPPFA provides that an organ of state must determine its preferential procurement policy and implement it within the framework prescribed by the PPPFA and Regulations thereto.

What must be noted from the PPPFA is that 90 points in the Project would have to be allocated to price and 10 points be allocated to specific goals (BBBEE).

Section 2(1)(e) of the PPPFA provides that any specific goal for which a point may be awarded, must be clearly specified in the invitation to submit a tender.

An organ of state is defined, in section 1 of the PPPFA, to include Stellenbosch Municipality.

Regulation 2 of the PPPFA Regulations, 2022 provides that the Regulations apply to organs of state, as defined in section 1 of the PPPFA.

Thus, the PPPFA is applicable to Stellenbosch Municipality and specifically directs an organ of state to have its preferential procurement policy and implement it within the framework of the PPPFA. Furthermore, the PPPFA requires that the specific goals be included in the tender documents.

The PPPFA currently places emphasis on equity ownership and the promotion of non-quantifiable Reconstruction and Development Programme ("RDP") goals, which include:

- promotion of South African owned enterprises;
- promotion of small, medium and micro enterprises;
- creation of new jobs;
- the promotion of enterprises located within a particular municipal area, region or province; and
- upliftment of communities through, inter alia, housing, transport, schools, infrastructure donations and charity organizations.

The PPPFA Regulations were amended in 2022, to ensure alignment between the PPPFA and the BBBEE Act (and Codes) and compliance with the judgement of the Supreme Court of Appeal finding the 2017 Regulations to be invalid.

2.5.3.2 BBBEE Act and the Department of Trade and Industry BBBEE Codes of Good Practice

Two of the main objects of the BBBEE Act are to empower the Minister to issue codes of good practice and to develop criteria for entering into partnerships with the private sector.

The Minister is empowered to issue codes of good practice on black economic empowerment by notice in the Gazette, in terms of section 9(1) of the BBBEE Act, in order to promote the purpose of the BBBEE Act.

The BBBEE Act, section 10 states that every organ of state and public entity must apply any relevant code of good practice issued in terms of the BBBEE Act. Section 10(2) provides that the Minister of Trade and Industry may exempt an organ of state from this requirement.

An organ of state is defined as, *inter alia*, a municipality, in terms of section 1 of the BBBEE Act (paragraph (b) of the definition).

It must be expressly stated that the Codes of Good Practice will be applied in all aspects of the procurement process as required by the BBBEE Act .

2.5.3.3 PPP Manual

The PPP Manual and in particular, the Municipal Service Delivery and PPP Guidelines published in 2015 must be taken into account. Module 2 of these Guidelines provides a *Code of Good Practice for BEE in Public-Private-Partnerships*.

The Codes of Good Practice, which were finalized in 2007 and as such the PPP Code may be out of sync with the 2015 Guidelines. Construction Sector Code

In terms of the BBBEE Act, a sector code of good practice has the same status as the Codes of Good Practice.

Section 3 of the Construction Sector Code states that it is applicable to measured entities which conduct any construction-related activities and entities which derive their majority turnover from construction related activities.

This sector was taken into consideration in the development of the Project BBBEE Scorecard.

2.5.3.4 Property Sector Transformation Charter

In terms of section 12 of the BBBEE Act, a transformation charter is published for general information purposes only and is not binding on a particular sector, therefore, although the Property Sector Transformation Charter is not binding it is an indication of what the industry deems possible to be achieved in terms of BBBEE. This charter was taken into consideration in the development of the Project BBBEE Scorecard.

2.5.3.5 Conclusion on legal framework

There is scope for the applicable of BBBEE in the Project, within the 90/10 framework as stated in the PPPFA.

The Project BBBEE Scorecard was developed taking into account the various policy documents applicable in terms of BBBEE.

It must be repeated that the Codes of Good Practice will be applied in all aspects of the procurement process.

2.5.4 BBBEE needs for the Project

In each phase of the PPP project cycle BBBEE needs need to be mentioned. Below is a diagram from the code of good practice for BEE in PPP partnerships 2004 depicting the various requirements for PPP BEE involvement.

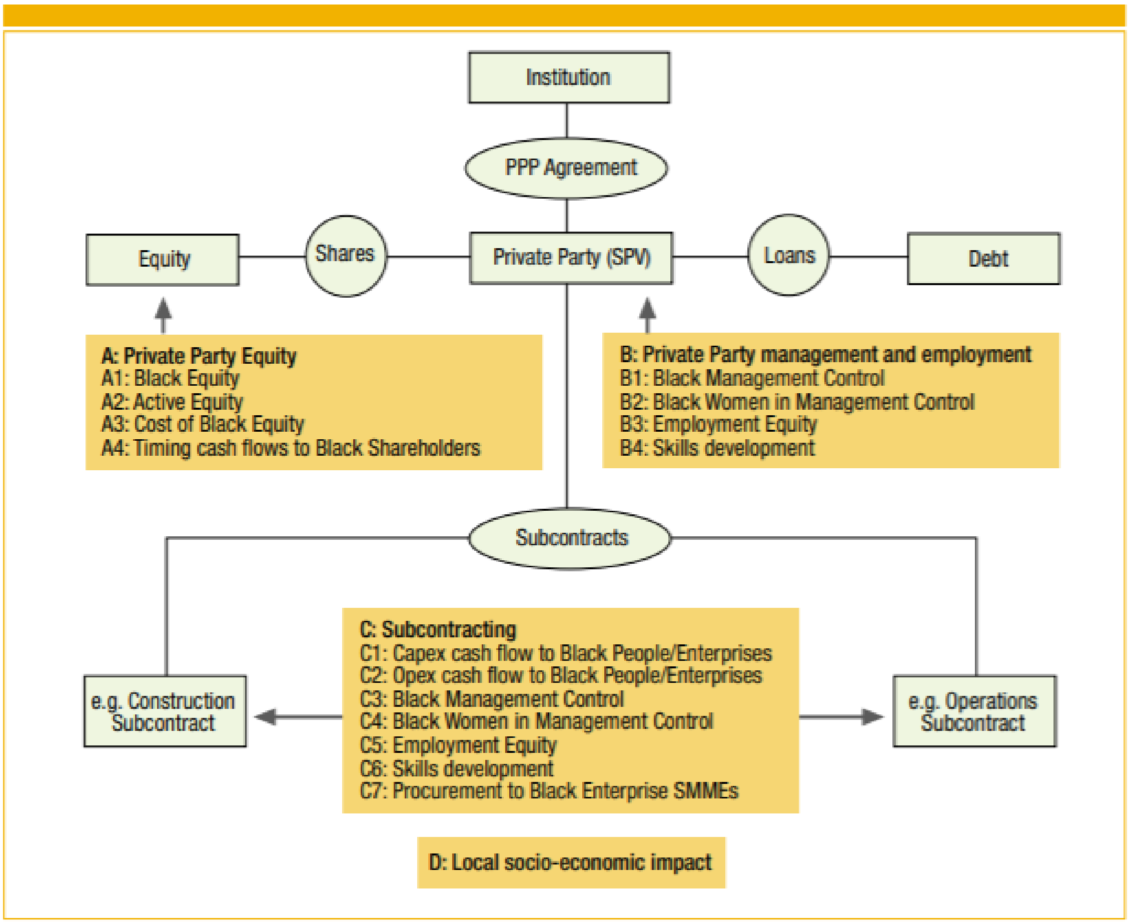


Figure 2-20: Extract, BEE in stages of PPP, Model 2, Code of Good Practice, 2004

How to apply BEE PPP policy at each phase of the PPP project cycle

In accordance with the 2003 Code of Good Practice, the PPP project cycle reflects the phases of a PPP prescribed by the MFMA PPP Regulations, including specific Treasury Approvals required therein. PPP BEE policy objectives will be pursued at every phase, namely:

- Appointment of a Transaction Advisor by the Institution;

Table 2-3: Extract, Transaction Advisor bid evaluation BEE elements, Source Code of Good Practice, 2004

	Transaction Advisor bid evaluation BEE elements	Maximum score	Scoring criteria	Weighting	Points total
1	The percentage of Black People playing leading professional roles in the Transaction Advisor consortium	5	25% – 35% = 3 >35% = 5	6	30
2	The percentage of black equity in the Transaction Advisor consortium	5	25% – 35% = 3 >35% = 5	6	30
3	A credible plan for structuring effective BEE for the PPP, with necessary skill and experience in the team	5	Poor plan, poor skill & experience = 1 or 2 Incomplete plan, limited skill & experience = 2 or 3 Credible plan, skill & experience = 4 or 5	4	20
4	A credible plan for skills transfer within the consortium to directly benefit black professionals inexperienced in PPPs (may specify targeting of Black People within a geographic area)	5	Poor plan = 1 or 2 Incomplete plan = 2 or 3 Credible plan = 4 or 5	4	20
	Total points				**100**
	Minimum threshold				**60**

- Feasibility Study for Treasury Approval I;

Table 2-4: Extract, Feasibility Phase BEE Tasks, source PPP Unit, National Treasury, 2004

Relevant stage of the Feasibility Study	Brief description	BEE feasibility phase task
Output specifications	To clearly identify what the Institution wants to deliver	Draw up a list of BEE outputs that the Institution wishes to achieve in the project, using the *PPP BEE Balanced Scorecard* as reference.
Solution options analysis	To identify the pros and cons of each option that can meet the Institution's needs and output specifications; to examine the risks, benefits and impacts for government of each; and to select a preferred option	Set out a preliminary view of the impact of each option on the intended BEE outputs, and identify the possible BEE outcomes of the preferred option.
Due diligence	To undertake a due diligence assessing all budgetary, institutional, legal, regulatory, site, BEE and other socio-economic factors that constrain and/or enable the project	Identify project-specific BEE sectoral conditions: Black Enterprise strength, implementation of sectoral BEE charters, local socio-economic factors that could be addressed in the project location, and any constraining factors to the achievement of the intended BEE outputs.
If the preferred option can be procured through a PPP, the Institution must then establish affordability, value for money and risk transfer. This entails constructing a PSC model, and a PPP reference model, both risk-adjusted.		
Risk identification	To identify all possible risks in the construction and operation of the project, the probability of each arising, the value of each risk, and strategies and costs of mitigation	Identify all possible BEE risks in the project, probabilities of each such risk arising, values for each, and the strategies for, and costs of mitigation.
Public sector comparator (PSC)	Life-cycle cost model of the output specifications where the public sector takes financing, construction and operating risks	Cost the achievement of the project's identified BEE outputs if it were procured conventionally, namely calculate preferential procurement as stipulated by the PPPFA's 90:10 formula price premium for procured goods and services, and include in the model.
PPP reference model	Life-cycle cost model of the same output specifications where the private sector takes substantial financing, construction and operating risk	Cost the achievement of the project's identified BEE outputs by calculating how the private sector would cost each of the BEE elements of a proposed *PPP BEE Balanced Scorecard for the project* in the PPP reference model.
Sensitivity analysis	To test the resilience of the models to changes in assumptions and risk over the project term	Test varying BEE targets for the project, their costs and their assumptions, to assess the impact on affordability and value for money.
Value-for-money test and making the procurement choice	To reach a justified conclusion analysing the outcomes of the modelling as to which procurement route is both affordable and will achieve optimal value for the Institution	Analyse which procurement route will best achieve the identified BEE outputs for the project.
If a PPP is the procurement choice, finalise the optimal **proposed *BEE Balanced Scorecard for the project***, with appropriate elements and targets.		
Economic analysis	To establish the economic rationale for the project, where required	Identify the economic benefits and opportunity cost to BEE of a 'no-project' scenario.

Table 2-5: Extract, Feasibility study considerations, source PPP Unit, National Treasury, 2004

PPP BEE element	Feasibility Study considerations
A: Private Party equity A1: Black Equity A2: Active Equity A3: Cost of Black Equity A4: Timing of project cash flows to Black Shareholders	A: Assess realistic targets by establishing: • Possible Black Equity participants • Extent, possible sources, and projected costs of Black Equity, impact of assumptions on affordability and value for money • Effect of phased increase in Black Equity on affordability and value for money • Effect on affordability and value for money of early cash flow to Black Shareholders • Impact of sectoral BEE charters.
B: Private Party management and employment B1: Black Management Control B2: Black Women in Management Control B3: Employment Equity B4: Skills development	B: Assess targets in a sectoral analysis of: • Black management capacity • Black Women in management • Employment equity track record • Skills shortfalls, existing initiatives to address these, training opportunities • Sources and costs of possible support.
C: Subcontracting C1: Capital expenditure cash flow to Black People and/or Black Enterprises C2: Operating expenditure cash flow to Black People and/or Black Enterprises C3: Black Management Control C4: Black Women in Management Control C5: Employment Equity C6: Skills development C7: Procurement to Black Enterprise SMMEs	C: Assess realistic targets by establishing cost and risk implications of: • Number and capacity of existing Black Enterprises in the relevant sectors • Employment equity track record of enterprises in the relevant sectors • Range of Black Enterprise SMMEs in the market for procurement opportunities, and nature, sources and cost of support they may need.
D: Local socio-economic impact	D: Cost all the local socio-economic targets and assess impact on project affordability, value for money and risk assumption.

- PPP procurement, including: bid documentation preparation for Treasury Approval IIA; PPP procurement and value-for-money report on the preferred bid, for Treasury Approval IIB; negotiations with the preferred bidder; and Treasury Approval III for the final terms of the PPP Agreement and the Institution's Contract Management Plan;
- RFQ stage: In order to Pre-qualify for the RFQ phase, the consortia should at least demonstrate:
    - *"that they have memoranda of understanding in place for the required targets of BEE participation in the Private Party and the first-tier sub-contracts;*
    - *that they have the ability to secure the targets of BEE management required for the Private Party and the first-tier sub-contracts;*
    - *that relevant members of the consortia have demonstrable track records in devising and implementing local socio-economic plans as part of their operations;*
    - *that the major sponsor companies have their own effective employment equity programmes in place and can demonstrate their own track record in BEE.",* PPP Unit, National Treasury, 2003
- Contract management for the term of the PPP Agreement. Detailed modules on each of these phases is provided in the National Treasury PPP Manual. Set out below is the approach to be

adopted in each to ensure that PPP BEE policy objectives are appropriately achieved in every PPP project undertaken in terms of the PPP Regulations.

According to the PPP Unit, National Treasury Code of Good Practice, 2004 the PPP BEE elements of the bid are equated as follows:

Equation 1: Extract National Treasury, 2004, Bid overall score calculation

a* (technical score/100) + b* (BEE score/100) + c* (price score/100) = d
where:
a is the weighting for technical elements (between 50% and 70%)[21]
b is the weighting for BEE elements (10%)[22]
c is the weighting for price (between 20% and 40%)[23], and
d is the total score achieved by the bidder.

The document further identifies the recommended weighted bid evaluation for the BEE component of the document.

Table 2-6: Extract BEE PPP Code of Good Practice recommended weighted evolution of BEE, Source PPP Unit, National Treasury, 2003

a* (technical score/100) + b* (BEE score/100) + c* (price score/100) = d
where:
a is the weighting for technical elements (between 50% and 70%)[21]
b is the weighting for BEE elements (10%)[22]
c is the weighting for price (between 20% and 40%)[23], and
d is the total score achieved by the bidder.

PPP BEE element	Indicative PPP project target	Recommended bid evaluation weighting
A: Private Party equity		**20%**
A1: Black Equity	40%	
A2: Active Equity	55% of A1	
A3: Cost of Black Equity	Value for money	
A4: Timing of project cash flows to Black Shareholders	Early and ongoing	
B: Private Party management and employment		**15%**
B1: Black Management Control	Commensurate with A1 and A2	
B2: Black Women in Management Control	15% of B1	
B3: Employment Equity	Compliant with law	
B4: Skills Development	1% of payroll	
C: Subcontracting		**50%**
C1: Capital expenditure cash flow to Black People and/or Black Enterprises	30%	
C2: Operating expenditure cash flow to Black People and/or Black Enterprises	30%	
C3: Black Management Control	25%	
C4: Black Women in Management Control	15% of C3	
C5: Employment Equity	Compliant with law	
C6: Skills development	1% of payroll	
C7: Procurement to Black Enterprise SMMEs	30%	
D: Local socio-economic impact	Sustainable, effective plan	**15%**

2.5.4.1 Stellenbosch Municipal policy

In terms of Section 4.2 of the municipal policy, procurement undertaken by Stellenbosch Municipality is to be in line with the Preferential Procurement Policy Framework Act Regulations (PPPFA of 2017 or as amended from time to time) [they were replaced in 2022 as indicated above] and circulars.), which places an emphasis on ownership and the achievement of developmental goals, such as the advancement of emerging contractors.

In terms of the directive issued by National Treasury on April 18, 2007, accounting officers and authorities are required to apply the PPPFA as it stands until such PPPFA has been revised.

Thus, although the Stellenbosch Policy does speak to BBBEE, it is limited in its scope and it is necessary, for purposes of the Project, to include additional items to be considered for BBBEE purposes and to respond to the new 2022 PPPFA Regulations.

2.5.5 Stellenbosch Integrated Development Plan

The socio-economic profile of Stellenbosch in accordance with the SEP Stellenbosch Municipality 2019 is summarised as per figure 3-5. This information was further updated in 2020 through the update of the Integrated development plan.

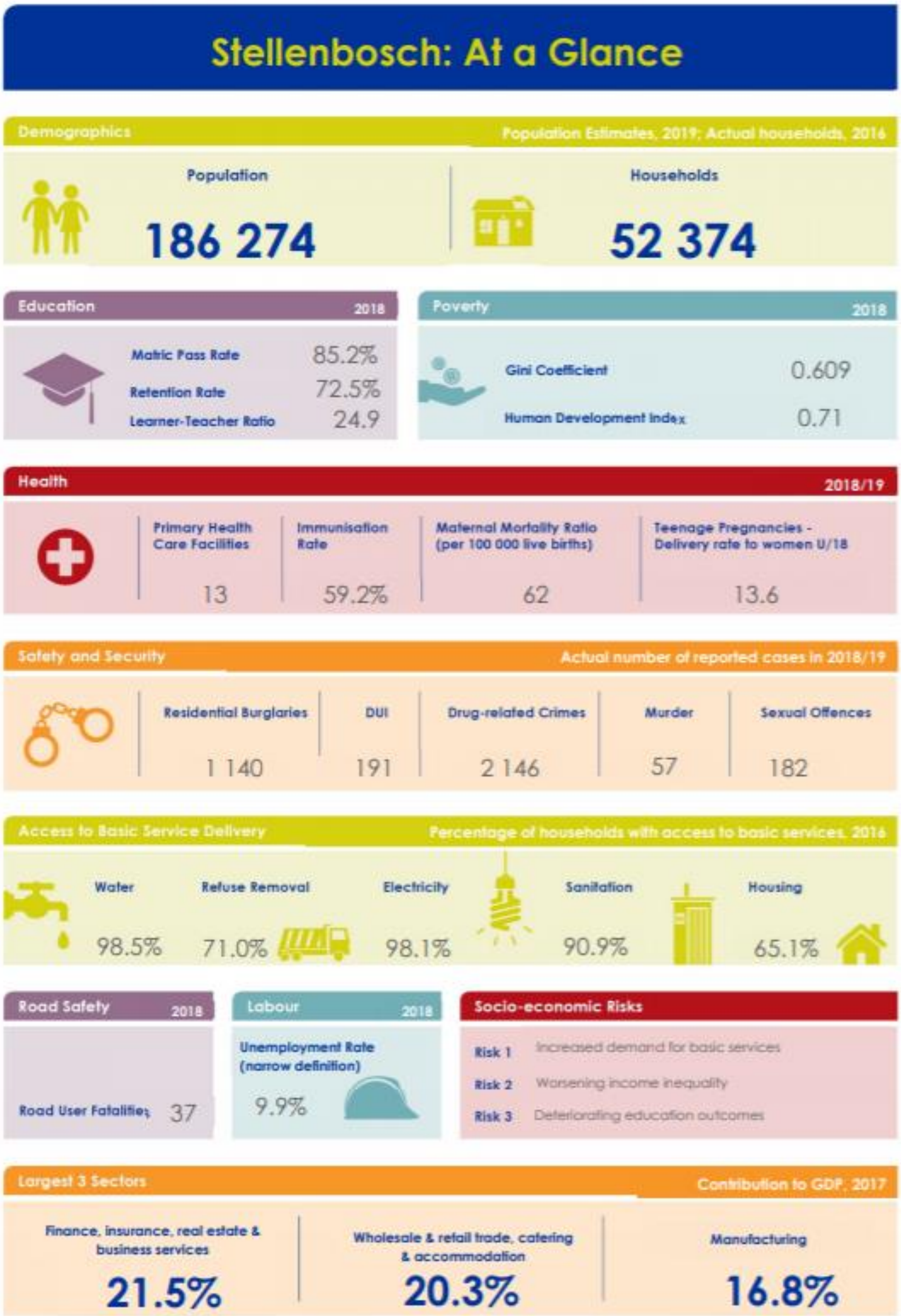


Figure 2-21: Extract Stellenbosch SEP 2019

2.5.5.1 Population

As per the 2020 IDP the population of Stellenbosch is 192 879 people in 2020, ranking amongst the most populated municipal areas in the CWD. This total is expected to growth to 209 849 by 2024, equating to an average annual growth rate of 2.1 per cent.

2.5.5.2 Sex Ratio

The data extracted from the 2020 IDP indicates that there are less males than females in the Stellenbosch municipal area with a ratio of 49 per cent (males) to 51 per cent (females).

2.5.5.3 Age

Cohorts Between 2020 and 2026, the largest population growth projection was recorded in the 65+ aged cohort which grew at an annual average rate of 3.3 per cent. The dependency ratio however, decreases towards 2023, and increases towards 2026 as identified in the 2020 IDP.

2.5.5.4 Household sizes

The actual size of households remains steady at 3.7 from 2020 to 2024. Contributing factors to a stagnation in household size growth could include, but are not limited to, lower fertility rates, occurrences of divorce, ageing population, etc.

2.5.5.5 Population Distribution Group

The population distribution group of Stellenbosch Municipality is dominated by coloured, black African and white populations. The coloured population group amounts to over 52% and the black African group to almost 30%. The persons of colour amounts to over 80% of the Stellenbosch Municipality population groups. Based on the unemployment statistics and

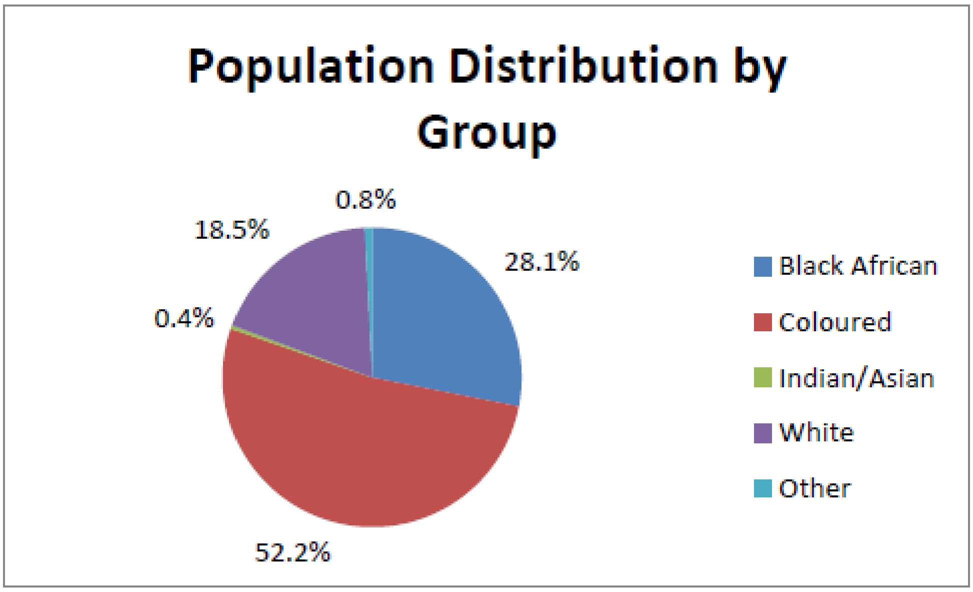


Figure 2-22: Extract Population group_ source CITP 2016

2.5.5.6 Population density

Amidst rapid urbanisation across the Western Cape, population density figures will aid public sector decision makers to mitigate environmental, individual health and service delivery risks. In 2020, the population density of the Cape Winelands District (CWD) was 44 persons per square kilometre. Integrated Development Plan 2017-2022 35 In order of highest to lowest, the various local municipal areas in the CWD compare as follows:

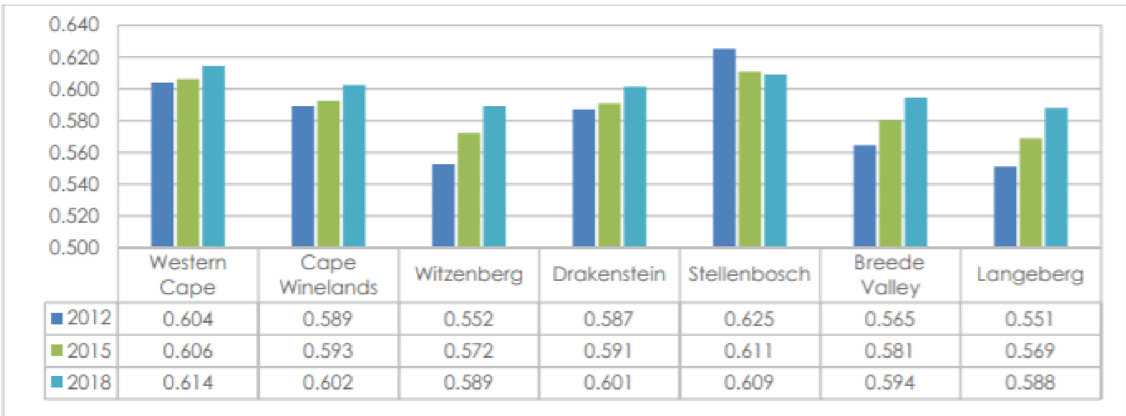
- Stellenbosch 232 people/km2

- Drakenstein 189 people/km2
- Breede Valley 50 people/km2
- Langeberg 26 people/km2
- Witzenberg 14 people/km2

According to the above comparison Stellenbosch has the highest densities in the Cape Winelands District.

2.5.5.7 Income Inequality

The National Development Plan (NDP) has set a target of reducing income inequality in South Africa from a Gini coefficient of 0.7 in 2010 to 0.6 by 2030.



	Western Cape	Cape Winelands	Witzenberg	Drakenstein	Stellenbosch	Breede Valley	Langeberg
2012	0.604	0.589	0.552	0.587	0.625	0.565	0.551
2015	0.606	0.593	0.572	0.591	0.611	0.581	0.569
2018	0.614	0.602	0.589	0.601	0.609	0.594	0.588

Figure 2-23: Extract SEP 2019 Income inequality Gini Coefficient

In 2018, the Gini coefficient of the CWD (0.602) was lower than that of the Western Cape (0.614). The Gini coefficient of the Stellenbosch municipal area at 0.609 is the highest in the district and outside of the NDP target of 0.6.

2.5.5.8 Economic Sector Performance

In 2017, the total GDPR for Stellenbosch amounted to R15.639 billion with economic activity mostly focussed within the tertiary sector (R10.953 billion; 70.0 per cent). The overall economy grew by 1.9 per cent between 2008 and 2017. From 2014 – 2018 (estimated) economic growth in the municipal area slowed to 1.4 per cent compared to the District's growth of 1.0 per cent over the same period. Stellenbosch's GDPR economy is expected to grow at 0.8 per cent 2018.

Stellenbosch: GDPR performance per sector, 2008 - 2017									
Sector	Contribution to GDPR (%) 2017	R million value 2017	Trend		Real GDPR growth (%)				
			2008 - 2017	2014 - 2018e	2014	2015	2016	2017	2018e
Primary sector	6.4	1 003.6	2.1	-0.3	6.7	-3.3	-9.6	9.0	-4.3
Agriculture, forestry & fishing	6.2	974.0	2.1	-0.3	6.7	-3.4	-9.8	9.2	-4.4
Mining & quarrying	0.2	29.6	1.4	1.6	7.2	0.3	0.6	2.2	-2.5
Secondary sector	23.5	3 682.4	-0.6	-0.2	0.3	0.0	-0.4	-0.9	-0.2
Manufacturing	16.8	2 627.0	-1.5	-0.8	-0.7	-0.8	-1.0	-1.3	-0.2
Electricity, gas & water	1.4	221.4	0.1	-0.3	0.1	-1.3	-2.5	1.1	1.4
Construction	5.3	834.0	4.0	2.2	4.9	3.5	2.7	0.5	-0.6
Tertiary sector	70.0	10 952.5	2.9	2.1	3.0	2.4	2.0	1.5	1.6
Wholesale & retail trade, catering & accommodation	20.3	3 179.2	3.3	2.3	3.1	3.6	3.1	0.7	1.1
Transport, storage & communication	10.8	1 693.0	4.7	3.8	5.9	3.2	3.3	3.4	3.3
Finance, insurance, real estate & business services	21.5	3 359.4	2.9	2.4	2.7	2.9	1.8	2.4	2.1
General government	10.7	1 669.7	1.9	0.1	2.4	-0.5	-0.6	-0.9	0.2
Community, social & personal services	6.7	1 051.3	1.2	0.9	1.2	0.6	1.2	1.0	0.3
Total Stellenbosch	**100**	**15 638.5**	**1.9**	**1.4**	**3.0**	**1.4**	**0.6**	**1.4**	**0.8**

Figure 2-24: Extract, SEP 2019 Economic Sector Performance

In accordance with the SEP 2019, the primary sector is almost exclusively supported by the agriculture, forestry and fishing sector which contributed 6.4 per cent to total GDPR in 2017. The agriculture, forestry and fishing sector grew at an average rate of 2.1 per cent between 2008 and 2017.

The growth contracted to 0.3 per cent from 2014 to 2018 dropping off mainly due to the impact of the drought, as per the SEP 2019. Challenges were encountered in the secondary sector, specifically in the manufacturing and agriculture, forestry and fishing sectors. The secondary sector contributed 23.5 per cent (R3.682 billion) to total GDPR in 2017 and maintained a negative 0.6 per cent growth rate between 2008 and 2017.

Strong growth within the construction sector (4.0 per cent) was offset by weakened performance in the manufacturing (-1.5 per cent) and electricity, gas and water (0.1 per cent) sectors. From 2014 to 2018 growth in the construction sector slowed to 2.2 per cent while the manufacturing sector shrunk to -0.8 per cent growth.

The finance, insurance, real estate & business services sector is the most dominant sector in the tertiary sector and the largest contributor to GDPR in 2017 (R3.359 billion; 21.5 per cent), followed closely by the wholesale and retail trade, catering and accommodation sector (R3.179 billion; 20.3 per cent). From 2008 to 2017, the fastest growing sector was the transport, storage and communication sector, growing at 4.7 per cent on average per annum.

As a result, the transport sector has a significant impact on the economic conditions with Stellenbosch Municipality.

2.5.5.9 Labour

Although various sectors have been increasing, there has been significant job losses in the primary sector as well as transport sector.

Stellenbosch: Employment growth per sector 2006 – 2017									
Sector	Contribution to employment (%)	Number of jobs	Trend		Employment (net change)				
	2017	2017	2008 - 2017	2014 - 2018e	2014	2015	2016	2017	2017e
Primary sector	14.0	10 726	-4 528	425	-581	2 245	-517	-463	-259
Agriculture, forestry & fishing	14.0	10 692	-4 526	424	-583	2 243	-518	-463	-255
Mining & quarrying	0.0	34	-2	1	2	2	1	0	-4
Secondary sector	15.6	11 921	404	666	176	163	135	135	57
Manufacturing	10.2	7 847	-546	-28	-37	89	-89	68	-59
Electricity, gas & water	0.2	157	45	17	6	6	8	0	-3
Construction	5.1	3 917	905	677	207	68	216	67	119
Tertiary sector	70.4	53 938	13 735	6 726	1 553	1 855	320	1 833	1 165
Wholesale & retail trade, catering & accommodation	25.4	19 444	5 631	3 125	451	951	253	1,073	397
Transport, storage & communication	4.3	3 255	1 504	455	118	250	-151	168	70
Finance, insurance, real estate & business services	16.7	12 794	3 541	2 214	387	550	238	395	644
General government	9.7	7 439	1 152	148	365	-156	122	-261	78
Community, social & personal services	14.4	11 006	1 907	784	232	260	-142	458	-24
Total Stellenbosch	**100**	**76 585**	**9 611**	**7 817**	**1148**	**4 263**	**-62**	**1 505**	**963**

Figure 2-25: Extract, SEP 2019 employment growth per sector

The semi-skilled and low-skilled employement trends still dominate the municipality with over 70% of the labour force. However, if the Gini Coeficient is observed, the grap between economic inequality is reducing with stellenbosch municipality having a coeficient of 0.609 which is near to the NDP target of 0.6, which is an indication of an increase in the skilled and semi-skilled labour force. However, there is still work to be done to increase the semi-skilled and skilled labour force and thus projects such as the parking garage in the CBD will increase required skilled needs for the construction phase will increase the need for skilled and semi-skilled labour for the operations and management of the facility.

Moreover, in considering the population groups in Stellenbosch as well as the PPPFA, PPP Unit, National Treasury, the municipalities procurement needs as well as the focus on BBBEE bid evaluation criteria can be used to help address the economic transformation required and mandated to the municipality.

Stellenbosch: Trends in labour force skills, 2014 - 2018				
Formal employment by skill	Skill level contribution (%)	Average growth (%)	Number of jobs	
	2017	2014 - 2018e	2017	2018e
Skilled	23.9	2.6	13 199	13 545
Semi-skilled	43.1	3.5	23 824	24 606
Low-skilled	33.0	2.5	18 273	18 368
Total Stellenbosch	**100**	**3.0**	**55 296**	**56 519**

Figure 2-26: Extract, SEP 2019 Labour force trends

3 Parking Demand Analysis

3.1 Introduction

The aim of the parking demand analysis is firstly to assess the performance of the parking supply in the vicinity of Eikestad Mall (Stellenbosch CBD) and to identify the parking requirements. During the pre-feasibility study done in 2021 for a parking facility in Stellenbosch, parking surveys were undertaken during a period when traffic and parking patterns were affected by Covid19. During the *Public Private Partnership for Eikestad Parking Development* appointment in 2023, surveys will be undertaken to update the parking demand calculations to review the parking demand post Covid19.

Surveys will be undertaken during the peak and off-peak seasons to identify the difference in parking demand between the peak and off-peak seasons. This comparison is important to develop a parking demand profile over an entire year considering the periods where a high parking demand is expected and periods where a lower parking demand is expected. This parking demand profile is important for the financial models to paint a more realistic picture of the expected income during high and low parking demand seasons.

The main deliverable associated with this phase of the project, is as follow:

- Determine the parking demand for the planned Eikestad parking facility.
- Determine the parking demand for revenue calculations.

The following specific tasks were identified as part of this phase of the project:

- Analyse the Spatial Development Framework of the Stellenbosch Municipality and identify those developments that will increase the demand for parking;
- Analyse the influence of the University's policies, parking provision and public transport systems on the CBD of Stellenbosch especially, and thus the demand for parking;
- Identify projects and policies that will increase the demand for parking namely: the pedestrianisation of certain streets, as well as the elimination of parking to increase street capacity;
- Identify specific parking requirements for the proposed parking facility;
- Determine specific parking shortfalls for the 2028 horizon year; and
- Compile the Future Parking Needs Plan.

3.2 Land-use Development

3.2.1 Legal Parking Provision Requirements

In the Provincial Gazette Extraordinary of Friday 27 September 2019 was published the "Stellenbosch Municipality: Zoning Scheme By-Law". Amongst other information this document carried the following requirements for the provision of parking at new developments:

Table 3-1: Off-Street Parking Requirements (Stellenbosch Municipality: Zoning Scheme By-Law, 2019)

Land Use Category	Normal parking	Additional parking reserved for visitors
Residential		
Bed- and breakfast (additional to dwelling)	1 bay/guest bedroom	
Commune	1 bay/bedroom	
Community Residential building: orphanage and old age home	0,3 bay/bedroom	
Dwelling house in all zones except LFR:		
1 bedroom	1 bay/dwelling house	
2 or more bedrooms	2 bays/dwelling house	
Dwelling house in LFR Zone	1 bay/dwelling house	
Flats in all zones except LFR:		
1- & 2-bedroom units	1 bay/dwelling unit	0,5 bay/dwelling unit
3-bedroom units	1,25 bays/dwelling unit	0,5 bay/dwelling unit
4 or more-bedroom units	1,5 bays/dwelling unit	0,5 bay/dwelling unit
Flats in LFR Zone:	1 bay/dwelling unit	0,25 bay/unit
Group house:	1 bay/group house	1 bay/unit
Guest house	1 bay/bedroom or suite	
Home lodging (additional to dwelling unit)	1 bay/boarder bedroom	
Hostel	1 bay/bedroom for private hostels; 0,6 bay per bedroom for tertiary institution; nil for schools	
Hotel	0,7 bay/bedroom or suite plus, additional parking for additional facilities accessed by non-guests at the corresponding ratio for the particular land use as set out in this table.	
Backpackers	To be determined by Council based on occupancy and location	
Second dwelling house: all zones except LFR	1 bay/second dwelling	
Second dwelling house in LFR zone	nil	
Tourist accommodation establishment	To Municipality's satisfaction - between 0,7 bays per bedroom and 1 bay per self-catering unit	
Business and office		
Business premises: including liquor store, funeral parlour, adult entertainment and similar	4 bays/100m² gross leasable area	
Commercial gymnasium	6 bays/100m² gross leasable area	
Conference facility	0,25 bay/seat	
Filling Station	4 bays/100m² gross leasable area	
Motor showroom: Light Vehicles	3 bays/100m² gross leasable area	
Motor showroom: Medium and Heavy Vehicles	1 bay/100m² gross leasable area with a min of 6 bays plus 1/bay/800m² gross leasable area for heavy vehicles (min 1 bay)	
Motor vehicle fitment centre, repair centre	4 bays per service bay plus 4 bays/100m² gross leasable area: Min 8 bays	
Offices	4 bays/100m² gross leasable area	
Place of entertainment -general	4 bays/100m² gross leasable area	
Cinemas and theatres -in shopping centre	0,1 bay/seat	
-stand-alone	0,25 bay/seat	
Plant nursery	1 bay/100m² gross leasable area (total indoor and outdoor sales area)	
Restaurant	4 bays/100m² gross leasable area	
Service station	4 bays /service bay plus 2 bays/100m² gross leasable area	
Shops (including supermarkets and centres):		
up to and including 1000m²	4 bays/100m² gross leasable area	
>1000m²	6 bays/100m² gross leasable area	
Industrial		
Industry	1,5 bays/100m² gross leasable area	
Warehouse, abattoir, brickworks, builders' yard	1 bay/100m² gross leasable area	
Scrap yard	1 bay/100m² gross leasable area	
Community facilities and medical		
Medical consulting rooms	6 bays/100m² gross leasable area	
Clinics and Hospitals	1 bay/bed plus 3 bays/consulting room	
Day care centre	1 bay/classroom or office	
Extramural facility	1 bay/4 students	
Place of Education	1 bay/classroom	

Land Use Category	Normal parking	Additional parking reserved for visitors
Tertiary educational institution colleges university	 1 bay/lecture room 1 bay/lecture room	 0,25 bay/student 0,4 bay /student
Place of worship Church Mosque	 0,4 bay/seat or 40 bays/100m² of seating and aisle area 25 bays/100m2 of net prayer area	
Place of assembly; indoor sport	0,25 bay/seat or 20 bays/100m² gross leasable area	
Outdoor sport	0,25 bay/seat, player or occupant	
Public institution (e.g. library, museum)	2 bays/100m² gross leasable area	
Welfare institution, libraries and museums	2 bays/100m² gross leasable area	

The following regulations for the provision of parking in terms of Table 3-1 have also been defined:

- Off-street parking requirements for any new development are set out in Table 3-1 and shall apply to all new development approved after the commencement of this Scheme.
- The parking standard in Table 3-1 applies to the land use as indicated in the table, notwithstanding the base zone, unless otherwise indicated.
- Off-street parking shall be provided:
  - on the same land unit where the land use is located for which the parking is required; or
  - in a public parking facility to be provided by the developer near the site, subject to the Municipality's approval and subject further to any conditions it may impose together with such approval; or
  - on another land unit, in which case the land on which such parking is provided shall be notarially tied with the subject land unit in accordance with this Scheme.
- Where an addition is made to an existing building, or where an existing building or its use is altered so as to require additional parking or loading, only the additional parking required by that particular addition or altered land use shall be required to be provided.
- Should the Municipality approve a departure from minimum parking requirement in terms of this Scheme, it may impose a condition which requires payment of a levy in lieu of the shortfall of the number of bays, on the basis that public parking or roads may be utilised for parking of vehicles connected to the activity. The Municipality shall adopt a policy in this regard, setting out the circumstances under which such levy may be charged, as well as the method of calculation, and a levy may only be charged in accordance with said approved policy.
- Parking on a land unit shall only be for land uses which are lawfully permitted on the land unit or part thereof. Apart from the provision in section 31(1)(a), no business vehicles may be parked on land which is not zoned in a manner which permits, with technical approval or consent use, if required that specific land use.
- The size and layout of all parking bays, parking areas and circulation space shall be to the Municipality's satisfaction and shall be dimensioned on a site development plan or building plan.
- Except in the case of dwelling houses, tandem parking bays count as one bay.

- Parking areas shall be constructed, adequately signposted, demarcated and maintained to the Municipality's satisfaction.
- Parking layout, circulation and dimensions shall be to the Municipality's satisfaction. Minimum parking bay dimensions are 2,5 meters wide by 5-meter-long unless otherwise approved by the Municipality. The Municipality may require that bays are wider to ensure they are accessible especially in cases where they are adjacent to solid walls and support columns or where narrow aisle widths require wider bays.
- All parking bays shall remain accessible for use as parking and may not be otherwise used or encroached upon.
- When approving a rezoning, consent use or departure application in terms of the Planning By-law, the Municipality may impose conditions which require more parking than stipulated in this section and may also impose parking requirements for land uses not stipulated in Table 3-1.
- Where two or more land uses on the same land unit combine to share a common parking area, parking requirements may be reduced with the Municipality's technical approval and an applicant for a building plan may submit a motivation prepared by a suitably qualified person in support of shared parking together with such building plan. Approval of reduced parking on this basis is solely at the Municipality's discretion.
- Shared parking may never be allocated or rented to specific users or tenants and shall at all times be available on a first-come-first-serve basis.

The above parking requirements are very clear cut, and it is obvious that if it is rigorously enforced, no new developments will add to the perceived parking shortfalls in the study area. The emphasis in this study would thus be to address the historic shortfalls in the study area.

3.2.2 SDF projects that may impact parking demand

In the SDF a number of policy statements are defined who may have a long-term influence on parking demand in the municipal area, it is however difficult to ascertain the exact influence over the short term. These policy statements are the following:

- The SDF has a clear policy objective of no long-term growth in automobile traffic. Graphically it is depicted as follows in the SDF (p111, MSDF):

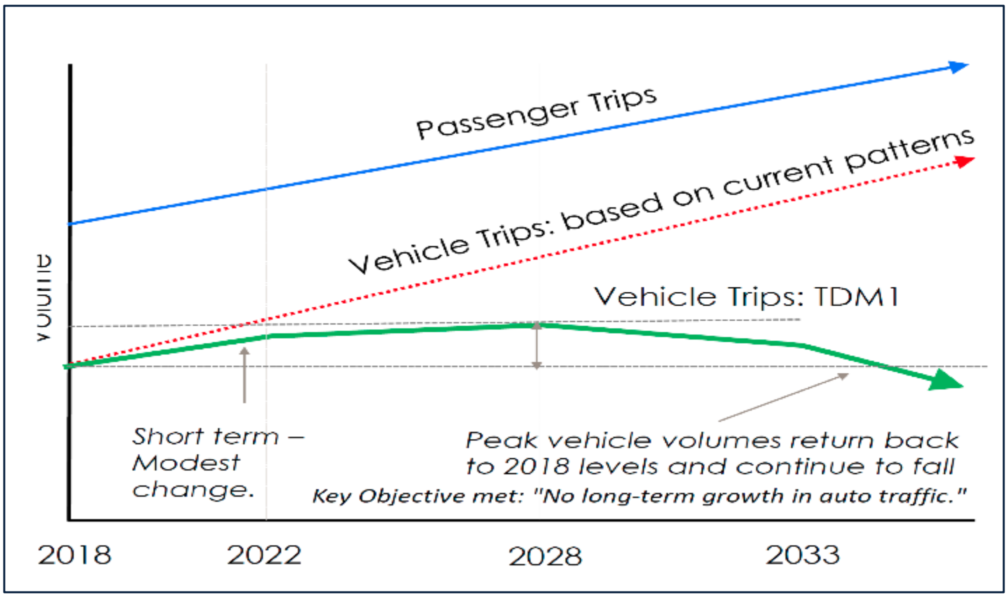


Figure 3-1: Expected Vehicle Growth in Stellenbosch

- The SDF also defines a future public transport system based on a series of hubs and park-and ride sites outside the town as depicted below:

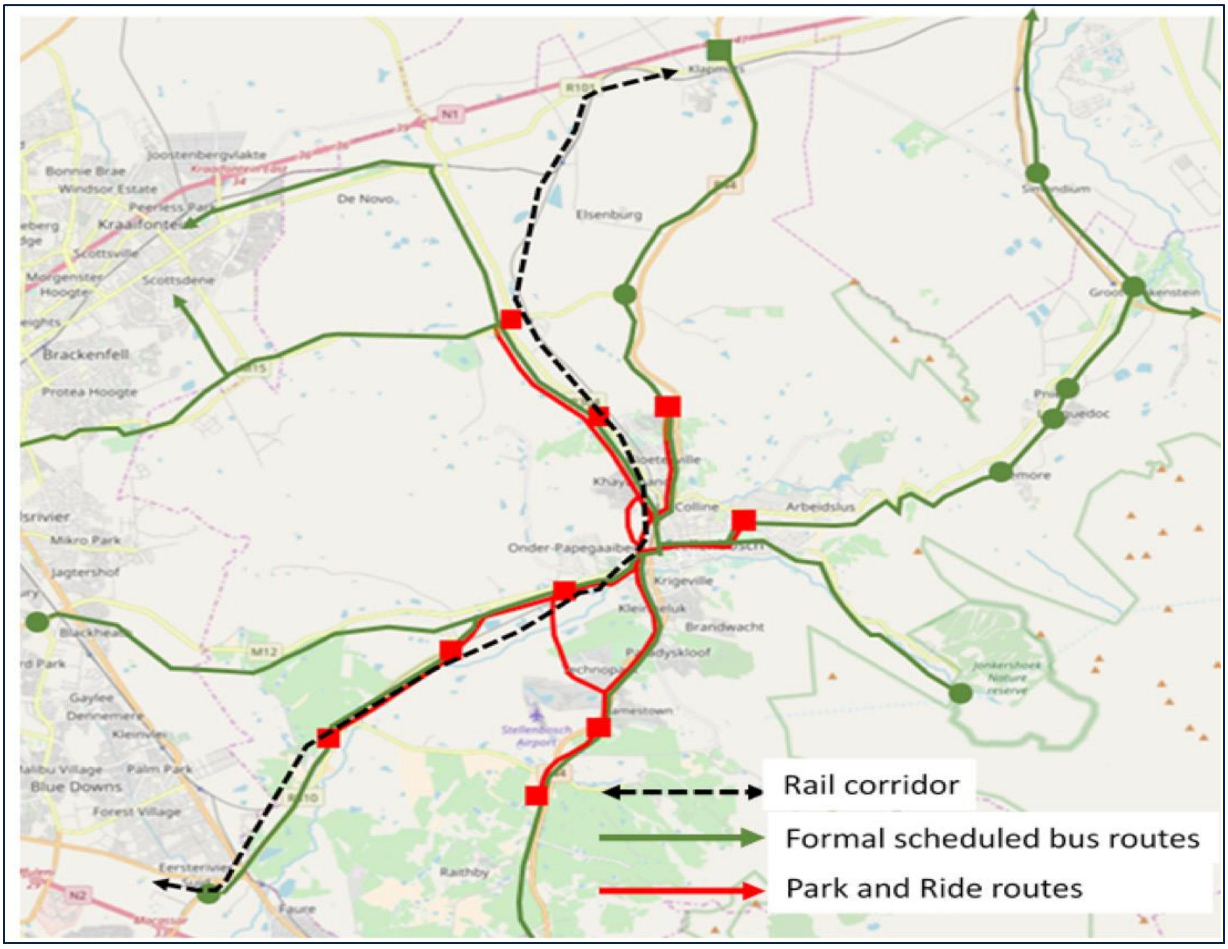


Figure 3-2: Future Park- and Ride Hubs

The parking requirements are quite clear, in the sense that all new developments (also in the CBD) will have to provide the necessary parking spaces off-street, to fulfil all the parking demand for such developments.

Coupled to this, has the SDF defined very ambitious objectives to lower the vehicle traffic inside Stellenbosch Town, with very clear projects with which to achieve this.

In summation, it can be said that it is a prudent approach to the parking garage feasibility study, to cap parking demand at existing levels, as it is unlikely with all the policies and objectives defined that there will be a future rise in parking demand in the study area.

3.3 Methodology

Taking into consideration the project deliverables, the following is recommended for the Public Private Partnership for Eikestad Parking Development Study:

- Analise parking survey data to determine the total parking demand.
- Parameters such as the peak time, parking accumulation, parking saturation, parking duration, peak parking ratio, parking turnover and parking index will be calculated from the parking surveys. These parameters will be used for the sizing of the planned parking facility.
- Scenario testing – Factors that could influence the parking demand.
- Following the parking demand calculations, other factors such as the following will be taken into consideration to determine the effect on the parking demand:
    - Spatial Development Framework
    - Public transport interventions
    - Stellenbosch University parking policies
    - Pedestrianisation of pre-defined streets in the CBD

3.4 Data collection

3.4.1 Inventory of Parking Facilities

A detailed parking inventory of all the existing public parking facilities in the study area was undertaken on 24 August 2020. The following were recorded:

- Parking area type;
- Number of parking spaces per parking facility;
- Operating times and parking duration time limit; and
- Parking fees and method of collection.

An updated inventory was undertaken on 3 October 2023 and the following was recorded:

- Operating times and parking duration time limit; and
- Parking fees and method of collection.

In addition to the above, the number of parking spaces at the new MySpace Apartment Block (underground parking) was recorded on 13 October 2023.

3.4.2 Parking Surveys

Parking surveys were undertaken in the study area from 06:00 to 18:00 between 15 and 19 September 2020 as well as between 22 and 24 April 2021, for the pre-feasibility study done in 2021 for a parking facility in the study area.

For the *Public Private Partnership for Eikestad Parking Development* appointment, parking surveys were undertaken post Covid19 to update the parking demand calculations to review the parking demand. Parking surveys were undertaken post Covid19 during the following periods to understand the utilisation of the parking areas within the survey area:

- Peak Period - Between 18 and 20 May 2023
- Off-peak Period - Between 11 and 15 July 2023

The parking areas were grouped into 32 parking survey areas with an average of 59 parking spaces per parking survey area. Each parking survey area was assigned to a surveyor (counter). Refer to Figure 3-3 for the 32 parking survey areas.

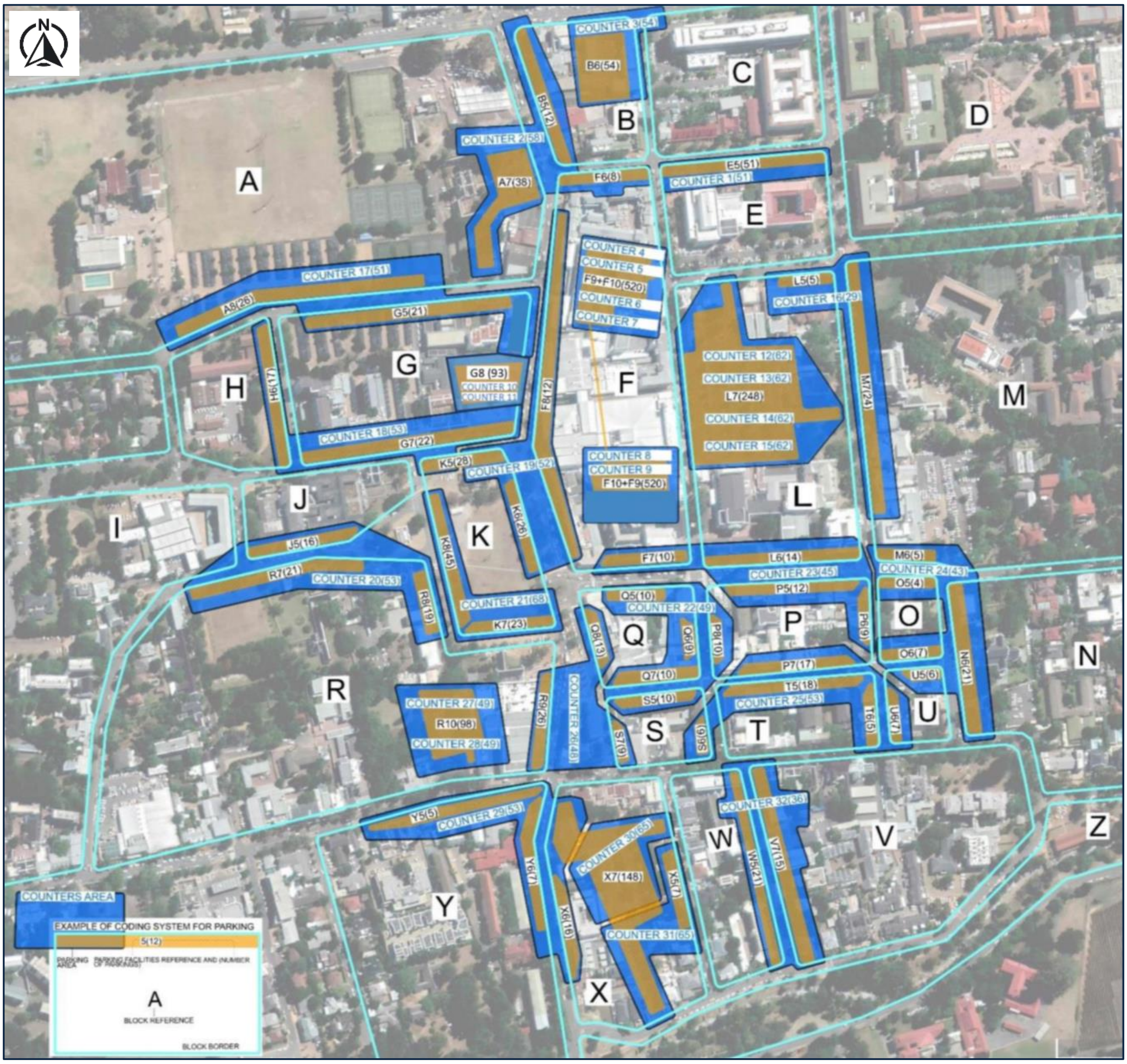


Figure 3-3: Counter locations in the study area

3.4.3 Stated Preference Surveys

Stated preference surveys were undertaken in the study area from 06:00 to 18:00 between 15 and 19 September 2020, for the pre-feasibility study done in 2021 for a parking facility in Stellenbosch CBD.

For the *Public Private Partnership for Eikestad Parking Development* appointment, stated preference surveys were undertaken post Covid19 to obtain detailed information from the parking users utilising the parking areas within the study area. Stated preference surveys were undertaken post Covid19 during the following periods:

- Peak Period - Between 18 and 20 May 2023
- Off-peak Period - Between 11 and 15 July 2023

The parking survey areas were grouped into 15 stated preference survey areas with an average of 3 parking survey areas per stated preference survey area. Each group was assigned to an interviewer interviewing the parking users at the various parking facilities in the stated preference survey area. Refer to Figure 3-4 for the 15 stated preference survey areas.

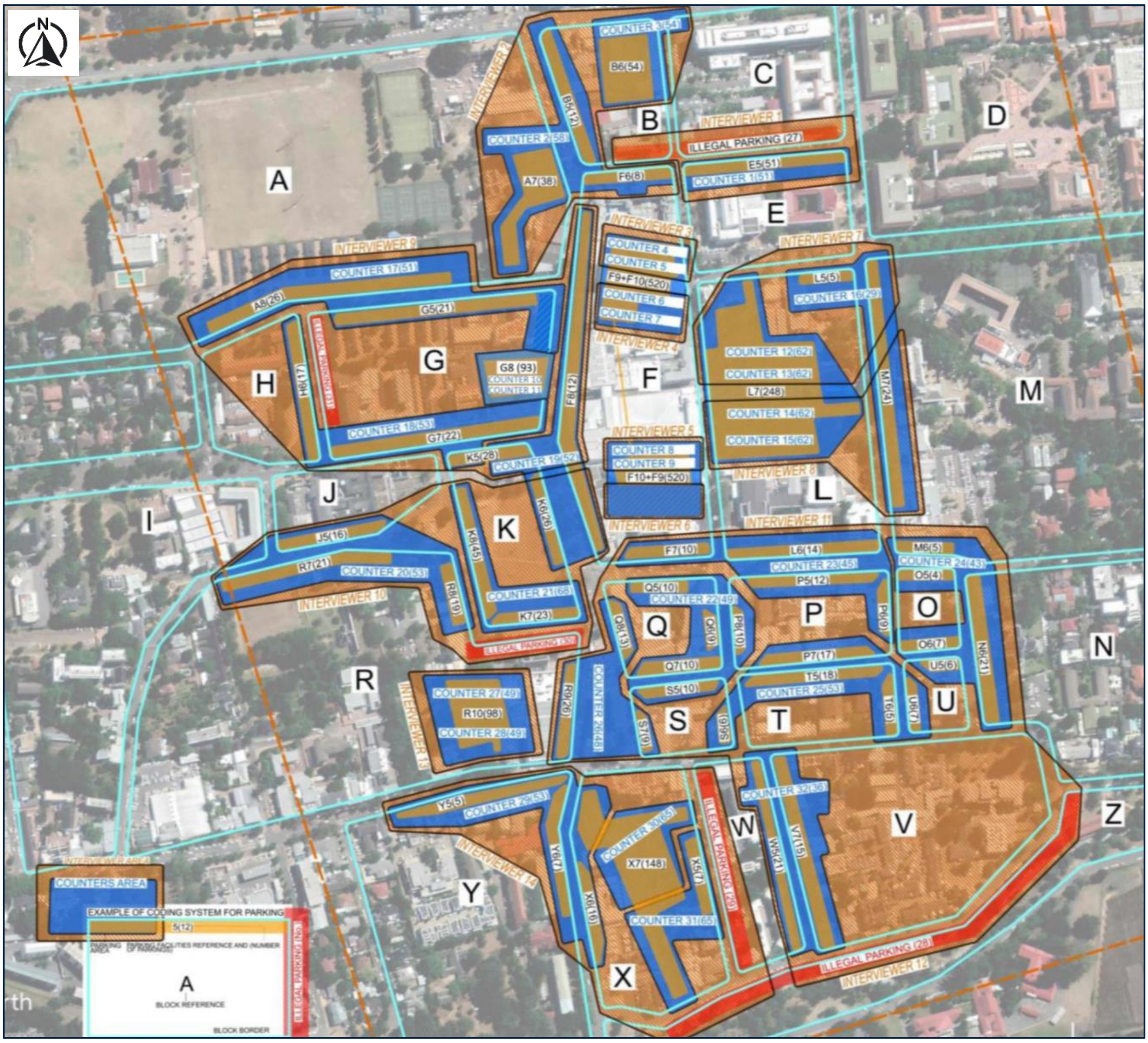


Figure 3-4: Stated Preference Survey Locations in the study area

3.4.4 Traffic Surveys

Traffic surveys are required to calculate the traffic growth rate within the study area. The traffic growth rate will be used to calculate the anticipated future parking requirements. Data from seven (7) permanent

Western Cape Government (WCG) counting stations, recoded between 1 September 2011 and 28 February 2022 at the following locations, were received:

- R304 – Joostenberg Vlakte (Station nr. 5011)
- M23 – Bottelary (Station nr. 5005)
- R44 – Delheim (Station nr. 5023)
- R45 – Franschoek (Station nr. 5013)
- M12 – Polkadraai (Station nr. 5075)
- R310 – Spier (Station nr. 5074)
- R44 – Eikendal (Station nr. 5057)

Note should be taken that at Counting Station 5074, no data was recorded after 28 February 2022. Refer to Figure 3-5 for the seven (7) permanent WCG counting station locations.

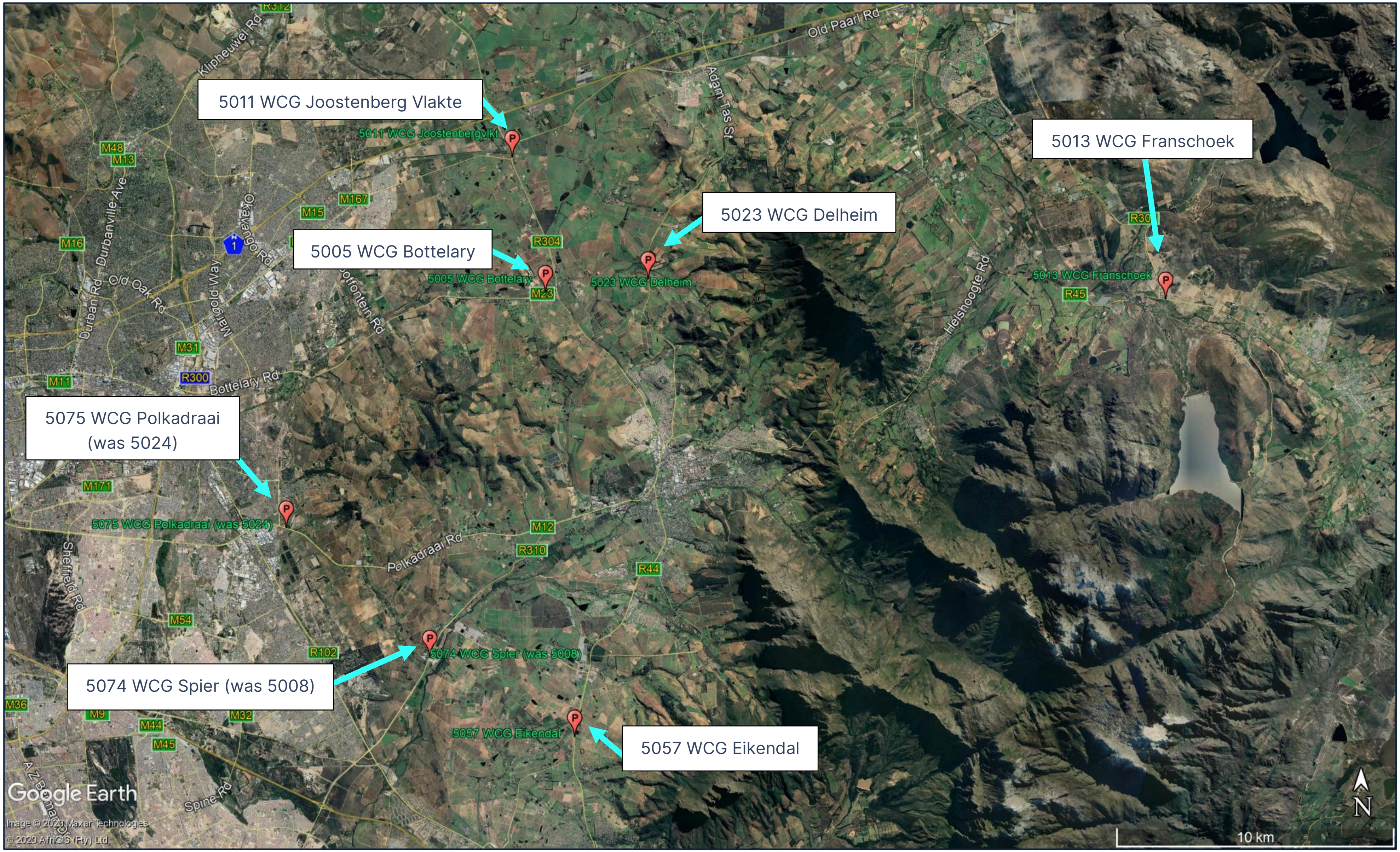


Figure 3-5: Western Cape Government (WCG) Counting Station Locations

3.5 Existing Parking Supply / Demand

This section summaries the parking analysis results of the parking inventory, parking survey, parking accumulation and status preference survey for the planned Eikestad parking facility.

3.5.1 Inventory Analysis

3.5.1.1 Parking Area Types and Coding System for Parking Inventory

The parking study for the planned Eikestad parking facility only includes the public parking facilities and illegal parking areas. The public parking facilities include on- and off-street parking, which can be classified as either free or paid parking.

The study area was subdivided into 32 blocks (Block A to Block Z). Refer to Figure 3-6 for the 32 blocks, the parking areas per block and the illegal parking areas.

Within the greater study area, a focus area was determined consisting of the parking areas for which the parking demand could realistically be assumed to make use of the planned Eikestad parking facility. This parking demand was then considered for further analysis. Refer to Figure 3-7 for the legal parking areas within the focus area. Note should be taken that the illegal parking areas and underground parking areas F9, F10 and G8 were assessed and used in two of the three methods of calculation the parking facility demand in Section 3.7.

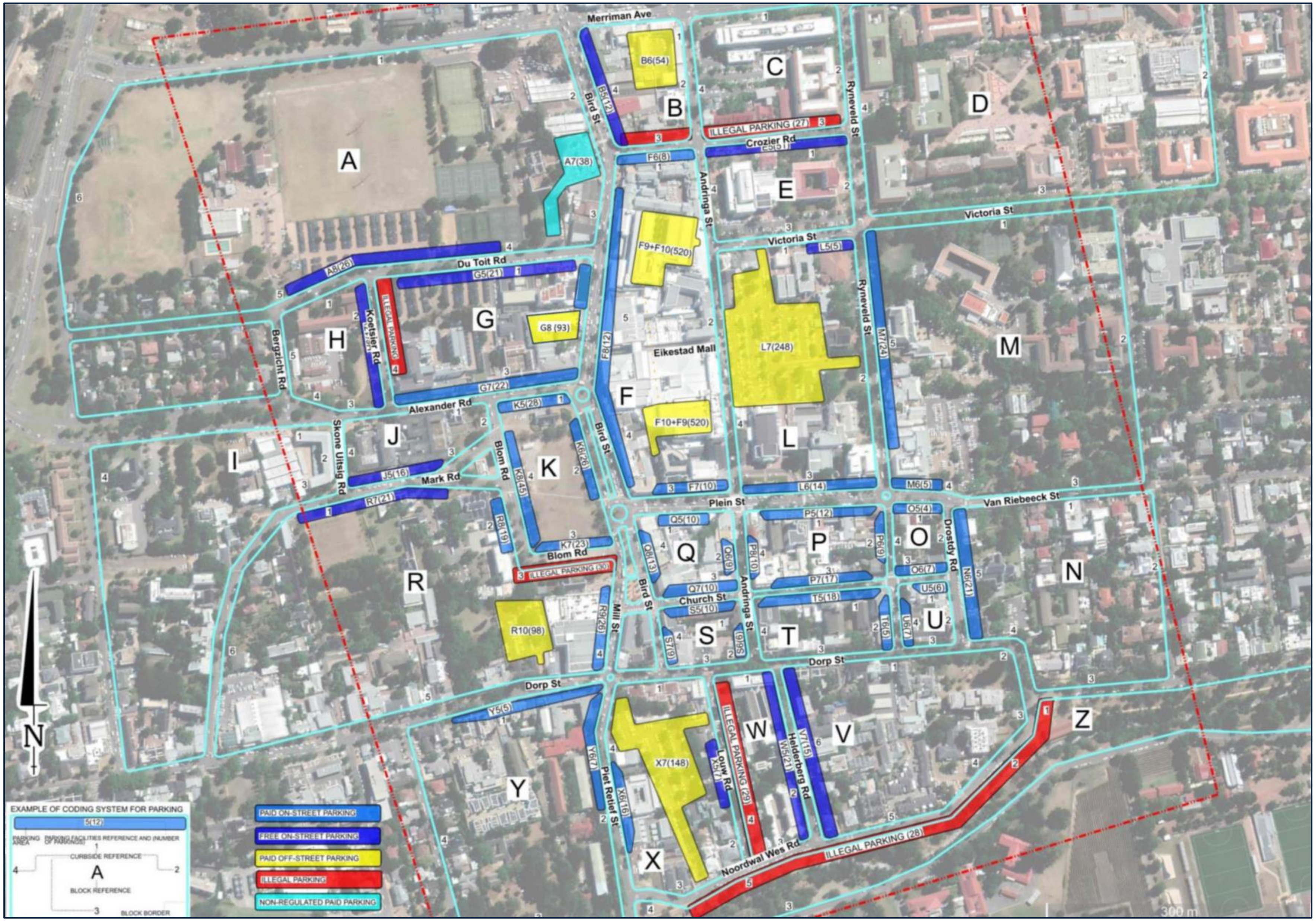


Figure 3-6: Coding system for parking areas in the study area

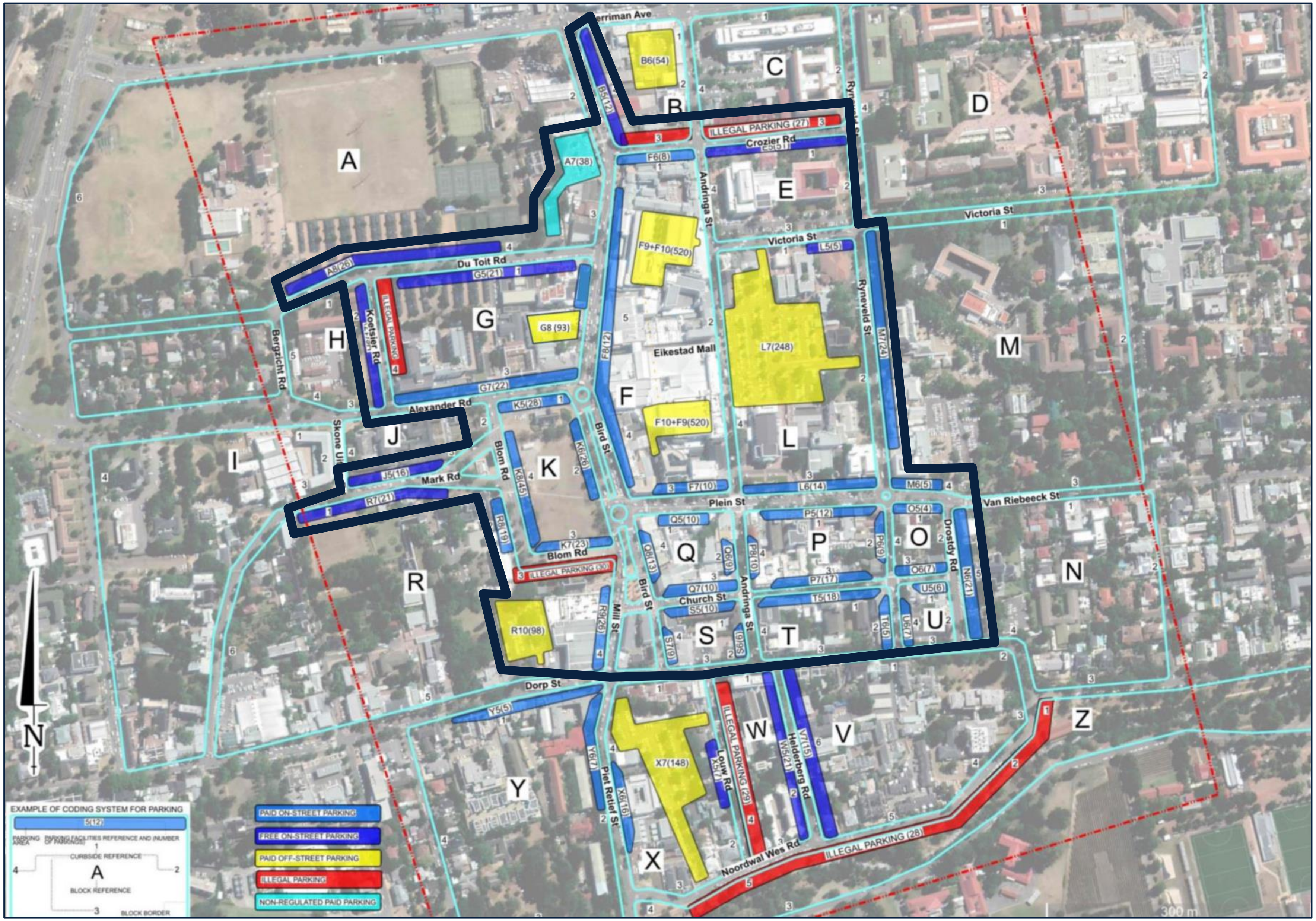


Figure 3-7: Legal parking areas within the Focus Area (Excluding Underground parking areas F9, F10 and G8)

Refer to Table 3-2 for a summary of the legal parking areas forming part of the focus area.

Table 3-2: Legal Parking Areas within the Focus Area

Parking Block	Parking Number
A	7, 8
B	5
E	5
F	6, 7, 8
G	5, 7
H	6
J	5
K	5, 6, 7, 8
L	5, 6, 7
M	6, 7
N	6
O	5, 6
P	5, 6, 7, 8
Q	5, 6, 7, 8
R	7, 8, 9, 10
S	5, 6, 7
T	5, 6
U	5, 6

3.5.1.2 Number of parking spaces per parking facility

The study area surveyed for the planned Eikestad parking facility has roughly 1 905 public parking spaces. Majority of the parking spaces within the greater study area are off-street parking (62%) and 96% of the off-street parking is paid parking. 69% of on-street parking in the study area is paid parking. Refer to Table 3-3.

Table 3-3: Parking Inventory Summary of the Study Area

Parking area Type		Inventory (Study Area)	% Split
On-Street	Free	214	11%
	Paid	468	25%
Off-Street	Free	44	2%
	Paid	1 179	62%
Total		**1 905**	**100%**

Refer to Table 3-4 for the parking inventory summary of the focus area (formalised parking only). Majority of the parking spaces within the focus area are on-street parking (61%) and 72% of the on-street parking is paid parking. 89% of off-street parking in the study area is paid parking.

Table 3-4: Parking Inventory Summary of the Focus Area (Formalised parking only)

Parking area Type		Inventory (Focus Area)	% Split
On-Street	Free	170	17%
	Paid	439	44%
Off-Street	Free	44	4%
	Paid	353	35%
Total		**1 006**	**100%**

3.5.1.3 Operating times and parking duration time limit

Two parking areas in the study area had a time limit on the parking duration:

- De Watergracht parking area is only open to public between 08:00 and 18:00 from Monday to Saturday.
- Parking area R7 has a 30-minute parking limit between 08:00 and 18:00 during weekdays, and between 08:00 and 13:00 on Saturdays.

3.5.1.4 Parking fees and method of collection

From site visits and a desktop study done between 24 August 2020 and 19 September 2020, information on the rates and method of collection before and after the 20% reduction in parking tariffs (as an economic relief due to the impact of Covid-19) were collected at all on- and off-street parking areas in the study area. On 3 October 2023, the parking fees and method of collection was reviewed and updated.

On-Street:

The payment method for on-street parking during the data collection periods was identified to be on-street payment to the parking marshal. All on-street parking areas in the study area belong to the Stellenbosch Municipality. The tariffs for on-street areas are set out in Table 3-5.

The trading/billing hours at paid on-street parking areas within the greater study area, excluding Parking Area X6, controlled by Stellenbosch Municipality, are defined below:

- 08:00 – 17:00 (Monday – Friday)
- 08:00 – 14:00 (Saturday)
- Free – (Sunday / Public Holidays)

The trading/billing hours at paid on-street Parking Area X6, controlled by Stellenbosch Municipality, are defined below:

- 08:00 – 19:00 (Monday – Friday)
- 08:00 – 14:00 (Saturday)
- Free – (Sunday / Public Holidays)

Table 3-5: On-Street Parking Tariffs

Street/Area	On-Street Parking Tariffs (Per hour - Incl. Vat)		
	Before amendments on 21 Sept 2020	Amended Tariff – Post 21 Sept 2020	Site Visit – Tuesday, 3 Oct 2023
Plein Street	R10.00	R8.00	R8.00
Blom Street	R10.00	R8.00	R8.00
Bird Street (Braak)	R10.00	R8.00	R8.00
Ryneveldt Street	R10.00	R8.00	R8.00
Andringa Street	R10.00	R8.00	R8.00
Bird Street	R10.00	R8.00	R8.00
Alexander Street	R10.00	R8.00	R8.00
Meul (Dorp/Plein)	R10.00	R8.00	R8.00
Dorp Street (West)	R10.00	R8.00	R8.00
Crozier Street	R10.00	R8.00	R8.00
Piet Retief (Parking area X6)	R10.00	R8.00	R8.00
Piet Retief (Parking area Y6)	R10.00	R8.00	R12.00
Banghoek (Andringa/Bird)	R10.00	R8.00	R8.00

Off-Street:

Payment for off-street parking during the data collection periods was made at the exit of the parking area to a parking marshal. This payment method was the same at all off-street parking areas (except underground parking at Eikestad mall and MySpace Apartment Block) in Stellenbosch CBD. The payment method for underground parking at Eikestad Mall is using a pay station at the access point to/from Eikestad Mall from/to the underground parking area. The payment method for underground parking at MySpace Apartment Block is either using a pay station in the parking area or by means of Admyt, an application using licence plate recognition to calculate the parking duration and invoice the user accordingly.

The parking tariffs for the off-street parking areas were grouped according to their rates. The following three groups were identified:

- Managed by Stellenbosch Municipality (Parking Areas L7, R10 and X7);
- Managed by private owners of De Watergracht apartment block (Parking Area B6);
- Managed by private owners of Eikestad Mall (Parking Areas F9 and F10); and
- Managed by private owners of MySpace apartment block (Parking Area G8).

Refer to Table 3-6 for the tariffs for the off-street parking areas, controlled by the Stellenbosch Municipality. The trading/billing hours at Parking Areas L7 and R10 are defined below:

- 07:00 – 00:00 (Monday – Saturday)
- Free – (Sunday / Public Holidays)

The trading/billing hours at Parking Area X7 are defined below:

- 07:00 – 18:00 (Monday – Friday)

- 08:00 – 14:00 (Saturday)
- Free – (Sunday / Public Holidays)

Table 3-6: Off-Street Parking Tariffs - Stellenbosch Municipality Parking

Time	Off-Street Parking Tariffs (Incl. Vat)			
	Site Visit - Tuesday, 15 Sept 2020	Before amendments on 21 Sept 2020	Amended Tariff – Post 21 Sept 2020	Site Visit - Tuesday, 3 Oct 2023
0 – 30 min	R0.00	R0.00	R0.00	R0.00
31 – 59 min	R12.00	R10.00	R8.00	R8.00
1 – 2 hours	R24.00	R20.00	R16.00	R16.00
2 – 3 hours	R30.00	R25.00	R20.00	R20.00
3 – 4 hours	R42.00	R35.00	R28.00	R28.00
4 – 5 hours	R54.00	R45.00	R36.00	R36.00
5 – 6 hours	R66.00	R55.00	R44.00	R44.00
6 – 7 hours	R78.00	R65.00	R52.00	R52.00
7 – 8 hours	R96.00	R80.00	R64.00	R64.00
8 – 9 hours	R102.00	R85.00	R68.00	R68.00
9 – 12 hours	R132.00	R110.00	R88.00	R88.00
12 – 24 hours	R180.00	R150.00	R120.00	R120.00
Lost Ticket	R180.00	R150.00	R120.00	R120.00
Month permit*	R1 200.00	R1 000.00	R800.00	R800.00

* Only at Parking Area X7

The parking tariffs for off-street parking at De Watergracht parking area, controlled by private owners, are defined in Table 3-7. The trading/billing hours at this parking area are defined below:

- 08:00 – 18:00 (Monday - Saturday)
- 18:00 – 08:00 (Monday – Saturday) and Sunday – Closed to public

Table 3-7: Off-Street Parking Tariffs - De Watergracht Parking

Time	Parking Tariffs*
0 – 30 min	R0.00
30 – 60 min	R8.00
1 – 2 hours	R15.00
2 – 3 hours	R30.00
3 – 4 hours	R40.00
4 – 5 hours	R50.00
5 – 8 hours	R80.00
8+ hours	R100.00
Lost Ticket	R100.00

* From a site visit on Tuesday, 3 Oct 2023

The parking tariffs for the Eikestad Mall Underground parking, controlled by private owners, are defined in Table 3-8. The trading/billing hours at this parking area is defined below:

- 07:00 – 19:00 (Monday – Sunday)

Table 3-8: Off-Street Parking Tariffs - Eikestad Mall Underground Parking

Time	Parking Tariffs*
Parking from 05:00 – 19:00	
0 – 30 min	R5.00
30 min – 1 hour	R10.00
1.01 – 2 hours	R20.00
2.01 – 3 hours	R25.00
3.01 – 4 hours	R30.00
4.01 – 5 hours	R40.00
5.01 – 6 hours	R60.00
6.01 – 7 hours	R80.00
7.01 – 8 hours	R100.00
Parking from 19:00 – 04:59	
R20.00	
Lost Ticket	R100.00

* From a site visit on Tuesday, 3 Oct 2023

The parking tariff for the MySpace Underground parking area, controlled by private owners, is defined as R5 per 30-minute period for the first 5 hours. Thereafter, a fixed rate of R50 applies. The trading/billing hours at this parking area is defined below:

- All day (Monday to Sunday)

3.5.2 Parking Survey Results

The parking survey data was collected for on- and off-street parking areas as well as the illegal parking areas within the study area during the peak and off-peak periods. During the peak period, the parking surveys were done on the following days:

- Thursday - 18/05/2023;
- Friday - 19/05/2023; and
- Saturday - 20/05/2023.

During the off-peak period, the parking surveys were done on the following days:

- Tuesday - 11/07/2023;
- Friday - 14/07/2023; and
- Saturday - 15/07/2023.

The parking survey results were assessed for seven (7) different parking categories, such as the following:

- All the parking areas together (excluding illegal parking)
- Off-Street Parking Areas (excluding illegal parking)
    - Free
    - Paid
- On-Street Parking Areas (excluding illegal parking)
    - Free
    - Paid
- Focus Area (excluding illegal parking)
- Illegal Parking

For each of the seven (7) parking categories, the data was analysed, and the following seven (7) characteristics were determined:

- Parking Volume;
- Peak Parking Saturation;
- Parking Load;
- Peak Parking Ratio;
- Average Parking Duration;
- Parking Turnover; and
- Parking Index.

3.5.2.1 Peak Period Results

The peak period results for each of the seven (7) characteristics, for each parking category, are summarised in Table 3-9, Table 3-10 and Table 3-11.

Table 3-9: Peak Period Parking Survey Results – Thursday, 18 May 2023

Parking Characteristics			All Parking*	Off-Street* Free	Off-Street* Paid	On-Street* Free	On-Street* Paid	Focus Area*	Illegal
Survey Duration (hours)			12	12	12	12	12	12	12
Total Number of Parking Spaces			1 905	44	1 179	214	468	1 005	88**
Parking Volume (vehicles)			7 380	167	4 222	592	2 399	4 620	177
Peak Parking Saturation			0.625	0.955	0.671	0.935	0.936	0.918	
Parking Load (vehicle hour)			3 690.0	83.5	2 111.0	296.0	1 199.5	2 310.0	88.5
Peak Parking Ratio			1.588	1.797	1.418	1.264	1.319	1.312	
Average Parking Duration (hours)			3.315	3.440	2.710	4.688	2.425	3.071	4.743
Parking Turnover			3.874	3.795	3.581	2.766	5.126	4.597	2.011
Parking index	Full day	Max	62%	95%	67%	93%	94%	92%	
		Average (06:00 - 18:00)	39%	53%	47%	74%	71%	70%	
	AM	Average (06:00 - 12:00)	32%	36%	37%	71%	58%	58%	
		Max (06:00 - 12:00)	62%	75%	67%	93%	91%	92%	
	PM	Average (12:00 - 18:00)	46%	70%	57%	77%	84%	82%	
		Max (12:00 - 18:00)	61%	95%	67%	89%	94%	92%	

* Excluding Illegal Parking

** Maximum number of illegal parking

Table 3-10: Peak Period Parking Survey Results – Friday, 19 May 2023

Parking Characteristics			All Parking*	Off-Street* Free	Off-Street* Paid	On-Street* Free	On-Street* Paid	Focus Area*	Illegal
Survey Duration (hours)			12	12	12	12	12	12	12
Total Number of Parking Spaces			1 905	44	1 179	214	468	1 005	83**
Parking Volume (vehicles)			8 113	184	4 709	564	2 656	5 198	200
Peak Parking Saturation			0.761	0.955	0.687	0.864	0.917	0.918	
Parking Load (vehicle hour)			4 056.5	92.0	2 354.5	282.0	1 328.0	2 599.0	100.0
Peak Parking Ratio			1.314	1.487	1.371	1.234	1.283	1.278	
Average Parking Duration (hours)			3.253	3.816	2.412	4.727	2.057	2.817	3.601
Parking Turnover			4.259	4.182	3.994	2.636	5.675	5.172	2.410
Parking index	Full day	Max	76%	95%	69%	86%	92%	92%	
		Average (06:00 - 18:00)	58%	64%	50%	70%	71%	72%	
	AM	Average (06:00 - 12:00)	49%	46%	41%	68%	61%	60%	
		Max (06:00 - 12:00)	76%	86%	69%	86%	91%	92%	
	PM	Average (12:00 - 18:00)	67%	82%	59%	73%	82%	83%	
		Max (12:00 - 18:00)	76%	95%	69%	86%	92%	91%	

* Excluding Illegal Parking

** Maximum number of illegal parking

Table 3-11: Peak Period Parking Survey Results – Saturday, 20 May 2023

<table>
<tr><th colspan="3" rowspan="3">Parking Characteristics</th><th colspan="7">Parking Category</th></tr>
<tr><th rowspan="2">All Parking*</th><th colspan="2">Off-Street*</th><th colspan="2">On-Street*</th><th rowspan="2">Focus Area*</th><th rowspan="2">Illegal</th></tr>
<tr><th>Free</th><th>Paid</th><th>Free</th><th>Paid</th></tr>
<tr><td colspan="3">Survey Duration (hours)</td><td>12</td><td>12</td><td>12</td><td>12</td><td>12</td><td>12</td><td>12</td></tr>
<tr><td colspan="3">Total Number of Parking Spaces</td><td>1 905</td><td>44</td><td>1 179</td><td>214</td><td>468</td><td>1 005</td><td>60**</td></tr>
<tr><td colspan="3">Parking Volume (vehicles)</td><td>6 669</td><td>158</td><td>3 869</td><td>425</td><td>2 217</td><td>4 573</td><td>92</td></tr>
<tr><td colspan="3">Peak Parking Saturation</td><td>0.625</td><td>0.955</td><td>0.498</td><td>0.612</td><td>0.932</td><td>0.834</td><td></td></tr>
<tr><td colspan="3">Parking Load (vehicle hour)</td><td>3 334.5</td><td>79.0</td><td>1 934.5</td><td>212.5</td><td>1 108.5</td><td>2 286.5</td><td>46.0</td></tr>
<tr><td colspan="3">Peak Parking Ratio</td><td>1.588</td><td>1.803</td><td>1.642</td><td>1.524</td><td>1.542</td><td>1.586</td><td></td></tr>
<tr><td colspan="3">Average Parking Duration (hours)</td><td>2.475</td><td>2.969</td><td>1.673</td><td>3.219</td><td>2.038</td><td>2.135</td><td>2.196</td></tr>
<tr><td colspan="3">Parking Turnover</td><td>3.501</td><td>3.591</td><td>3.282</td><td>1.986</td><td>4.737</td><td>4.550</td><td>1.533</td></tr>
<tr><td rowspan="6">Parking index</td><td rowspan="2">Full day</td><td>Max</td><td>62%</td><td>95%</td><td>50%</td><td>61%</td><td>93%</td><td>83%</td><td></td></tr>
<tr><td>Average (06:00 - 18:00)</td><td>39%</td><td>53%</td><td>30%</td><td>40%</td><td>60%</td><td>53%</td><td></td></tr>
<tr><td rowspan="2">AM</td><td>Average (06:00 - 12:00)</td><td>32%</td><td>49%</td><td>24%</td><td>41%</td><td>48%</td><td>42%</td><td></td></tr>
<tr><td>Max (06:00 - 12:00)</td><td>62%</td><td>95%</td><td>50%</td><td>61%</td><td>93%</td><td>83%</td><td></td></tr>
<tr><td rowspan="2">PM</td><td>Average (12:00 - 18:00)</td><td>46%</td><td>57%</td><td>37%</td><td>40%</td><td>73%</td><td>64%</td><td></td></tr>
<tr><td>Max (12:00 - 18:00)</td><td>61%</td><td>86%</td><td>48%</td><td>61%</td><td>90%</td><td>82%</td><td></td></tr>
</table>

* Excluding Illegal Parking
** Maximum number of illegal parking

From the above, the following were determined from the peak period results for all parking areas:

- The parking volume was recoded 10% higher for Friday compared to the weekday.
- The parking volume was recoded 22% higher for Friday compared to the Saturday.
- The average parking duration was recorded as 72% longer for free parking compared to paid parking.
- Free parking is on average 11% more occupied than paid parking.
- On-street parking is on average 8% more occupied than off-street parking.

3.5.2.2 Off-peak Period Results

The off-peak period results for each of the seven (7) characteristics, for each parking category, are summarised in Table 3-12, Table 3-13 and Table 3-14.

Table 3-12: Off-Peak Period Parking Survey Results – Tuesday, 11 July 2023

Parking Characteristics			All Parking*	Off-Street*		On-Street*		Focus Area*	Illegal
				Free	Paid	Free	Paid		
Survey Duration (hours)			12	12	12	12	12	12	12
Total Number of Parking Spaces			1 902	47	1 176	209	470	1 006	83**
Parking Volume (vehicles)			5 872	156	3 307	492	1917	3 901	107
Peak Parking Saturation			0.716	0.830	0.650	0.890	0.815	0.864	
Parking Load (vehicle hour)			2 936.0	78.0	1 653.5	246.0	958.5	1 950.5	53.5
Peak Parking Ratio			1.435	1.790	1.481	1.427	1.362	1.430	
Average Parking Duration (hours)			3.373	3.070	2.758	5.008	2.656	3.265	4.508
Parking Turnover			3.087	3.319	2.812	2.354	4.079	3.878	1.289
Parking index	Full day	Max	72%	83%	65%	89%	81%	86%	
		Average (06:00 - 18:00)	50%	46%	44%	62%	60%	60%	
	AM	Average (06:00 - 12:00)	38%	28%	31%	58%	46%	46%	
		Max (06:00 - 12:00)	67%	68%	59%	87%	79%	80%	
	PM	Average (12:00 - 18:00)	62%	65%	57%	67%	73%	75%	
		Max (12:00 - 18:00)	72%	83%	65%	89%	81%	86%	

* Excluding Illegal Parking
** Maximum number of illegal parking

Table 3-13: Off-Peak Period Parking Survey Results – Friday, 14 July 2023

Parking Characteristics			All Parking*	Off-Street*		On-Street*		Focus Area*	Illegal
				Free	Paid	Free	Paid		
Survey Duration (hours)			12	12	12	12	12	12	12
Total Number of Parking Spaces			1 902	47	1 176	209	470	1 006	57**
Parking Volume (vehicles)			6 615	214	3 668	454	2 279	4 485	94
Peak Parking Saturation			0.696	0.787	0.615	0.861	0.870	0.870	
Parking Load (vehicle hour)			3 307.5	107.0	1 834.0	227.0	1 139.5	2 242.5	47.0
Peak Parking Ratio			1.380	1.482	1.470	1.405	1.303	1.387	
Average Parking Duration (hours)			3.041	2.540	2.316	4.989	2.317	2.876	3.469
Parking Turnover			3.478	4.553	3.119	2.172	4.849	4.458	1.649
Parking index	Full day	Max	70%	79%	61%	86%	87%	87%	
		Average (06:00 - 18:00)	50%	53%	42%	61%	67%	63%	
	AM	Average (06:00 - 12:00)	40%	37%	32%	57%	53%	48%	
		Max (06:00 - 12:00)	69%	72%	61%	82%	84%	83%	
	PM	Average (12:00 - 18:00)	61%	69%	52%	66%	80%	78%	
		Max (12:00 - 18:00)	70%	79%	60%	86%	87%	87%	

* Excluding Illegal Parking
** Maximum number of illegal parking

Table 3-14: Off-Peak Period Parking Survey Results – Saturday, 15 July 2023

Parking Characteristics			Parking Category						
			All Parking*	Off-Street*		On-Street*		Focus Area*	Illegal
				Free	Paid	Free	Paid		
Survey Duration (hours)			12	12	12	12	12	12	12
Total Number of Parking Spaces			1 902	47	1 176	209	470	1 006	33**
Parking Volume (vehicles)			5 012	184	2581	306	1 941	3732	41
Peak Parking Saturation			0.511	0.894	0.402	0.440	0.821	0.701	
Parking Load (vehicle hour)			2 506.0	92.0	1 290.5	153.0	970.5	1 866.0	20.5
Peak Parking Ratio			1.521	1.626	1.593	1.689	1.475	1.497	
Average Parking Duration (hours)			2.280	2.716	1.667	2.631	2.105	2.161	2.111
Parking Turnover			2.635	3.915	2.195	1.464	4.130	3.710	2.636
Parking index	Full day	Max	51%	89%	40%	44%	82%	70%	1.242
		Average (06:00 - 18:00)	34%	55%	25%	26%	56%	47%	
	AM	Average (06:00 - 12:00)	26%	50%	19%	23%	43%	36%	
		Max (06:00 - 12:00)	48%	83%	38%	39%	77%	67%	
	PM	Average (12:00 - 18:00)	41%	60%	31%	29%	68%	58%	
		Max (12:00 - 18:00)	51%	89%	40%	44%	82%	70%	

* Excluding Illegal Parking
** Maximum number of illegal parking

From the above, the following were determined from the off-peak period results for all parking areas:

- The parking volume was recoded 13% higher for Friday compared to the weekday.
- The parking volume was recoded 32% higher for Friday compared to the Saturday.
- The average parking duration was recorded as 52% longer for free parking compared to paid parking.
- Free parking is on average 9% more occupied than paid parking.
- On-street parking is on average 9% more occupied than off-street parking.

3.5.3 Parking Accumulation Analysis

Parking accumulation is the number of vehicles parked in a specific area at any specified time. The parking accumulation against time, usable and system capacity are plotted on the same figure to compare the three (3) data sets. The usable capacity refers to the maximum level of accumulation that can be reached prior to negative consequences, particularly for first-time users. Such consequences can include excessive circulating traffic in an area to locate a parking space, causing traffic congestion. It is important to consider usable capacity when designing a system, in order to avoid circulating traffic. System capacity refers to the full capacity of the parking inventory. Refer to Table 3-15 for the usable and system capacity for on-and off-street parking areas within the study area.

Table 3-15: System Capacity vs Usable Capacity per parking area type

Parking Area Type	System Capacity (% of parking inventory capacity)	Average Usable Capacity (% of parking inventory capacity)
On-Street	100%	90%
Off-Street		85%
Underground Parking		80%

3.5.3.1 All Parking Areas (excluding illegal parking)

The peak period parking accumulation against time, usable and system capacity for all parking areas in the study area are illustrated in Figure 3-8.

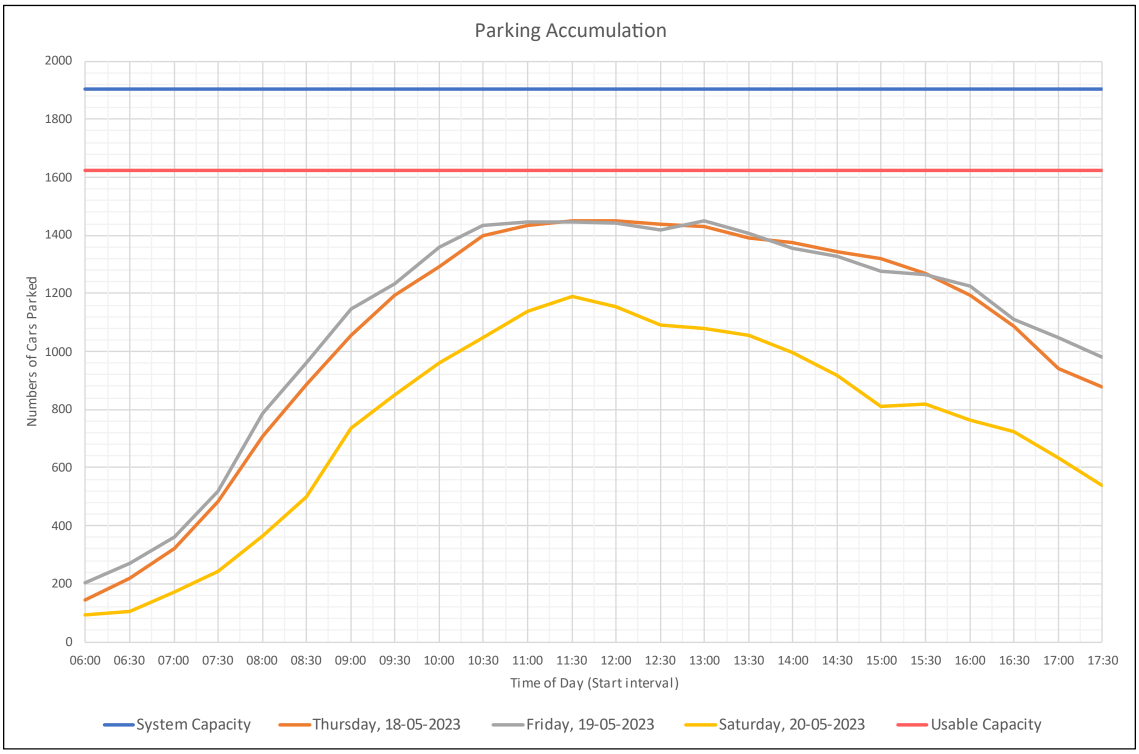


Figure 3-8: Peak Period Parking Accumulation – Usable and System Capacity (All Parking)

From the above, an overall maximum peak parking saturation of 76% was observed during the peak period taking into considering all the parking areas within the study area. Considering the location of the planned Eikestad parking facility relative to the location of the parking areas in the study area, the focus area would provide a more realistic indication of the parking demand that will be considered for further calculations of planned Eikestad parking facility.

The off-peak period parking accumulation against time, usable and system capacity for all parking areas in the study area are illustrated in Figure 3-9.

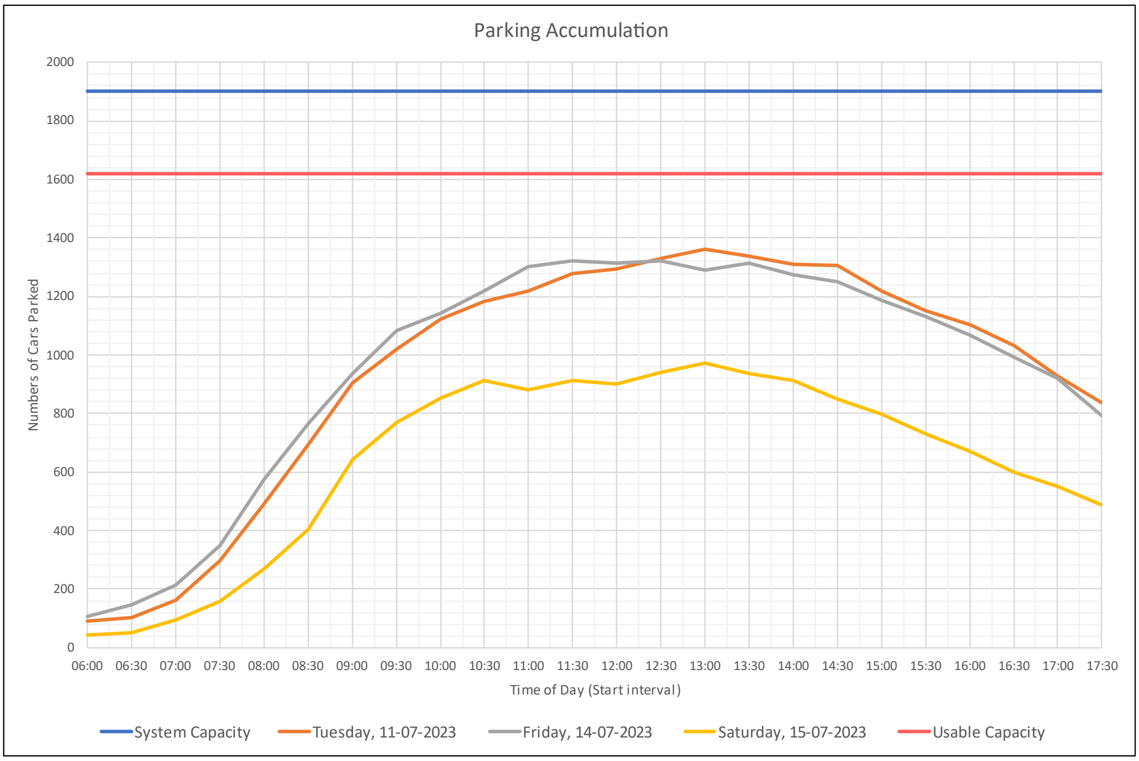


Figure 3-9: Off-peak Period Parking Accumulation – Usable and System Capacity (All Parking)

From the above, an overall maximum peak parking saturation of 72% was observed during the off-peak period taking into considering all the parking areas within the study area. During the off-peak period, a significant lower demand was observed compared to the peak period.

3.5.3.2 On-Street Parking Analysis (excluding illegal parking)

Paid Parking

The peak period parking accumulation against time, usable and system capacity for all the on-street paid parking areas in the study area are illustrated in Figure 3-10.

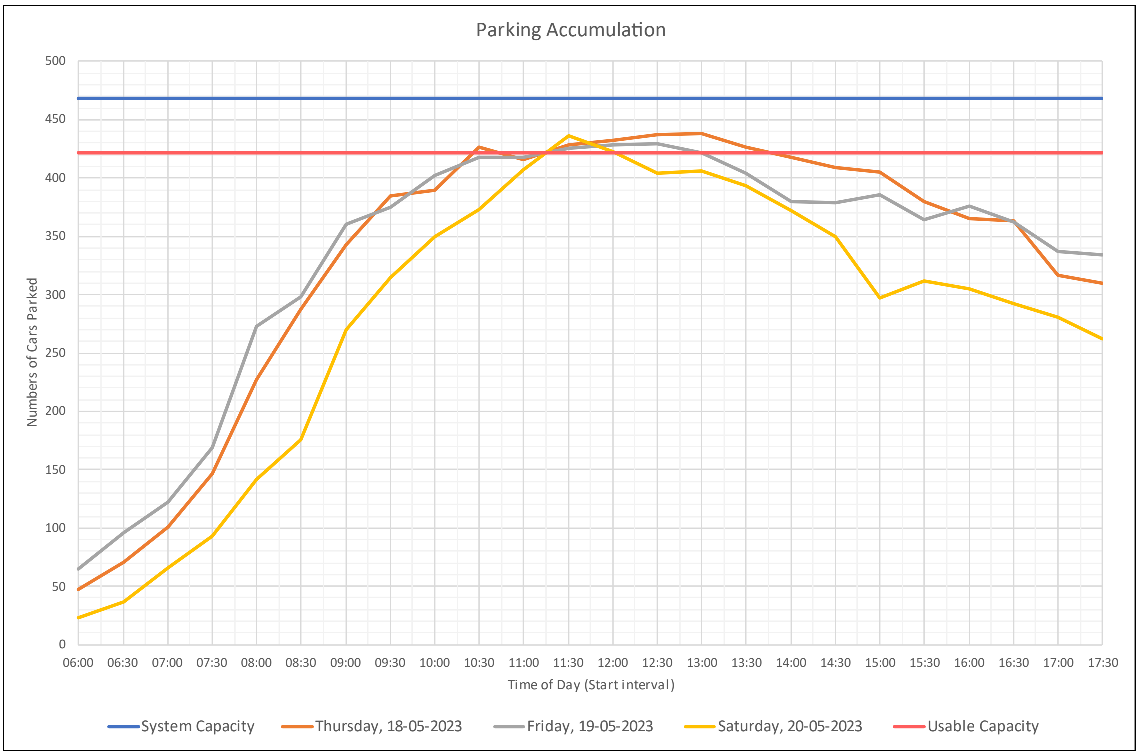


Figure 3-10: Peak Period Parking Accumulation – Usable and System Capacity (On-Street Paid Parking)

From the above, it can be seen that the demand for all on-street paid parking in the study area exceeded the maximum usable capacity during the peak period for all three days surveyed. During the weekday, the longest period (approximately 3 hours) was observed where the demand exceeded the capacity with Friday the second longest period (approximately 2 hours) and Saturday the shortest period (approximately 1 hour). As a result of the overall parking demand for on-street paid parking exceeding the maximum usable capacity, traffic circulation is expected.

The off-peak period parking accumulation against time, usable and system capacity for all the on-street paid parking areas in the study area are illustrated in Figure 3-11.

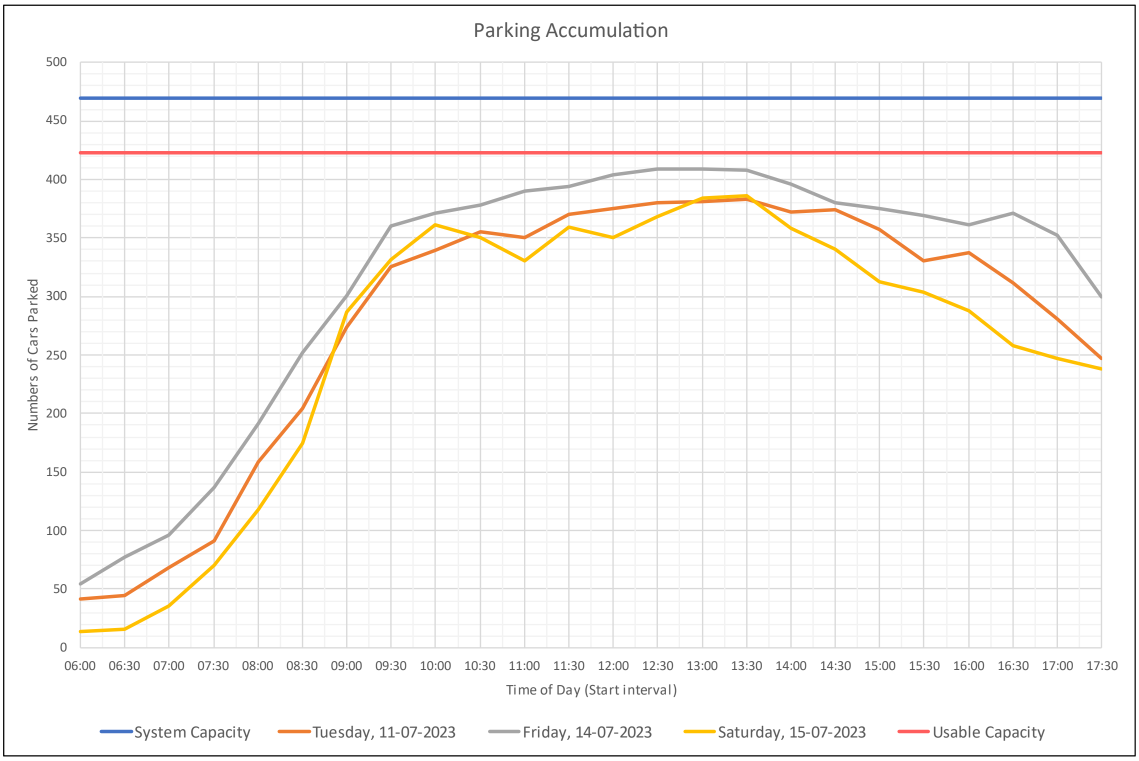


Figure 3-11: Off-peak Period Parking Accumulation – Usable and System Capacity (On-Street Paid Parking)

From the above, a maximum peak parking saturation of 87% was observed during the off-peak period taking into considering the on-street paid parking areas within the study area. During the off-peak period, a significant lower demand was observed compared to the peak period.

Free Parking

The peak period parking accumulation against time, usable and system capacity for all the on-street free parking areas in the study area are illustrated in Figure 3-12.

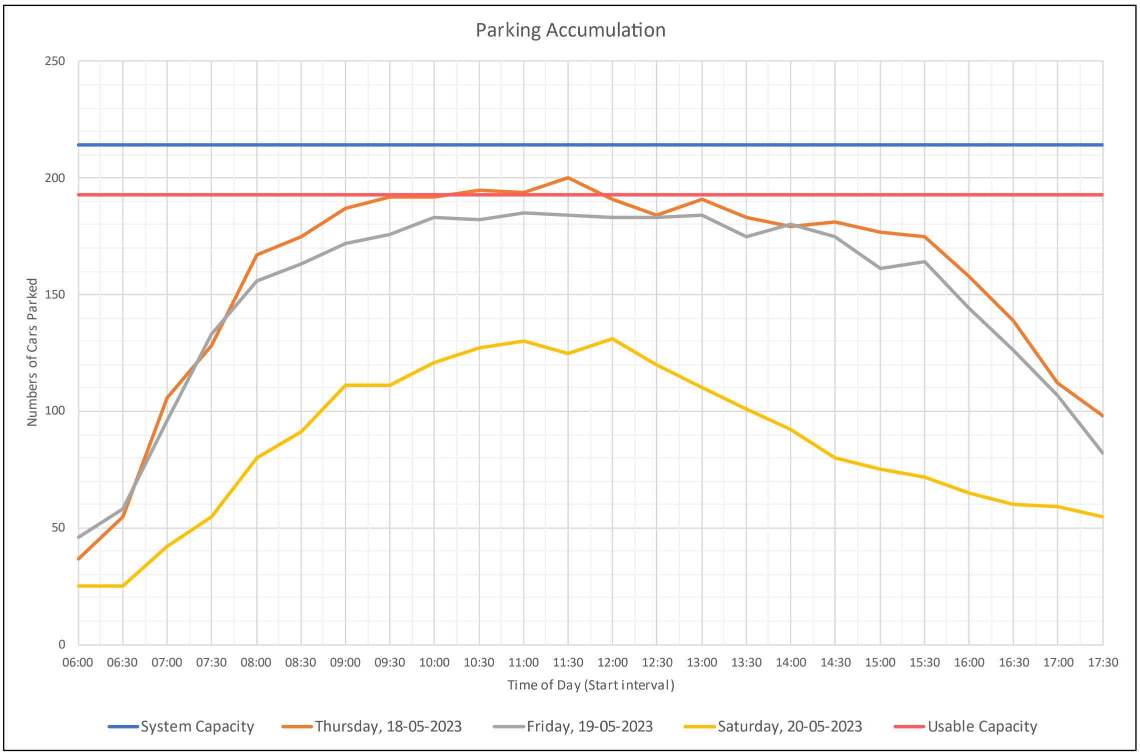


Figure 3-12: Peak Period Parking Accumulation - Usable and System Capacity (On-Street Free Parking)

From the above, it can be seen that the demand for all the on-street free parking in the study area only exceeded the maximum usable capacity (approximately 3 hours) during the weekday in the peak period. As a result of the overall parking demand for on-street free parking exceeding the maximum usable capacity, traffic circulation is expected.

The off-peak period parking accumulation against time, usable and system capacity for all the on-street free parking areas in the study area are illustrated in Figure 3-13.

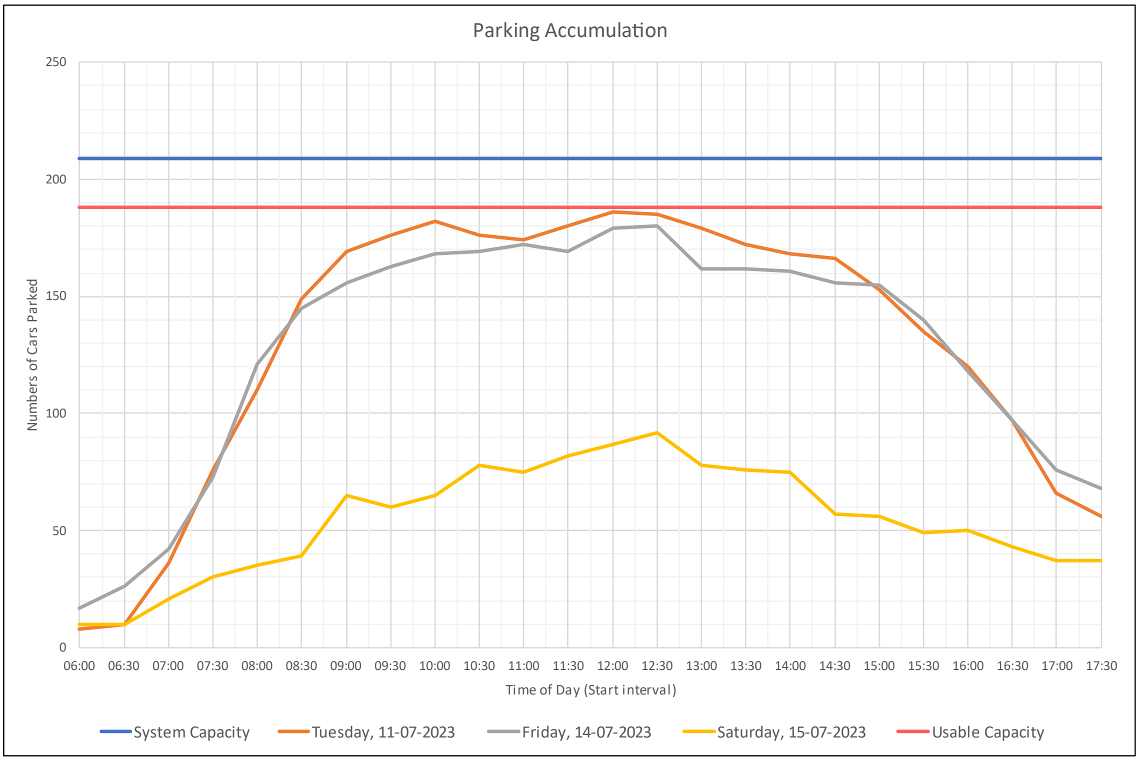


Figure 3-13: Off-peak Period Parking Accumulation - Usable and System Capacity (On-Street Free Parking)

From the above, a maximum peak parking saturation of 89% was observed during the off-peak period taking into considering the on-street free parking areas within the study area. During the off-peak period, a significant lower demand was observed compared to the peak period.

3.5.3.3 Off-Street Parking Analysis (excluding illegal parking)

Paid Parking

The peak period parking accumulation against time, usable and system capacity for the following off-street paid parking areas are illustrated in the following figures:

- All off-street paid parking areas (excluding underground parking) - Illustrated in Figure 3-14
- All underground parking areas together - Illustrated in Figure 3-15

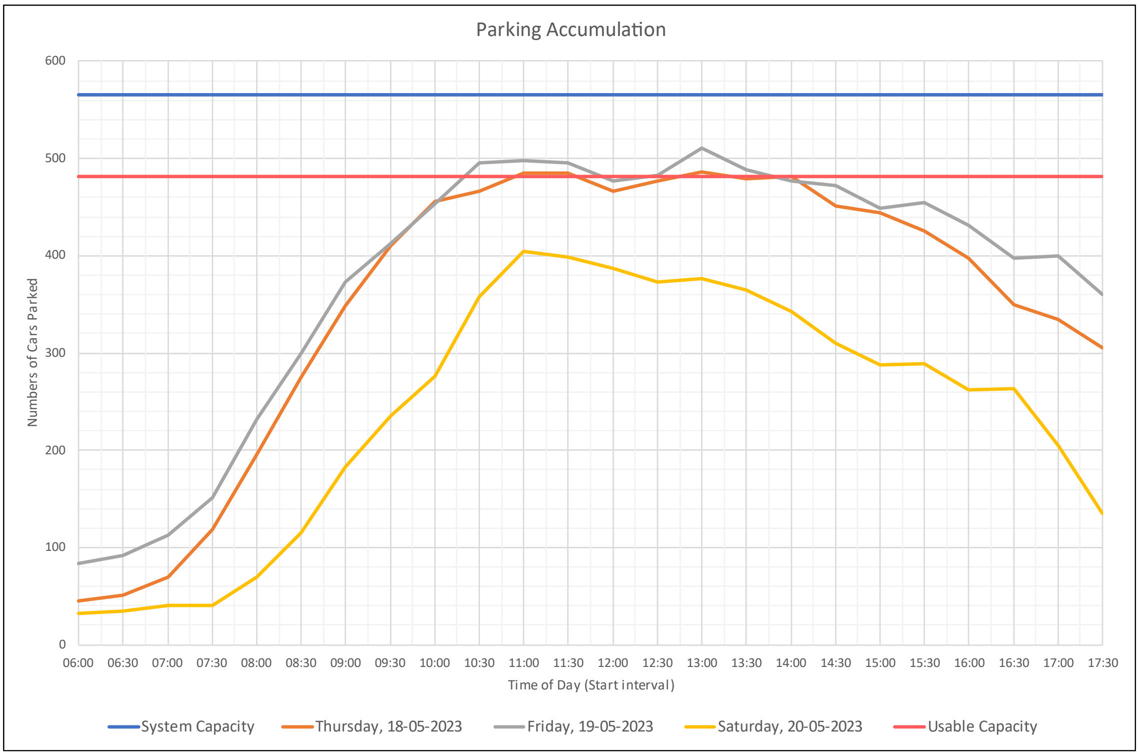


Figure 3-14: Peak Period Parking Accumulation - Usable and System Capacity (Off-Street Paid Parking excluding underground parking)

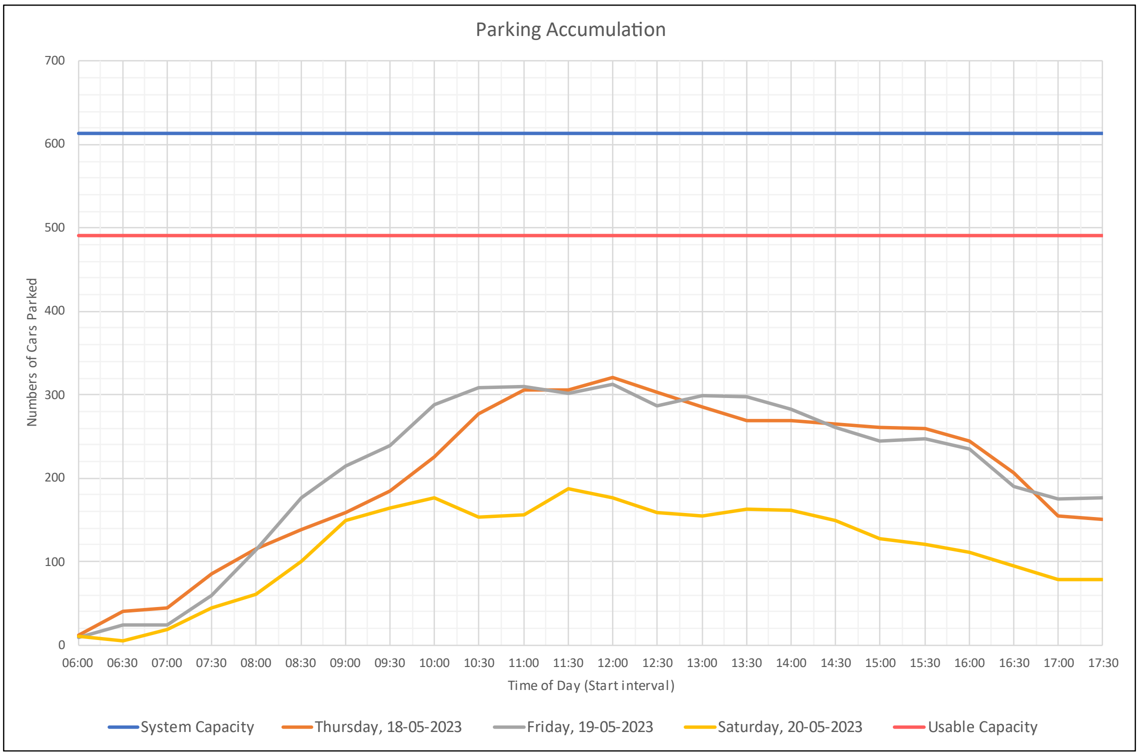


Figure 3-15: Peak Period Parking Accumulation – Usable and System Capacity (Underground Parking Areas)

From the above, it can be seen that the parking accumulation during the peak period for all off-street paid parking areas together, excluding underground parking, exceeded the usable capacity for the weekday between 11:00 and 11:30 and at 13:00, and on Friday between 10:30 and 13:30. For the underground parking only, the usable capacity was never reached indicating that underground parking is the least favourable parking area compared to off-street paid parking only. However, due to ability to survey the underground parking area, it must be noted that parking bays were counted vs the volume of traffic entering and existing the facility. As a result, employees, mall staff, shoppers and gym users entering the parking facility prior to the start of the counts were not captured. In essence those parking bays may have been occupied for the duration of the day.

The off-peak period parking accumulation against time, usable and system capacity for the following off-street paid parking areas are illustrated in the following figures:

- All off-street paid parking areas (excluding underground parking) - Illustrated in Figure 3-16
- All underground parking areas together - Illustrated in Figure 3-17

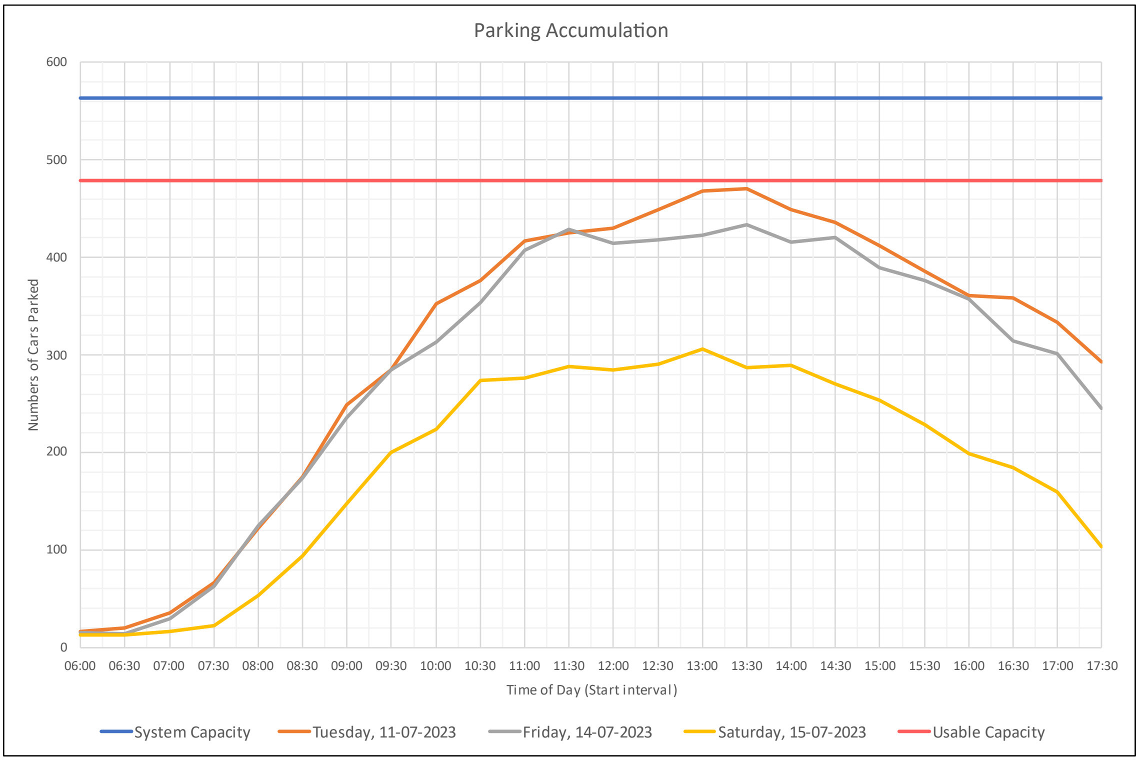


Figure 3-16: Off-peak Period Parking Accumulation - Usable and System Capacity (Off-Street Paid Parking excluding underground parking)

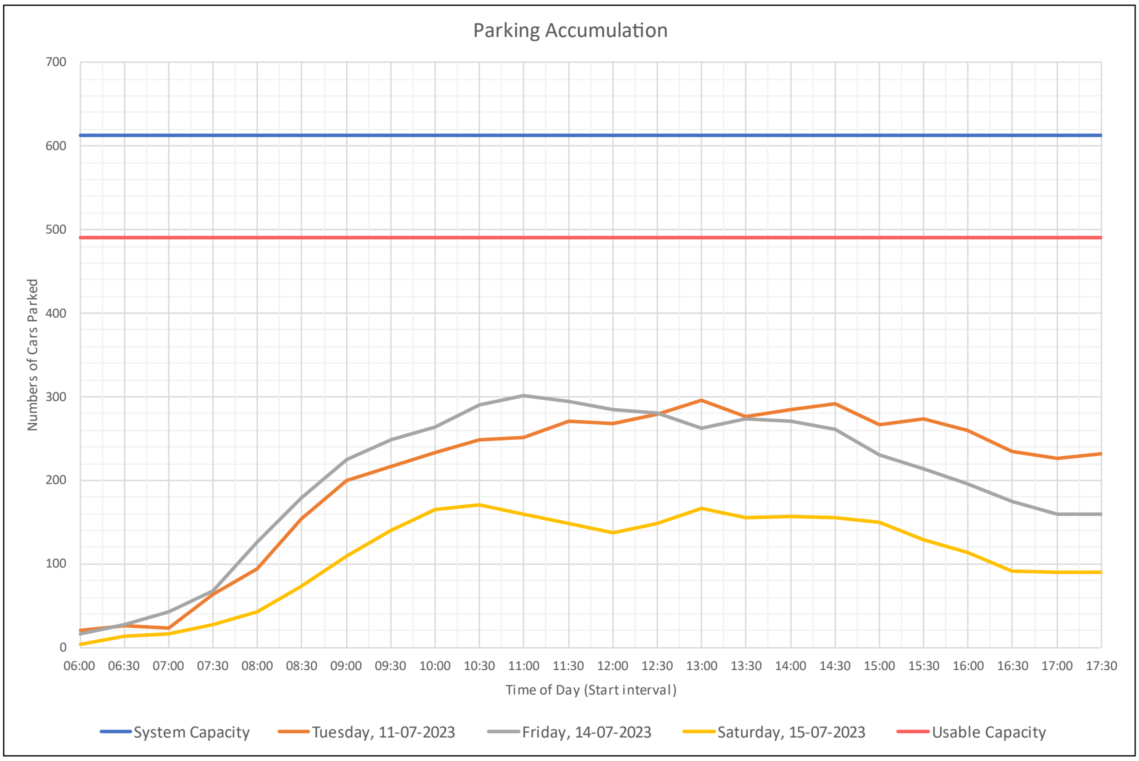


Figure 3-17: Off-peak Period Parking Accumulation – Usable and System Capacity (Underground Parking Areas)

From the above, it can be seen that the usable capacity was not reached for either the off-street paid parking only (excluding underground parking) or the underground parking only during the off-peak period.

Free Parking

The peak period parking accumulation against time, usable and system capacity for all the off-street free parking areas in the study area are illustrated in Figure 3-18.

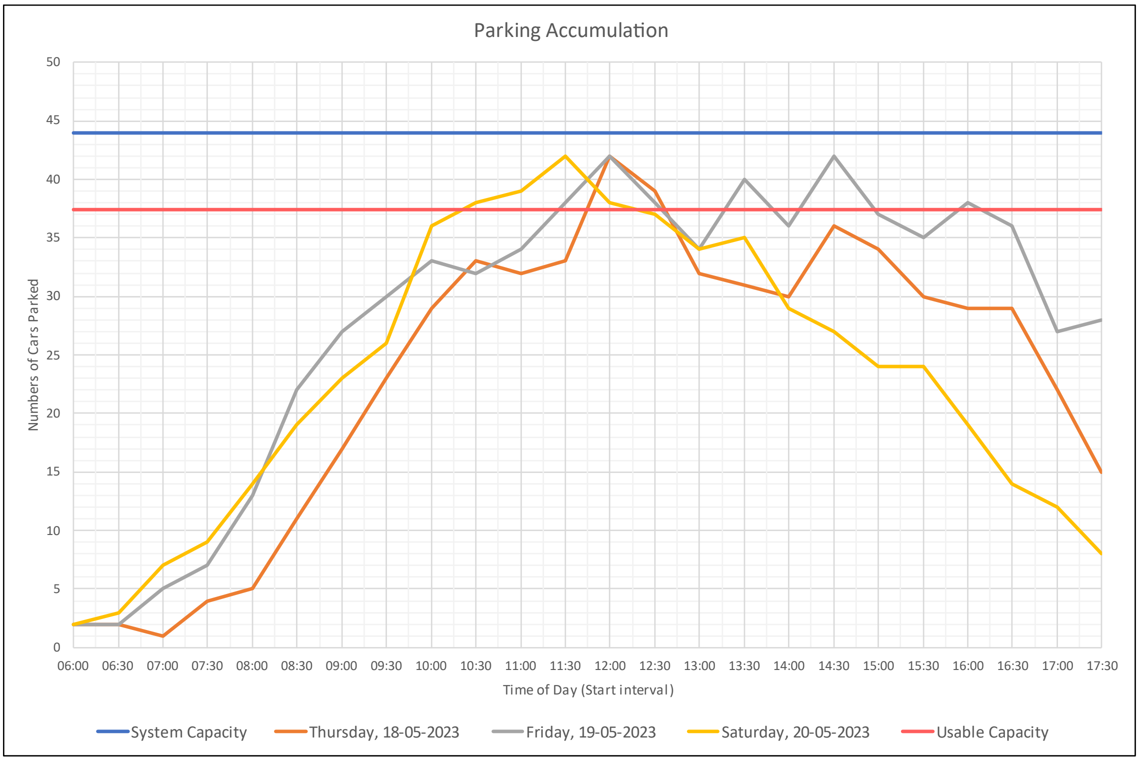


Figure 3-18: Peak Period Parking Accumulation – Usable and System Capacity (Off-Street Free Parking)

From the above, it can be seen that the demand for off-street free parking in the study area exceeded the maximum usable capacity during the peak period for all three days surveyed. As a result of the overall parking demand for off-street free parking exceeding the maximum usable capacity, traffic circulation is expected.

The off-peak period parking accumulation against time, usable and system capacity for all the off-street free parking areas in the study area are illustrated in Figure 3-19.

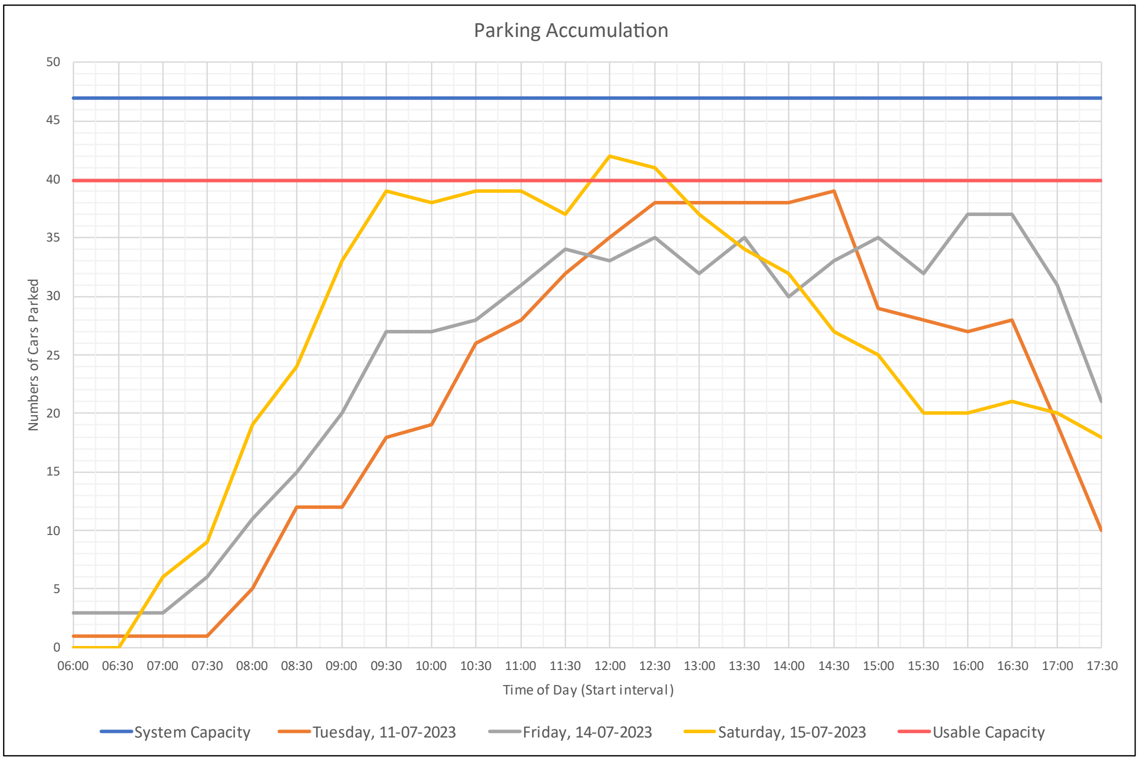


Figure 3-19: Off-peak Period Parking Accumulation – Usable and System Capacity (Off-Street Free Parking)

From the above, a maximum peak parking saturation of 89% was observed during the off-peak period taking into considering the off-street free parking areas within the study area. The maximum usable capacity was exceeded during the off-peak period on the Saturday between 12:00 and 12:30 During the off-peak period, a significant lower demand was observed compared to the peak period.

3.5.3.4 Focus Area (excluding illegal parking)

The peak period parking accumulation against time, usable and system capacity for all the parking areas in the focus area are illustrated in Figure 3-20.

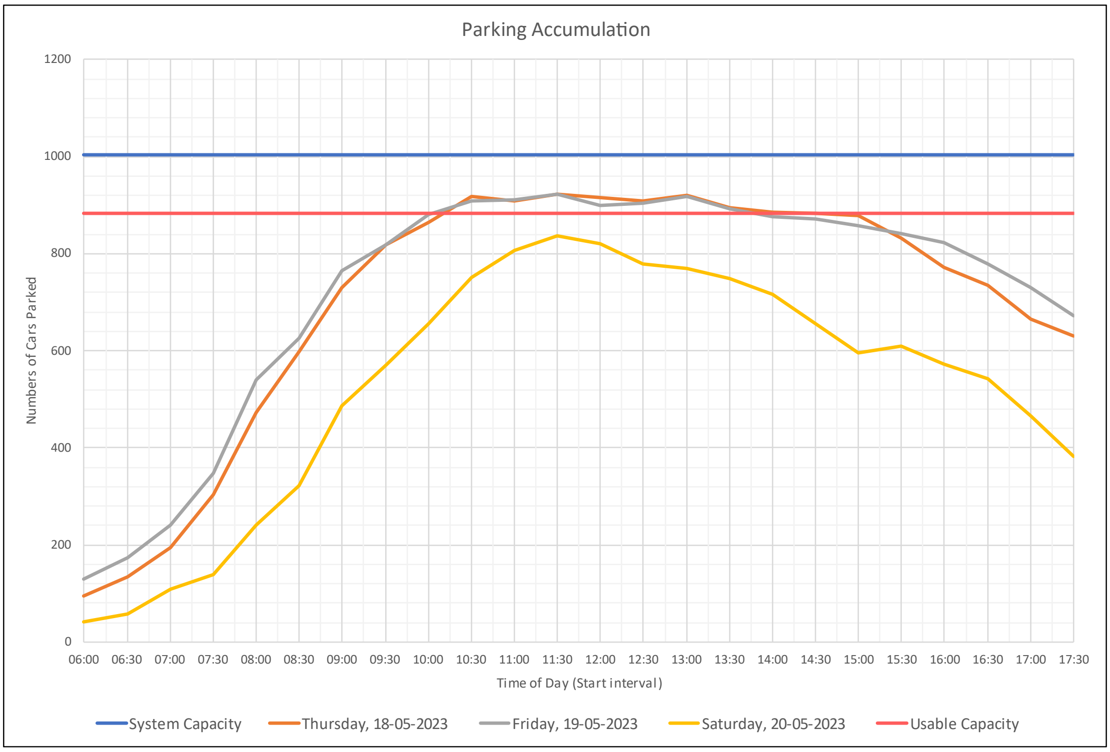


Figure 3-20: Peak Period Parking Accumulation – Usable and System Capacity (Focus Area)

From the above, an overall maximum peak parking saturation of 92% was observed during the peak period taking into considering all the parking areas within the focus area. It can be seen that the demand for the focus area exceeded the maximum usable capacity (approximately 4 hours) during the weekday in the peak period. As a result of the overall parking demand for on-street free parking exceeding the maximum usable capacity, traffic circulation is expected.

The off-peak period parking accumulation against time, usable and system capacity for all the parking areas in the focus area are illustrated in Figure 3-21.

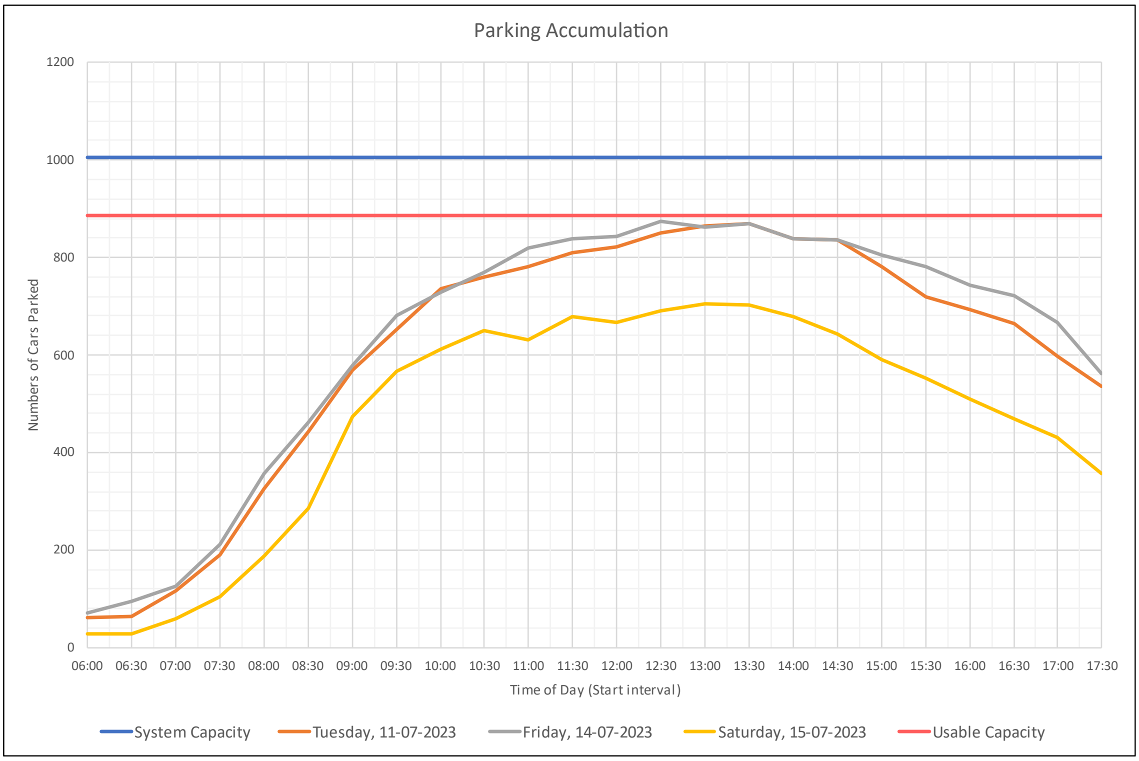


Figure 3-21: Off-peak Period Parking Accumulation – Usable and System Capacity (Focus Area)

From the above, an overall maximum peak parking saturation of 87% was observed during the peak period taking into considering all the parking areas within the focus area. During the off-peak period, a significant lower demand was observed compared to the peak period.

Taking the above into consideration, the need for additional parking in the vicinity of Eikestad Mall is warranted during the peak period.

3.5.3.5 Illegal Parking

The peak period parking accumulation against time for the predefined Illegal parking areas in the study area are illustrated in Figure 3-22.

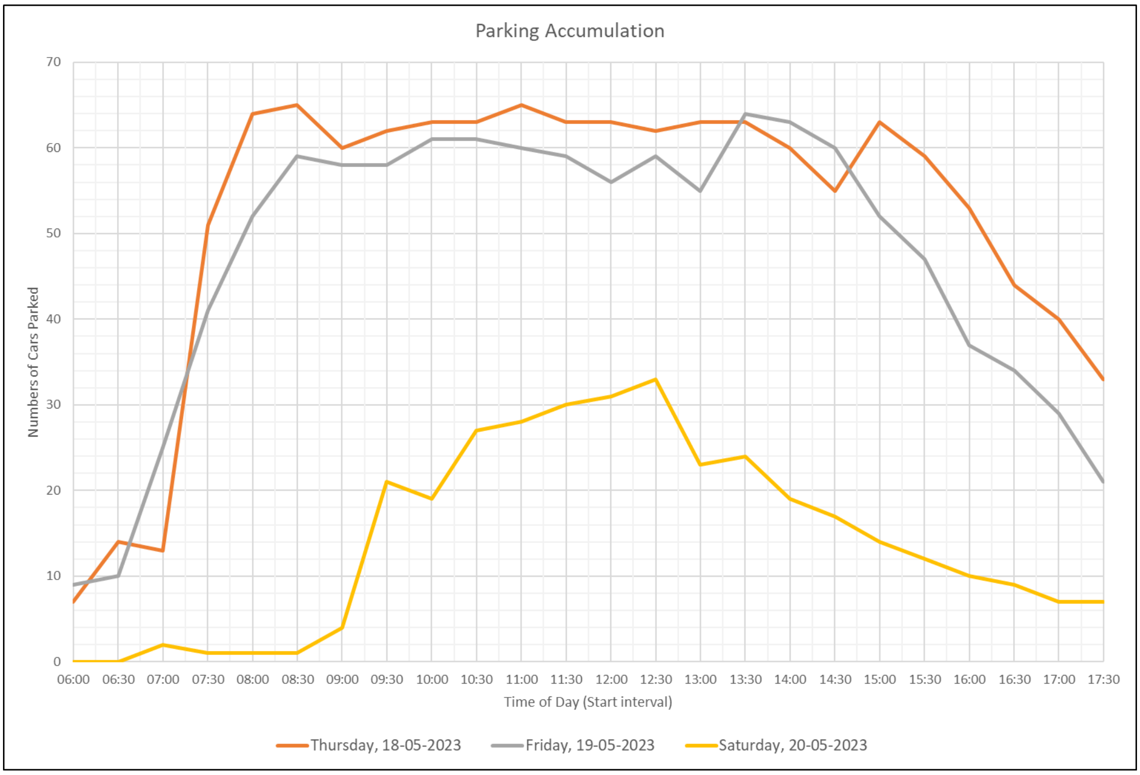


Figure 3-22: Peak Period Parking Accumulation (Illegal Parking)

From the above, an overall maximum of 65 illegally parked vehicles were observed during the peak period at the predefined illegal parking areas within the study area.

The off-peak period parking accumulation against time for the predefined illegal parking areas in the study area are illustrated in Figure 3-23.

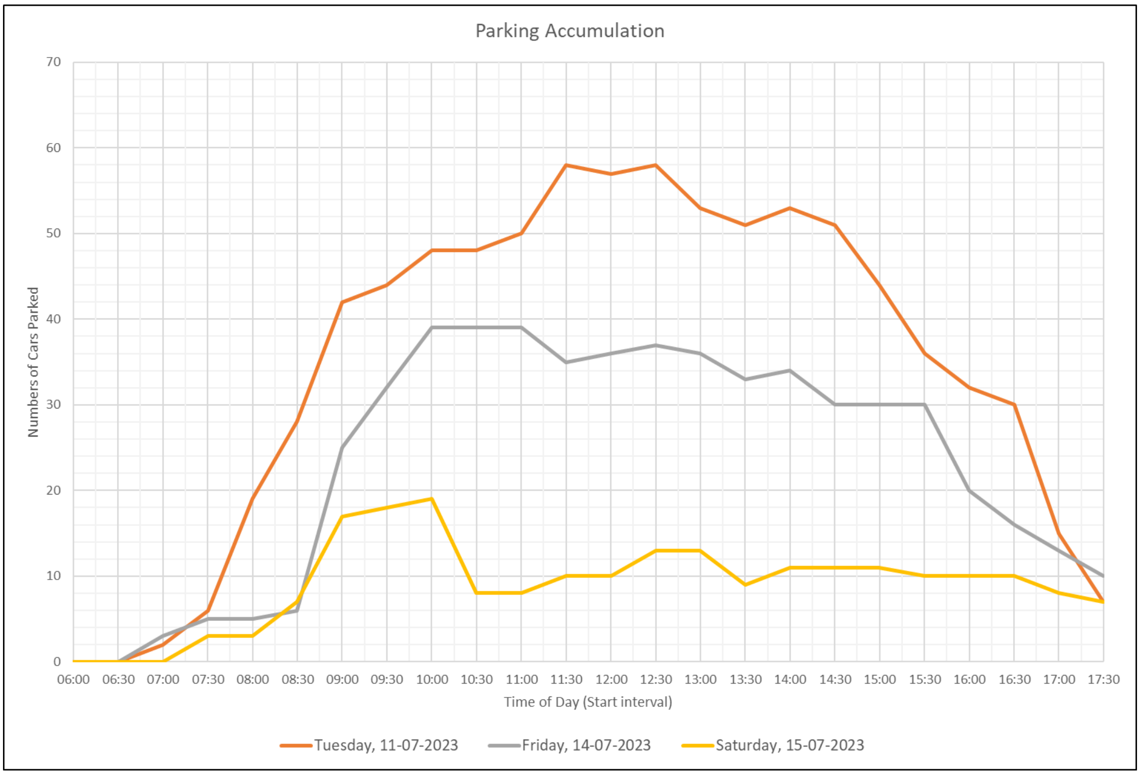


Figure 3-23: Off-peak Period Parking Accumulation (Illegal Parking)

From the above, an overall maximum of 58 illegally parked vehicles were observed during the peak period at the predefined illegal parking areas within the study area.

3.5.4 Stated Preference Survey Results

Stated preference survey data was processed for the peak and off-peak periods. The processed data was analysed and will be discussed in this section of the report. The results of the following will be discussed in more detail for the peak and off-peak periods:

- Main purpose of trips.
- Planned parking duration.
- Is the user willing to pay for parking and how much per hour.
- Reason why the user chose a specific parking area.
- Trip origin.
- How often does the user visit a specific area.

3.5.4.1 Main purpose of the trip

Information on the main purpose of trips to the study area was extracted from the stated preference survey data to evaluate the reasons for trips to the study area utilising the parking facilities. Refer to Figure 3-24 and Figure 3-25 for the peak and off-peak period results.

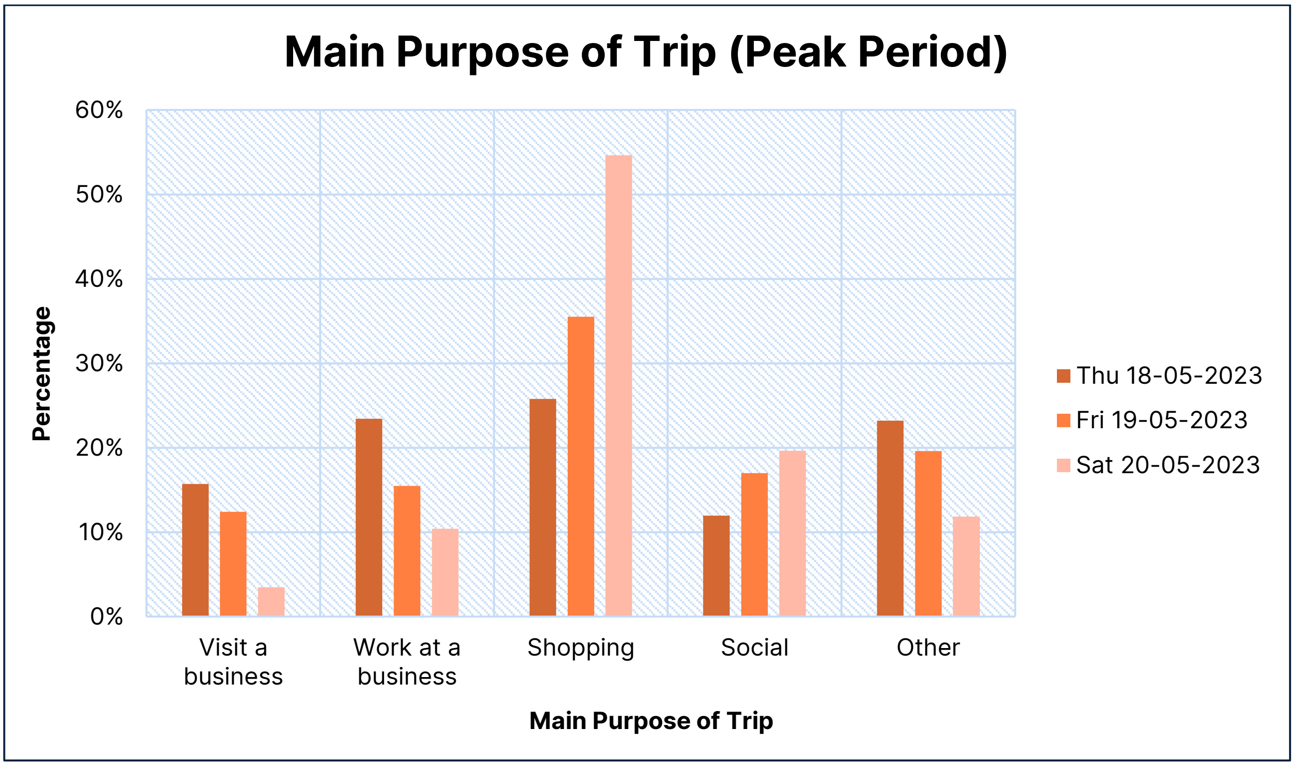


Figure 3-24: Main purpose of trips to the study area utilising the parking facilities: Peak Period

From the above, the following observations were made from the *main purpose of trips to the study area utilising the parking facilities* results on a typical weekday, Friday and Saturday during the peak period:

- Weekday - The main purpose of trips to the study area making use of the parking facilities are mainly for shopping, work at a business and other purposes not mentioned.
- Friday - The main purpose of trips to the study area making use of the parking facilities are mainly for shopping, other purposes not mentioned and social activities.
- Saturday - The main purpose of trips to the study area making use of the parking facilities are mainly for shopping and social activities.

Overall, the observation was made that shopping as the main purpose of trips for Friday and the weekend was significantly higher compared to the other reported trip purposes.

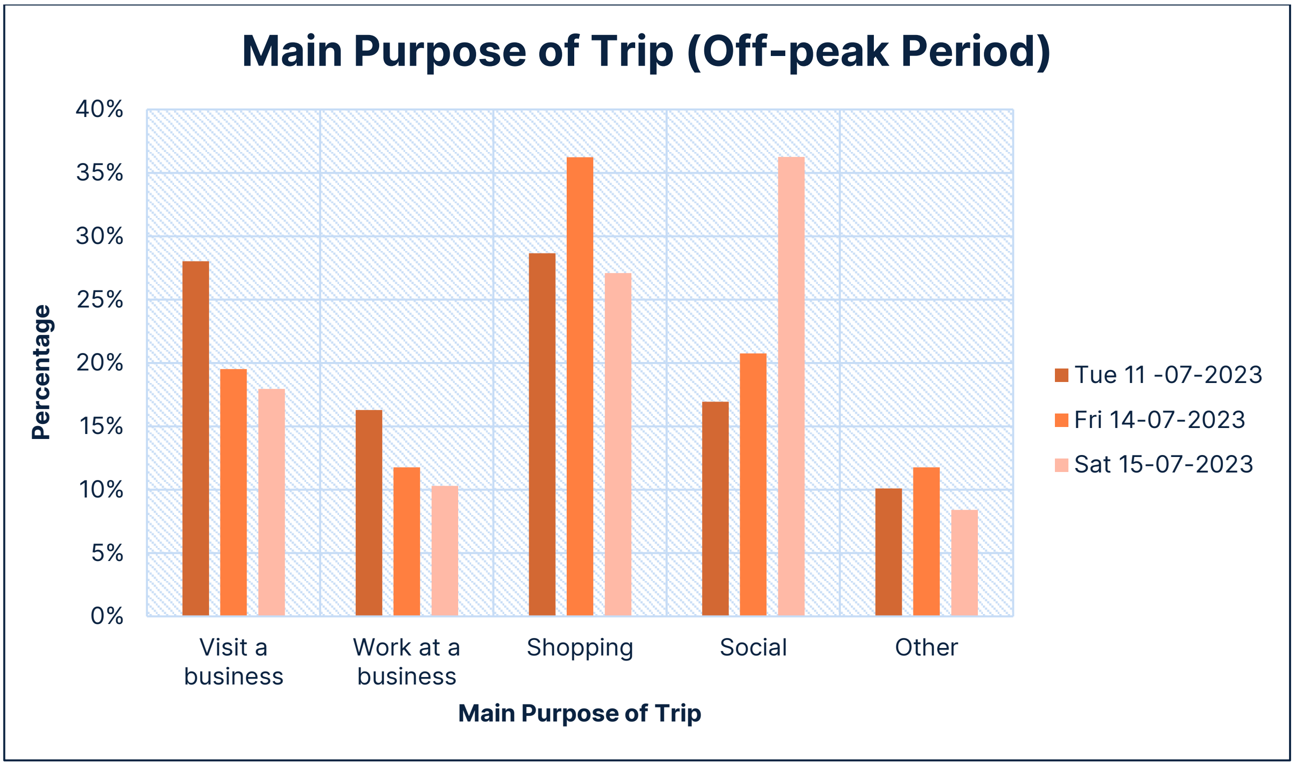


Figure 3-25: Main purpose of trips to the study area utilising the parking facilities: Off-peak Period

From the above, the following observations were made from the *main purpose of trips to the study area utilising the parking facilities* results on a typical weekday, Friday and Saturday during the off-peak period:

- Weekday - The main purpose of trips to the study area making use of the parking facilities are mainly for shopping and to visit a business.
- Friday - The main purpose of trips to the study area making use of the parking facilities are mainly for shopping, social activities and to visit a business.
- Saturday - The main purpose of trips to the study area making use of the parking facilities are mainly for social activities and shopping.

3.5.4.2 Planned parking duration

Information on the planned parking duration was extracted from the stated preference survey data to evaluate the planned parking duration in the study area. Refer to Figure 3-26 and Figure 3-27 for the peak and off-peak period results.

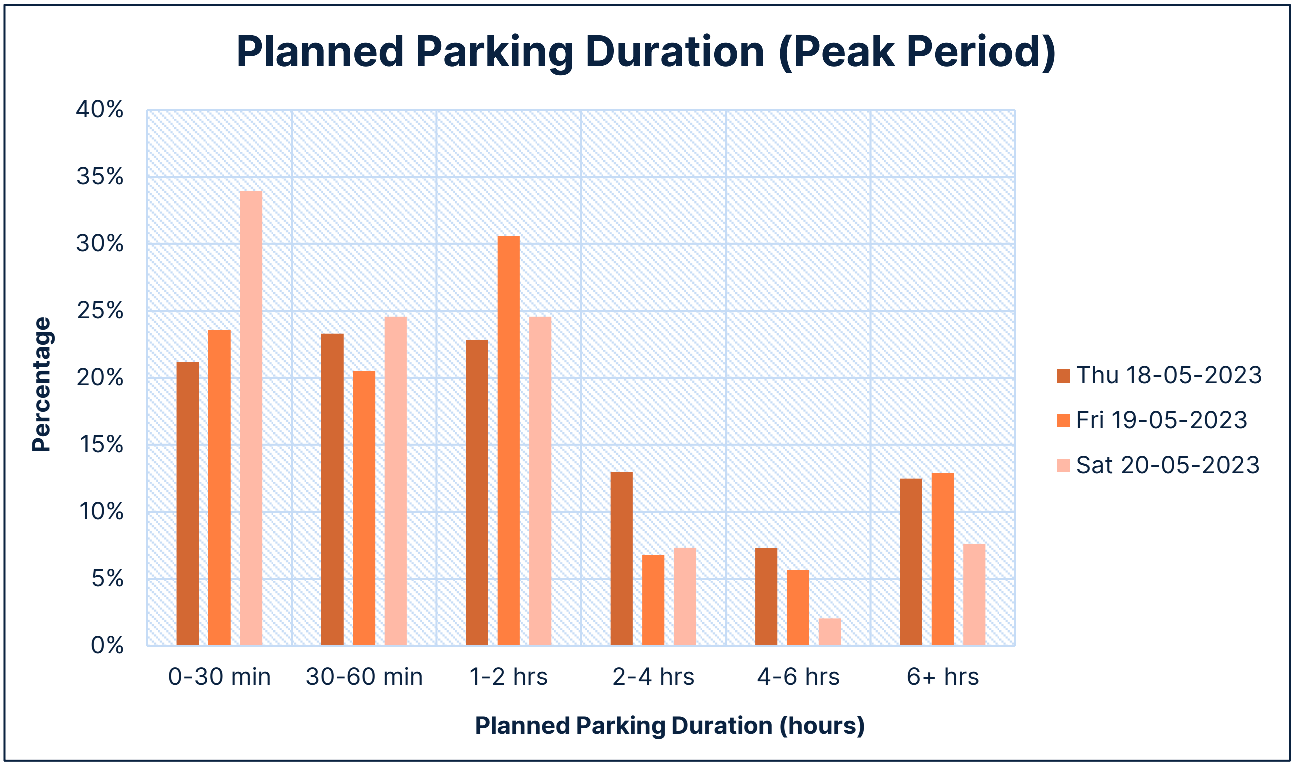


Figure 3-26: Planned parking duration in the study area: Peak Period

From the above, it was identified that majority of users planned to park for 0 – 2 hours on a typical weekday, Friday and Saturday during the peak period. It was also identified that short parking durations are much more favourable than longer parking durations.

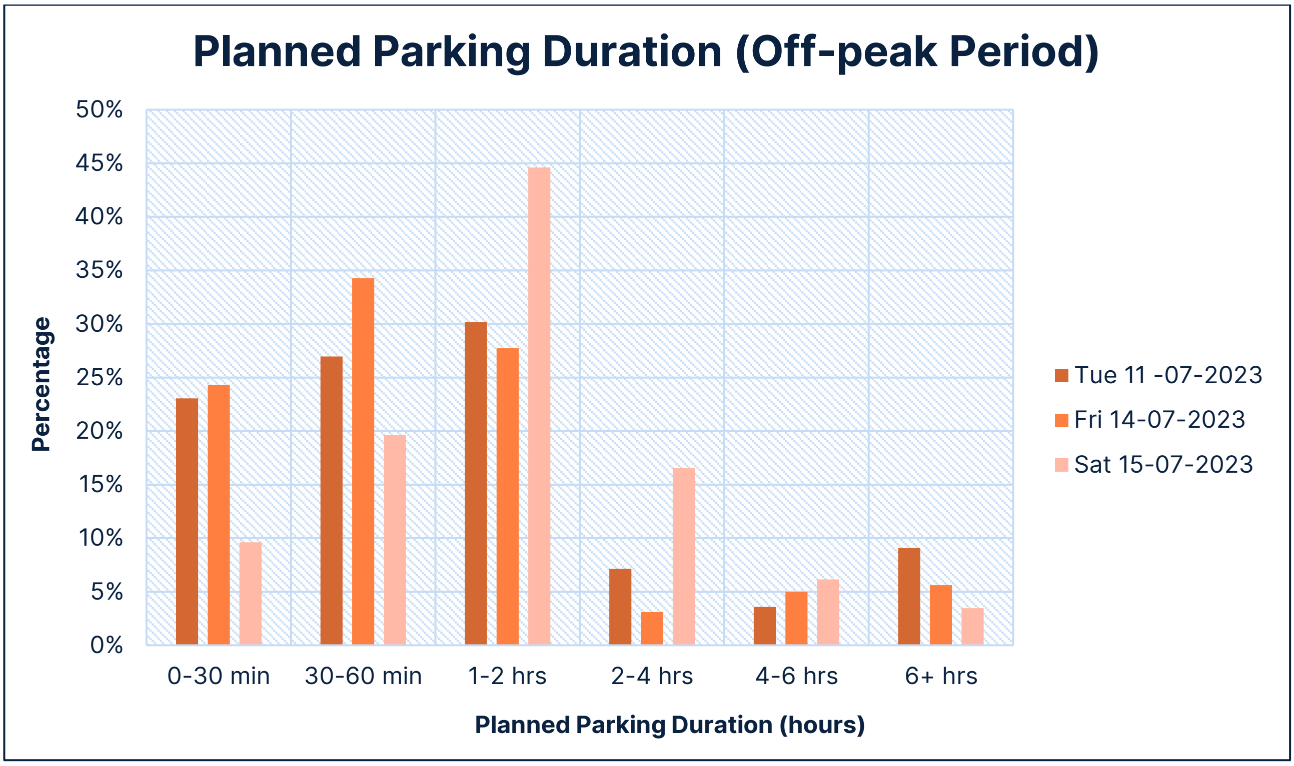


Figure 3-27: Planned parking duration in the study area: Off-peak Period

From the above, a similar trend in the parking duration was observed for the off-peak period compared to the peak period.

3.5.4.3 Is the user willing to pay for parking and how much per hour

Information was extracted from the stated preference survey data on *the willingness to pay for parking in the study area* and if no free parking was available, how much is the user willing to pay for a parking in a preferred area. Refer to Figure 3-28 and Figure 3-29 for the peak and off-peak period results.

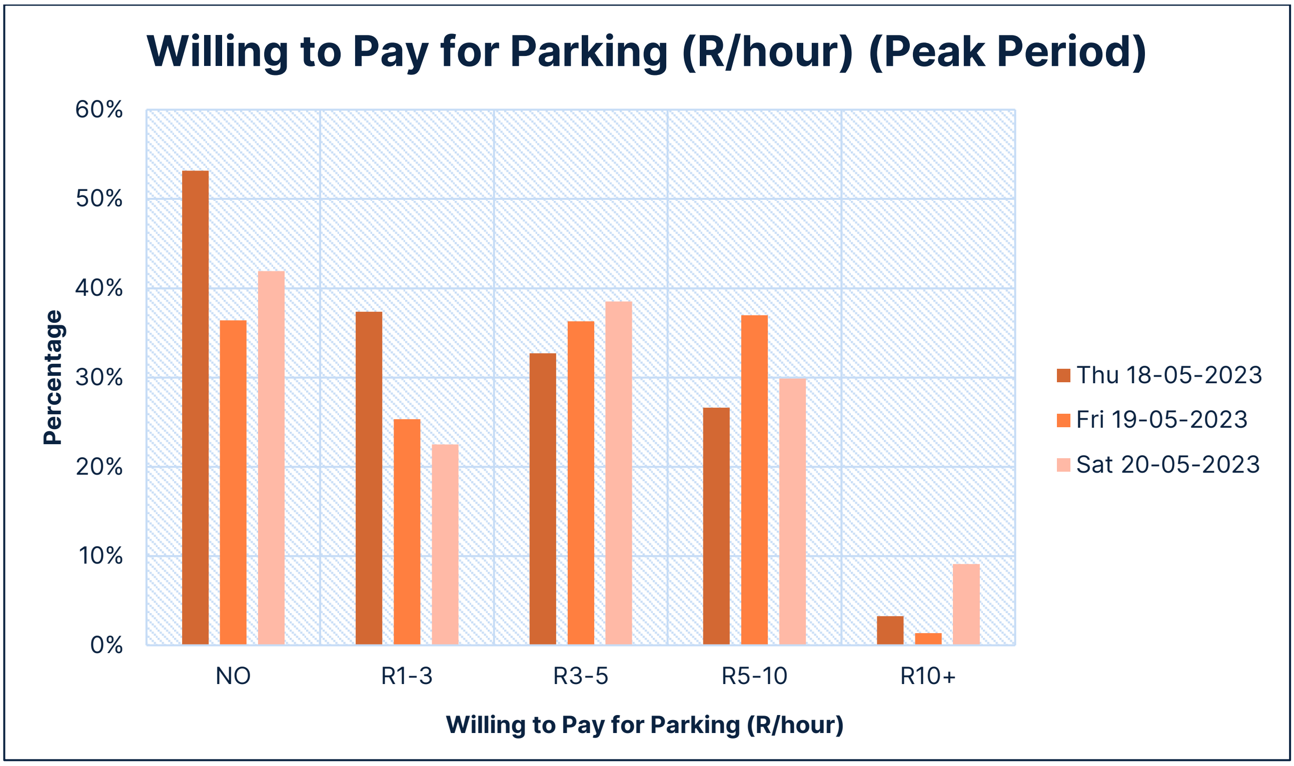


Figure 3-28: Willingness to pay for parking in the study area: Peak Period

From the above, a similar trend in the willingness to pay for parking was identified for Friday and Saturday during the peak period. Overall, between 36% and 53% of the parking users do not want to pay for parking, but if no free parking was available, majority would consider paying a parking fee of between R1 and R10 per hour.

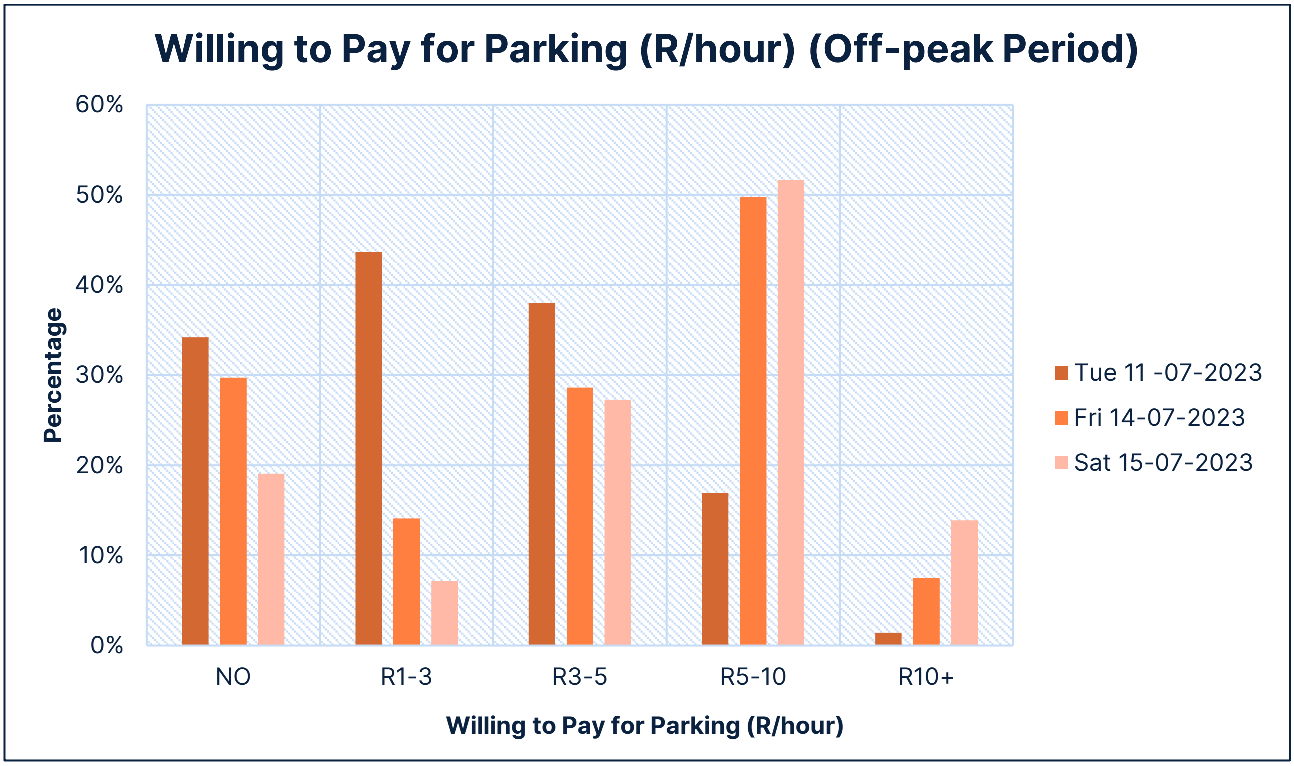


Figure 3-29: Willingness to pay for parking in the study area: Off-peak Period

From the above, between 19% and 34% of the parking users do not want to pay for parking during the off-peak period. However, if no free parking was available, majority would consider paying a parking fee of between R1 and R10 per hour during a typical off-peak weekday and between R3 and R10 per hour on a typical off-peak Friday and Saturday. An increase in the willingness to pay for parking during off-peak periods compared to peak periods was identified.

3.5.4.4 Reason why the user chose a specific parking area

Information was extracted from the stated preference survey data on the reason why parking users chose specific parking bays in the study area. Refer to Figure 3-30 and Figure 3-31 for the peak and off-peak period results.

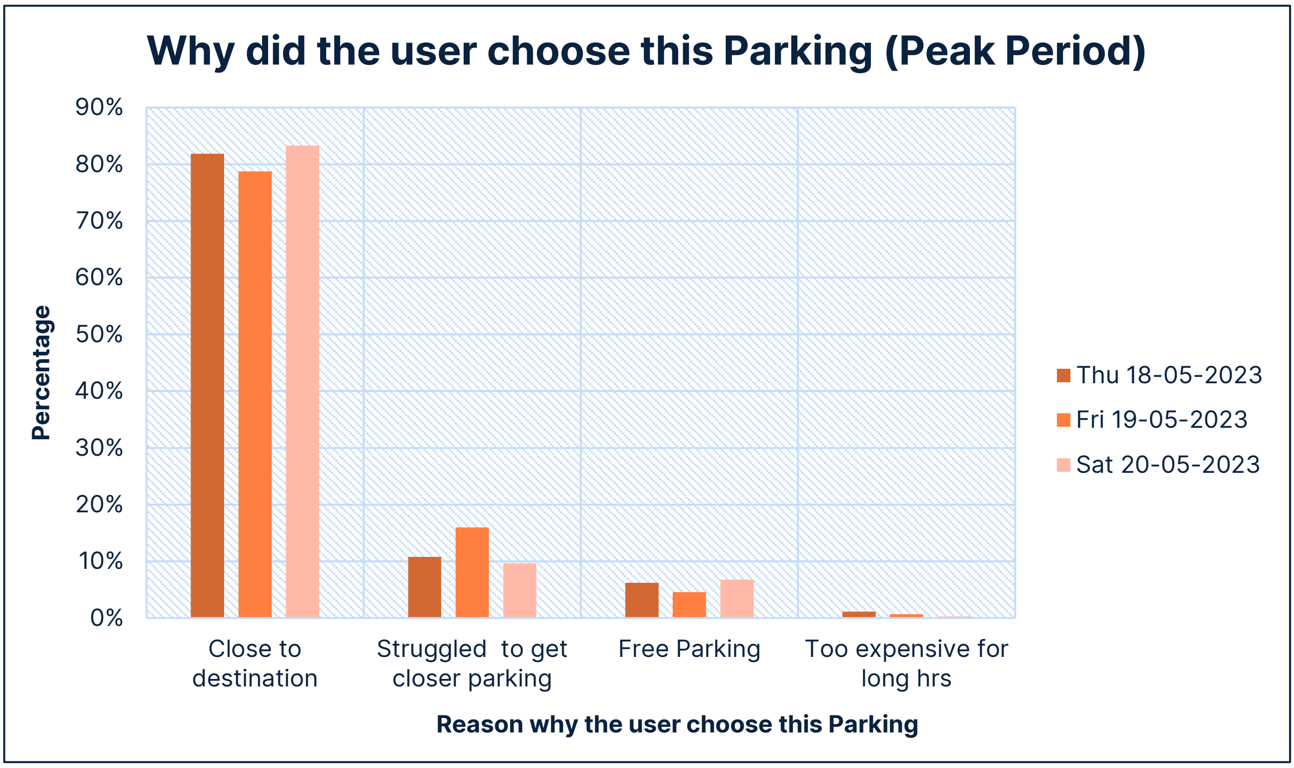


Figure 3-30: Reason why the user chose the specific parking area: Peak Period

From the above, it was identified that for all three days in the peak period, majority of the parking users chose the closest parking to their destination. It was also identified that parking close to destination is much more favourable than free parking. However, the number of paid parking spaces is much higher than the number of free parking spaces. Therefore, although it seems that parking close to destination is much more favourable than free parking, it is not a true reflection of reality.

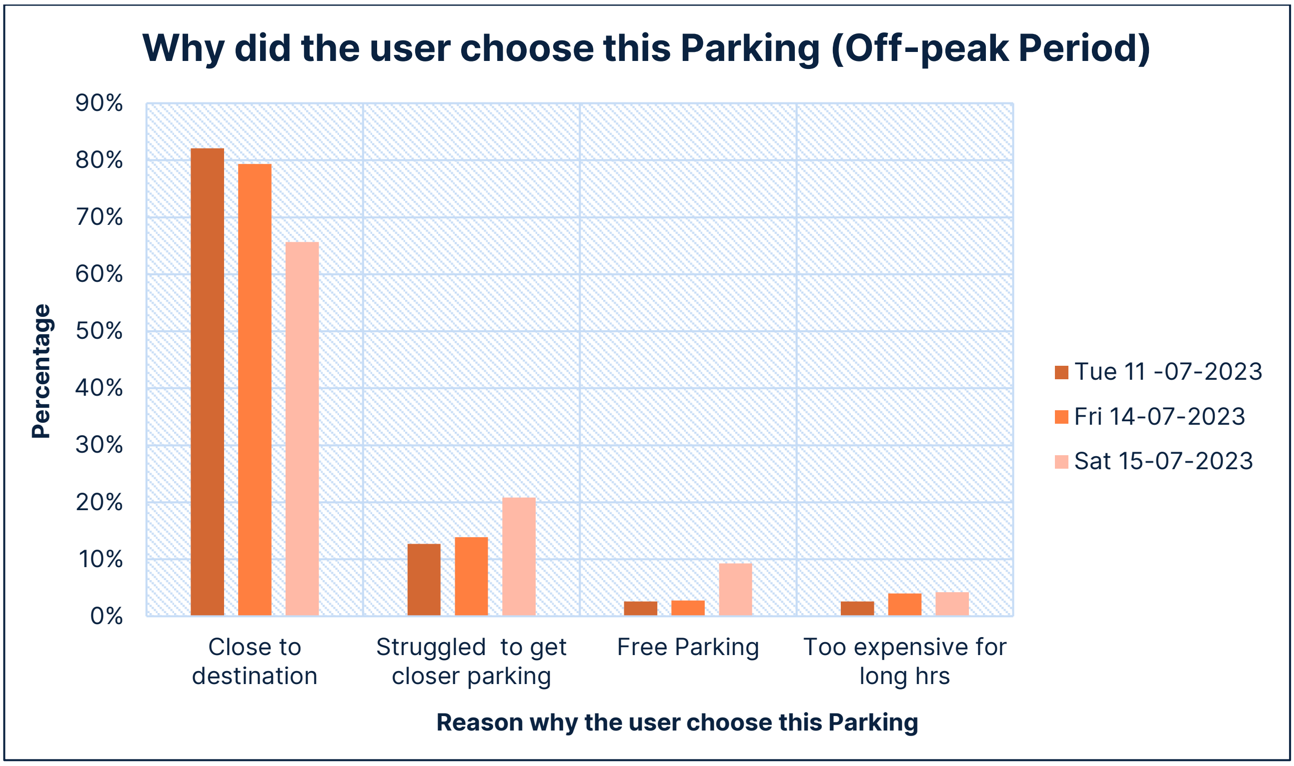


Figure 3-31: Reason why the user chose the specific parking area: Off-peak Period

From the above, a similar trend in the reason why users chose a specific parking area in the study area during the peak period was observed during the off-peak period.

3.5.4.5 Trip origin

Information on the trip origin to the study area was extracted from the stated preference survey data. This information was extracted to identify the percentage of users traveling from inside or outside Stellenbosch to the study area. Furthermore, the parking users were then grouped based on the direction of travel from inside Stellenbosch to the study area. Refer to Figure 3-32 and Figure 3-33 for the peak and off-peak period results.

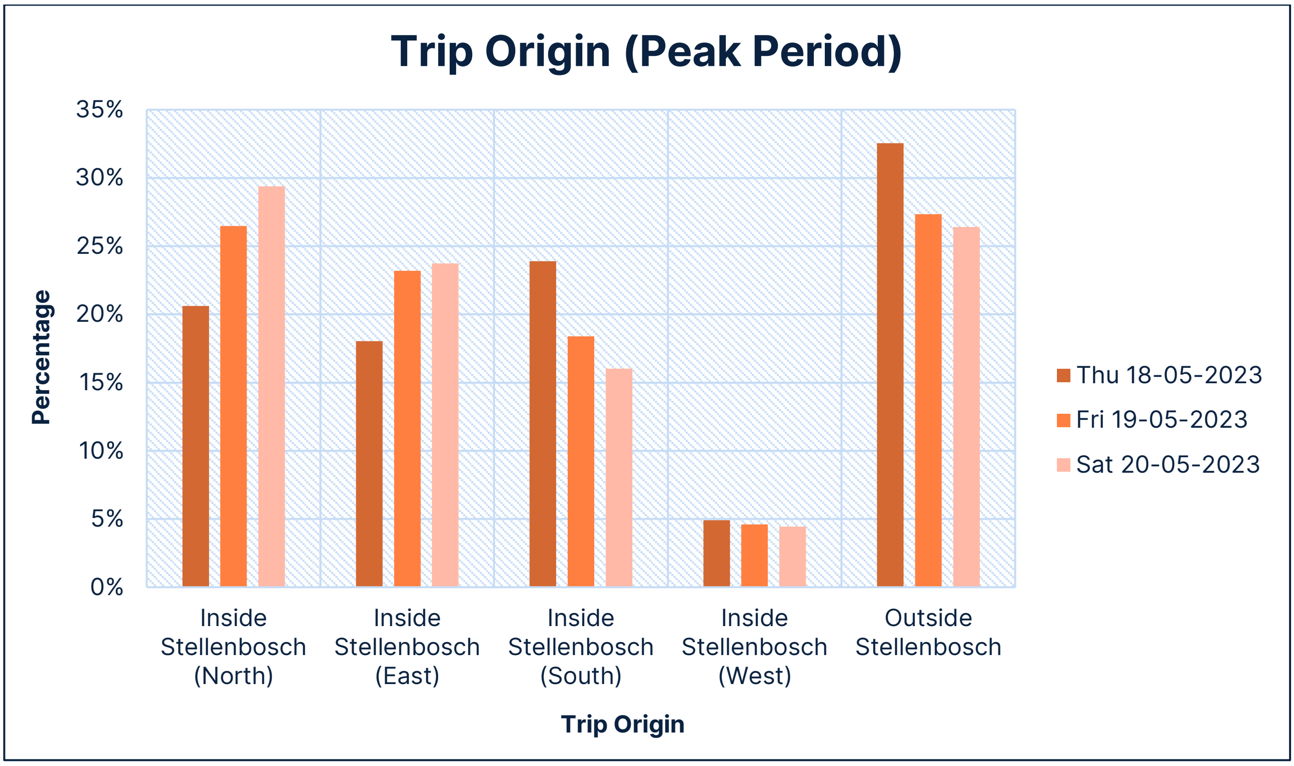


Figure 3-32: Trip origin of the parking users: Peak Period

From the above, majority of the trip origins were recorded from inside Stellenbosch during the peak period. From the weekday data, majority of the internal trip origins were recorded from the south and from the Friday and Saturday data, majority of the internal trip origins were recorded from the north.

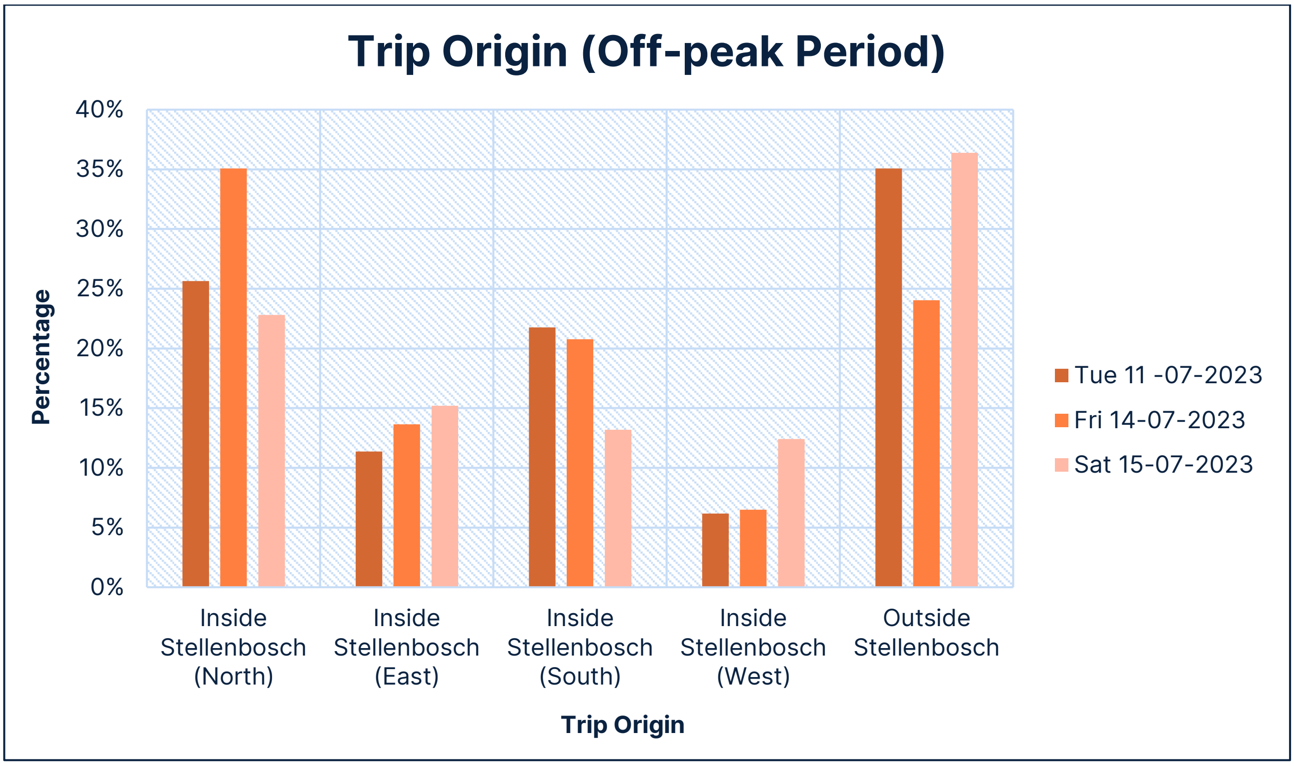


Figure 3-33: Trip origin of the parking users: Off-peak Period

From the above, majority of the trip origins were recorded from inside Stellenbosch during the off-peak period. From the off-peak period data, majority of the internal trip origins were recorded from the north.

3.5.4.6 How often does the user visit a specific area

Information was extracted from the stated preference surveys on how often a user visits the study area utilising the parking facilities. This information was extracted to evaluate the parking needs and potentially how familiar the users are with the parking areas in the study area. Refer to Figure 3-34 and Figure 3-35 for the peak and off-peak period results.

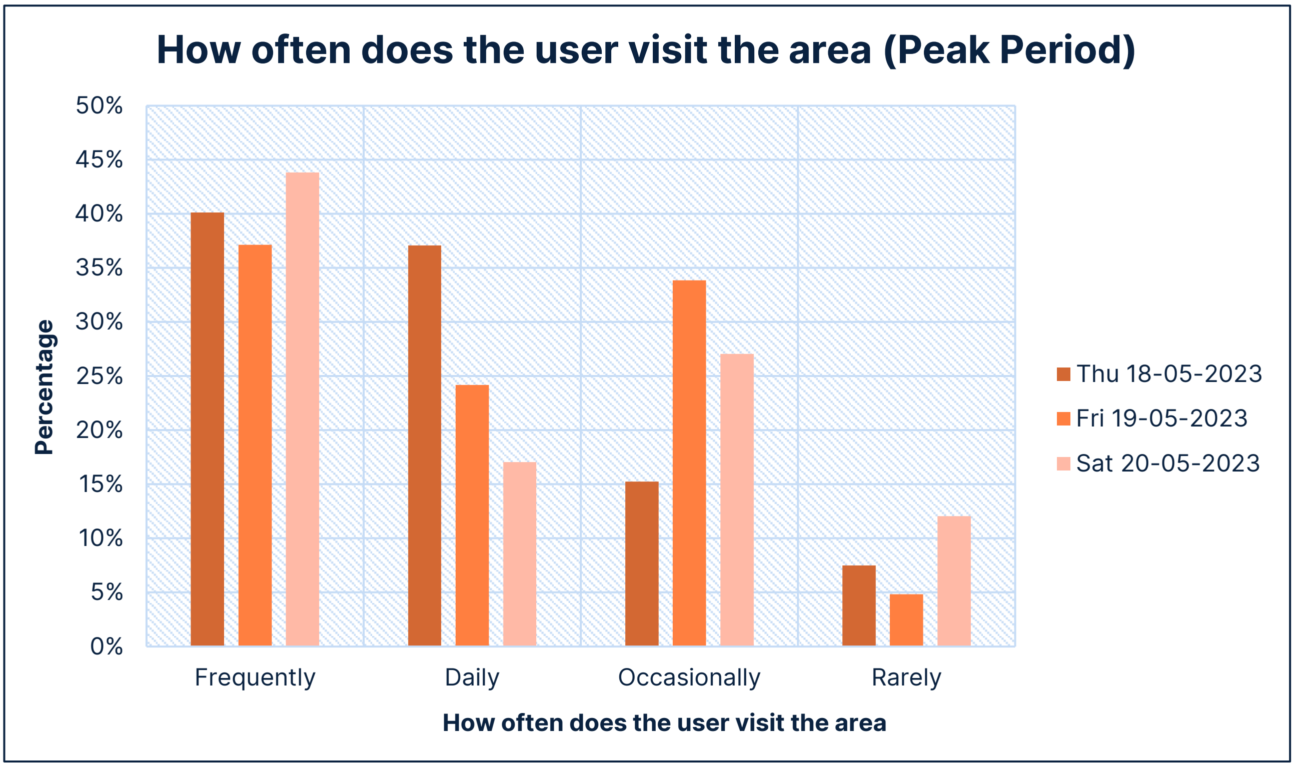


Figure 3-34: How often does the parking users visit the study area: Peak Period

From the above, it was identified that majority of the parking users frequently visit the study area and minority of the users rarely visit the study area. Therefore, the assumption can be made that the parking users are familiar with the parking areas in the study area during the peak period.

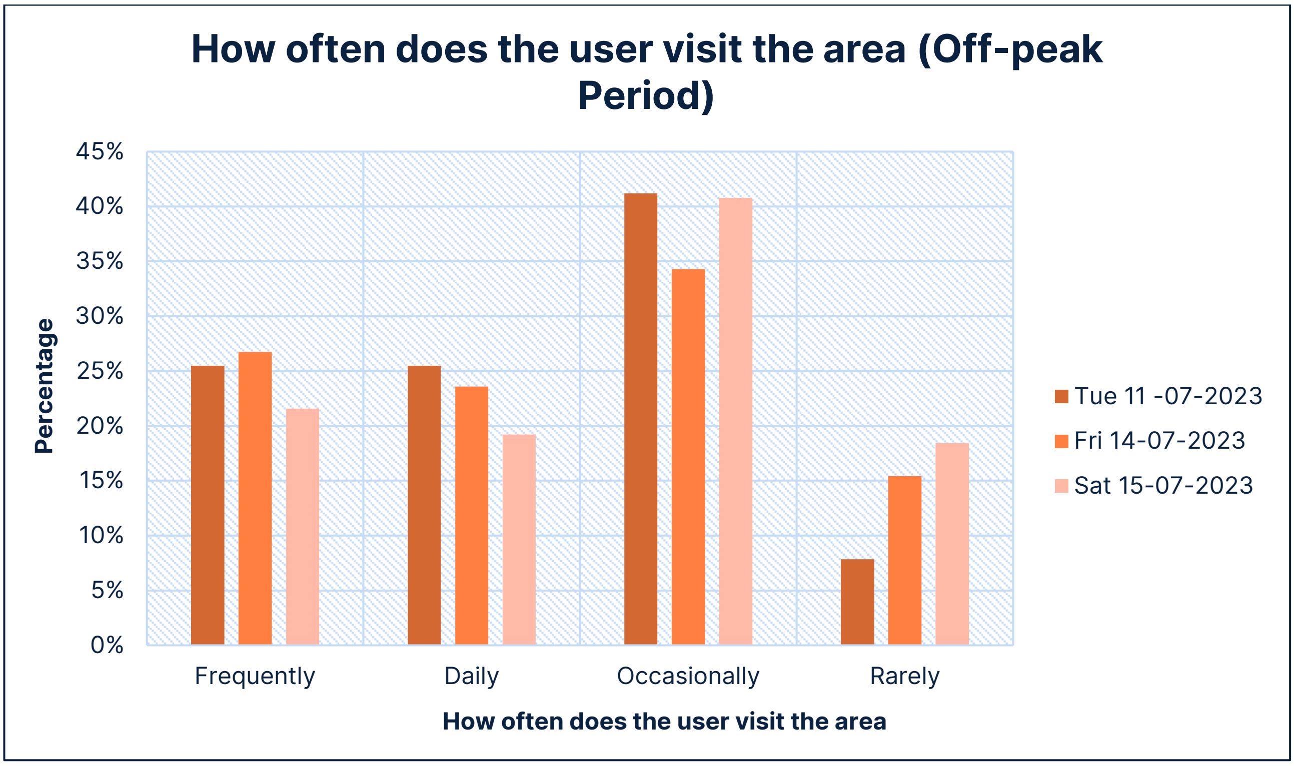


Figure 3-35: How often does the parking users visit the study area: Off-peak Period

From the above, it was identified that majority of the parking users occasionally visit the study area and minority of the users rarely visit the study area. Therefore, the assumption can be made that the parking users are relatively familiar with the parking areas in the study area during the off-peak period.

3.5.4.7 General Feedback from the public

From interviews with parking users on-site, undertaken during 2020 and 2023, complaints were received on the parking payment method and parking rates. Users were very unhappy with card payment being the only option to pay for parking and that they are required to pay such small amounts using a card. Users were also unhappy with regular payments when they park at various parking areas in the study area on the same day. Complaints were received on the duration of processing payments at the Eikestad off-street parking area. The payment processing takes too long.

People would rather consider shopping at Stellenbosch Square, Paarl or Somerset-West instead of Eikestad mall. One of the shop owners in Eikestad mall mentioned that their sales decreased with as much as 30% since they implemented the new parking system in the study area. Some of the users requested pension discount.

In addition to payment method and parking rate concerns, the users also had concerns regarding security and safety. They note that even when paying for parking, they are not guaranteed personal safety or vehicle security. Users note that better access control is required as informal ‘car guards’ demand payment in addition to the existing parking rates.

3.6 2020 vs 2021 vs 2023 Survey Results

Data was collected on 15, 18 and 19 September 2020 during Level 1 of the National Covid19 Lockdown, which had a big impact on the transport sector in Stellenbosch and the rest of South Africa. The total daily traffic count data for all the major roads entering and exiting Stellenbosch were evaluated to determine the impact of Covid19 on traffic patterns and whether the traffic condition normalise after lockdown. Refer to Figure 3-36.

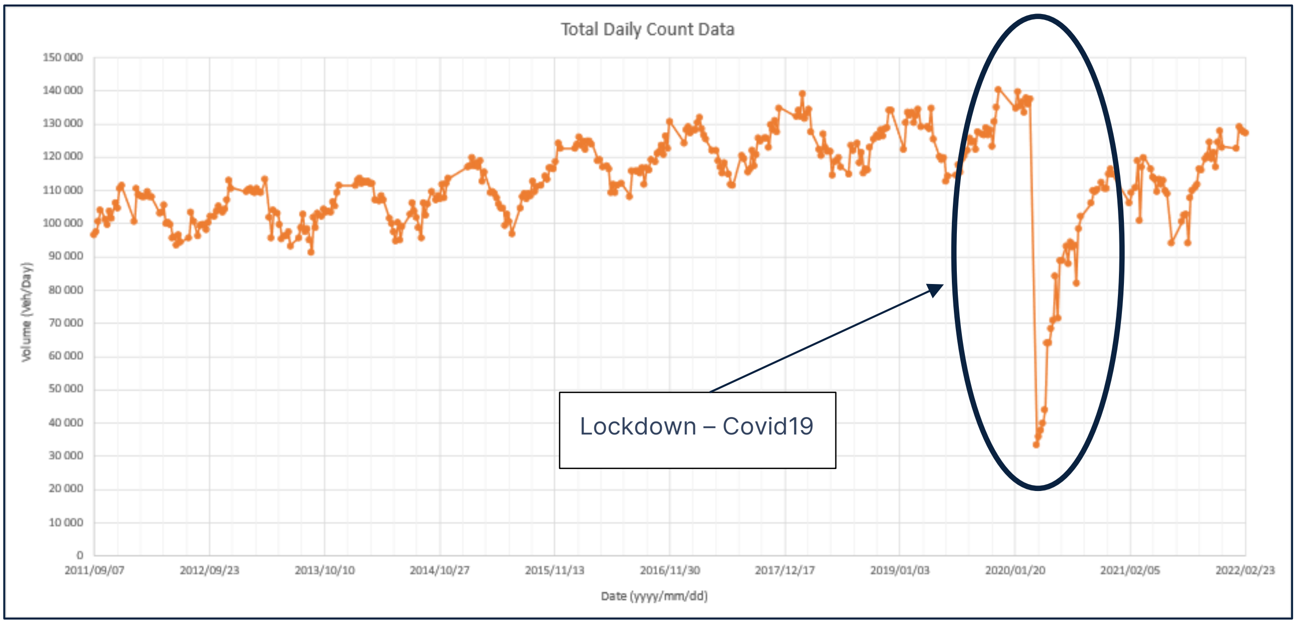


Figure 3-36: Total daily count data of the 7 counting stations together

From the above, it can be seen that the total daily volumes decreased from 137 488 vehicles per day to 33 569 vehicles per day when the National Lockdown was implemented. During the initial surveyed period (15, 18 and 19 September 2020), the daily volume was recorded to be approximately 100 361 vehicles per day.

Lockdown Level 1 is an activity that occurs occasionally, and it would not be appropriate to use the data to represent the typical worst-case condition. In 2021, as the universities reopened, the data was re-assessed between 22 and 24 April 2021. However, due to lockdown regulations there was an assumed large reduction in tourists visiting Stellenbosch compared to previous years.

The growth rate using data up until 2019 was calculated as a 2.57% compounded. Considering the data up until 2021, a compound growth rate of 1.06% was calculated. Therefore, due to the implications of Covid19 on the daily traffic volumes, the compound growth rate using data up until 2019 was used for further calculations.

In addition to obtaining the growth rate, calibrations were done by re-surveying selected parking areas in the focus area to determine the impact on the parking demand during COVID 19 when the university was closed (2020) compared to lower Covid19 lockdown levels (2021). However, it must be noted that South Africa was still a high-risk travel destination area during the April 2021 survey period and as such there were limited international tourists visiting Stellenbosch. Stellenbosch is a sought-after tourist destination, and the CBD is a major tourist attraction. Note should be taken that the surveys done in 2021 still did not reflect a true reflection of the peak demand.

During 2023, surveys were undertaken again during more normal conditions compared to prior Covid19 to update the parking demand calculations. Note should be taken that since Covid19, the daily traffic volumes were still not on the same level as pre Covid19. Refer to Figure 3-37 for a total daily volume plot for the 6 permanent counting stations for which data was available from 07 September 2011 up until 21 June 2023.

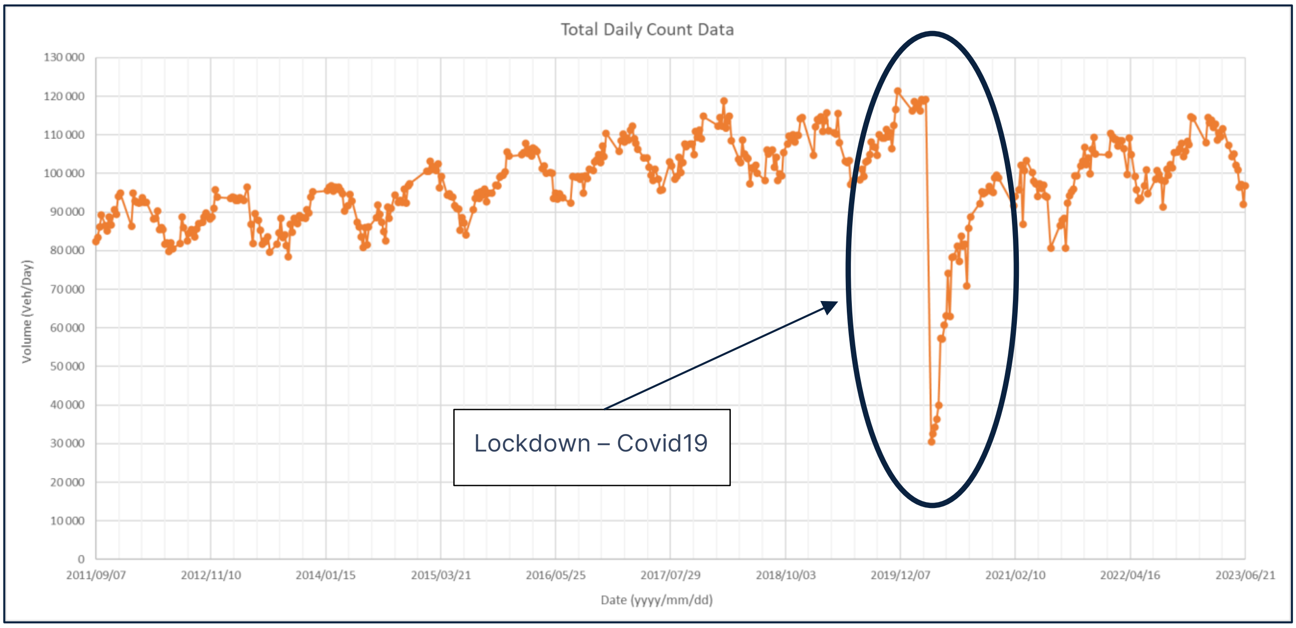


Figure 3-37: Total daily count data of the 6 counting stations together

From the above, the maximum total daily volume for the six counting stations was 121 338 vehicles on 27 November 2019 and on 07 December 2022 the maximum total daily volume was 114 275 vehicles. This is 6.18% lower in 2022 compared to 2019.

The parking survey data for the three years surveyed (2020, 2021 and 2023) were compared for the following parking areas:

- All parking areas
- Eikestad Underground Parking
- Eikestad Mall Off-Steet Parking Area

3.6.1 Eikestad Underground Parking

Refer to Table 3-16 for a summary of the Eikestad Underground parking area parking characteristics from the 2020, 2021 and 2023 peak periods parking surveys.

The parking accumulation against time, usable and system capacity for the Eikestad Underground parking area are illustrated in Figure 3-38, Figure 3-39 and Figure 3-40 for the weekday, Friday and Saturday respectively, comparing the 2020, 2021 and 2023 survey data.

Table 3-16: Eikestad Underground Parking: 2020 vs 2021 vs 2023

Parking Characteristics			2020			2021			2023		
			Weekday	Friday	Saturday	Weekday	Friday	Saturday	Weekday	Friday	Saturday
Survey Duration (hours)			12	12	12	12	12	12	12	12	12
Total Number of Parking Spaces			520	520	520	520	520	520	520	520	520
Parking Volume (vehicles)			1505	1588	1144	1684	1790	1579	2024	1968	1442
Peak Parking Saturation			0.440	0.504	0.402	0.535	0.552	0.483	0.608	0.600	0.379
Parking Load (vehicle hour)			752.5	794	572	842	895	789.5	1012	984	721
Peak Parking Ratio			1.544	1.669	1.625	1.491	1.670	1.848	1.615	1.511	1.691
Average Parking Duration (hours)			1.858	1.600	1.306	1.802	1.742	1.219	1.622	1.709	1.124
Parking Turnover			2.894	3.054	2.200	3.238	3.442	3.037	3.892	3.785	2.773
Parking index	Full day	Max	44%	50%	40%	53%	55%	48%	61%	60%	38%
		Average (06:00 - 18:00)	29%	30%	25%	36%	33%	26%	38%	40%	22%
	AM	Average (06:00 - 12:00)	26%	30%	18%	39%	34%	24%	29%	33%	20%
		Max (06:00 - 12:00)	44%	50%	38%	53%	55%	48%	58%	59%	38%
	PM	Average (12:00 - 18:00)	31%	31%	32%	33%	32%	28%	46%	46%	25%
		Max (12:00 - 18:00)	44%	43%	40%	48%	54%	43%	61%	60%	35%

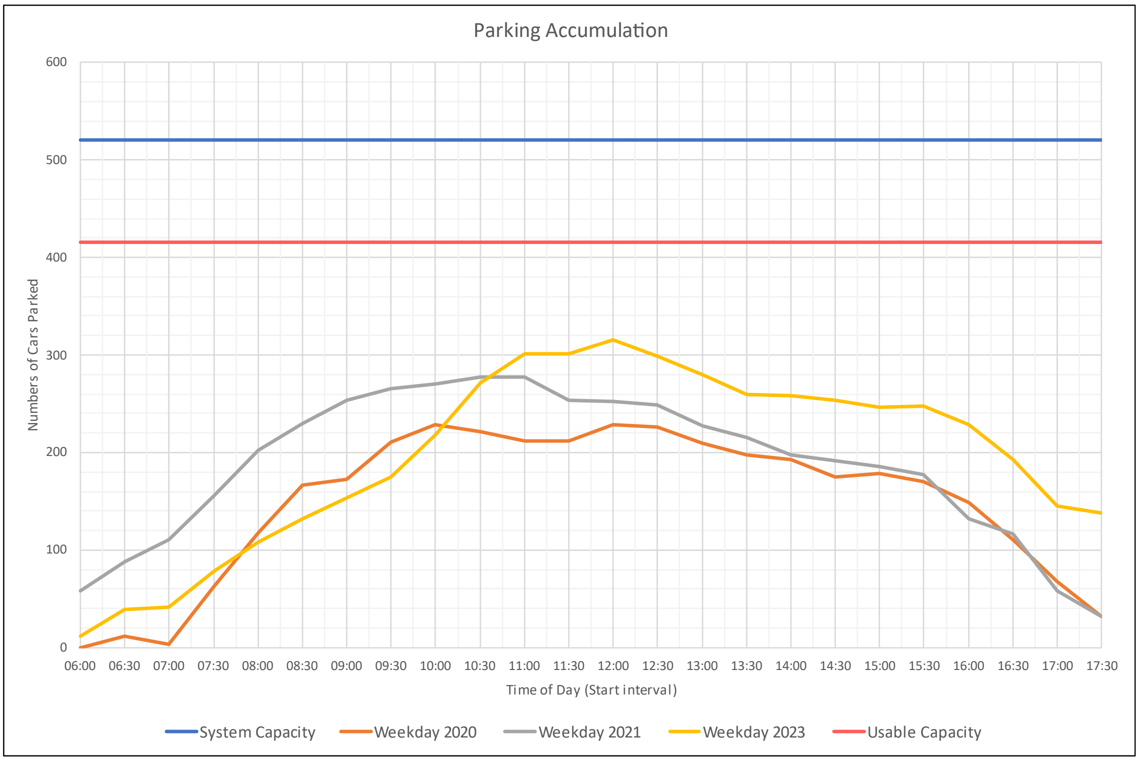


Figure 3-38: Parking Accumulation – 2020 vs 2021 vs 2023 Weekday (Eikestad Underground Parking)

From the above, a 21% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a further 14% increase was observed from 2021 to 2023 during typical weekdays.

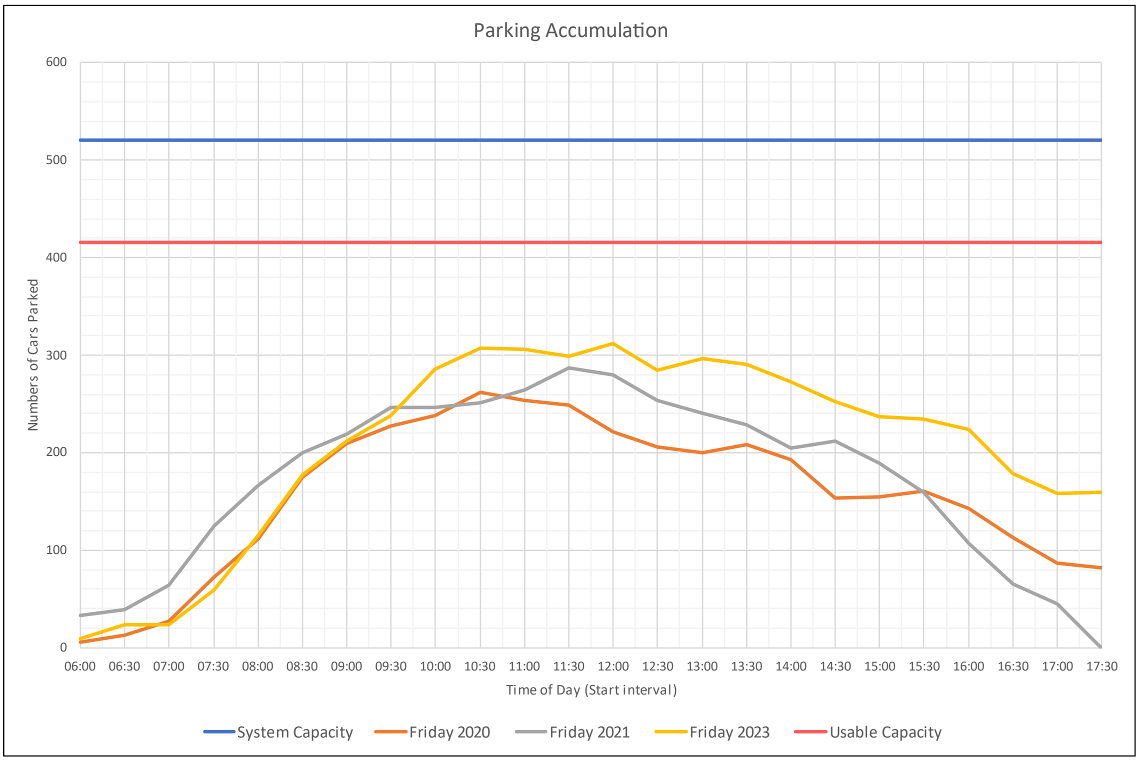


Figure 3-39: Parking Accumulation – 2020 vs 2021 vs 2023 Friday (Eikestad Underground Parking)

From the above, a 10% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a further 9% increase was observed from 2021 to 2023 during typical Fridays.

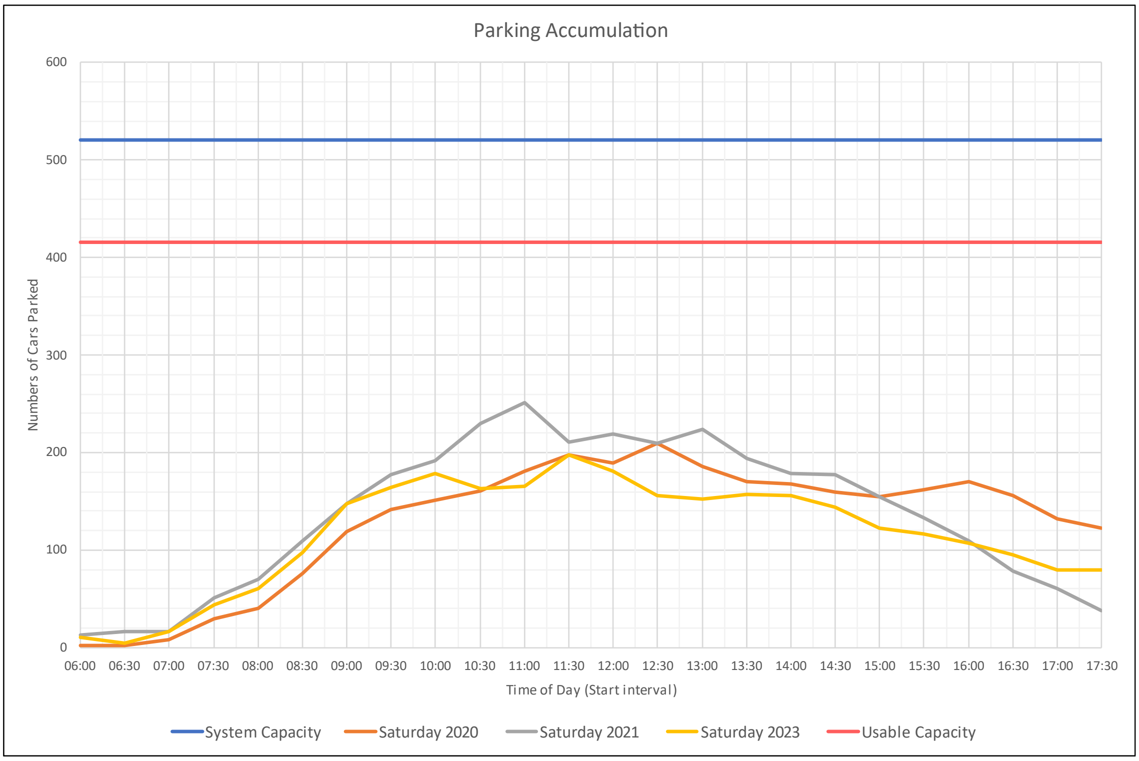


Figure 3-40: Parking Accumulation – 2020 vs 2021 vs 2023 Saturday (Eikestad Underground Parking)

From the above, a 20% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a 22% decrease was observed from 2021 to 2023 during typical Saturdays.

From Figure 3-38, Figure 3-39 and Figure 3-40, it can be seen that for all three years surveyed, the parking demand did not exceed the system or usable capacity for Eikestad Underground Parking.

3.6.2 Eikestad Mall Off-Street Parking Area

Refer to Table 3-17 for a summary of the Eikestad Mall Off-Street parking area parking characteristics from the 2020, 2021 and 2023 peak periods traffic surveys.

The parking accumulation against time, usable and system capacity for the Eikestad Mall Off-Steet parking area are illustrated in Figure 3-41, Figure 3-42 and Figure 3-43 for the weekday, Friday and Saturday respectively, comparing the 2020, 2021 and 2023 survey data.

Table 3-17: Eikestad Mall Off-Street Parking Area: 2020 vs 2021 vs 2023

Parking Characteristics			2020			2021			2023		
			Weekday	Friday	Saturday	Weekday	Friday	Saturday	Weekday	Friday	Saturday
Survey Duration (hours)			12	12	12	12	12	12	12	12	12
Total Number of Parking Spaces			248	248	248	248	248	248	248	248	248
Parking Volume (vehicles)			750	804	684	1012	1327	1149	988	1142	1199
Peak Parking Saturation			0.448	0.423	0.403	0.536	0.726	0.645	0.992	0.992	0.835
Parking Load (vehicle hour)			375	402	342	506	663.5	574.5	494	571	599.5
Peak Parking Ratio			1.719	1.618	1.684	1.579	1.641	1.625	1.308	1.325	1.552
Average Parking Duration (hours)			1.378	1.439	1.409	1.372	1.371	1.554	4.019	3.506	2.371
Parking Turnover			3.024	3.242	2.758	4.081	5.351	4.633	3.984	4.605	4.835
Parking index	Full day	Max	45%	42%	40%	54%	73%	65%	99%	99%	83%
		Average (06:00 - 18:00)	26%	26%	24%	34%	44%	40%	76%	75%	54%
	AM	Average (06:00 - 12:00)	17%	16%	18%	21%	28%	25%	61%	58%	37%
		Max (06:00 - 12:00)	40%	33%	38%	48%	65%	63%	99%	99%	83%
	PM	Average (12:00 - 18:00)	35%	36%	30%	46%	60%	54%	90%	91%	71%
		Max (12:00 - 18:00)	45%	42%	40%	54%	73%	65%	99%	99%	81%

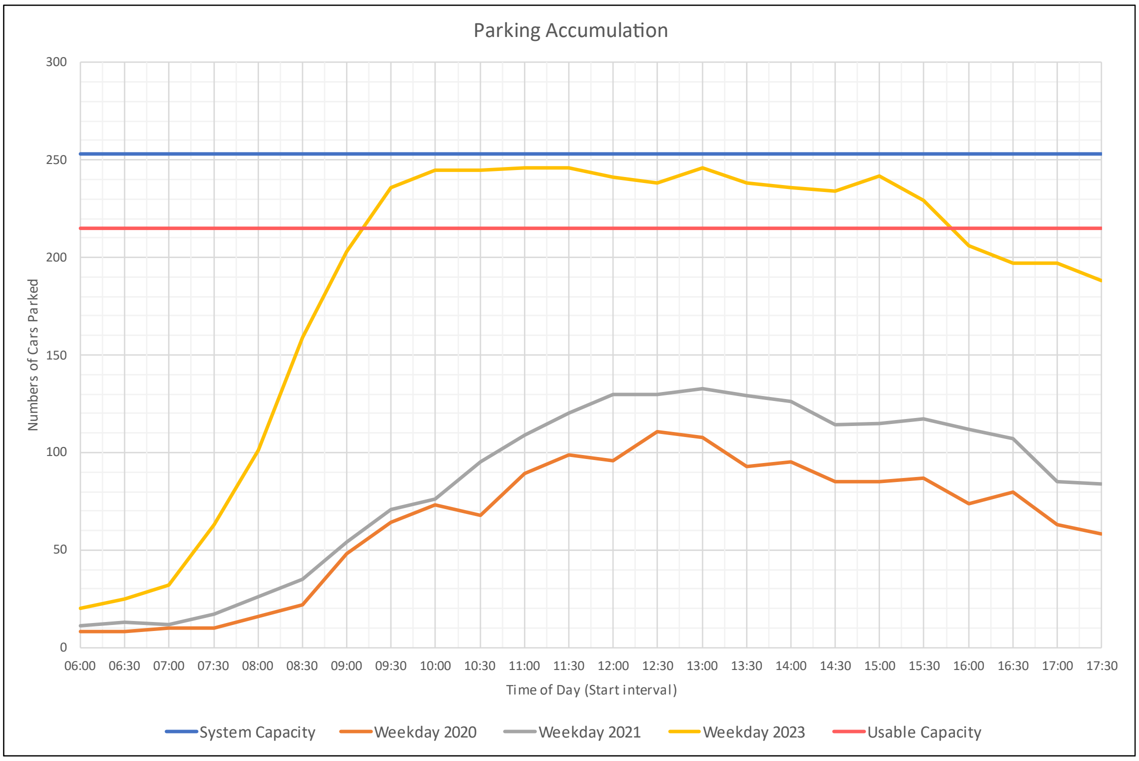


Figure 3-41: Parking Accumulation – 2020 vs 2021 vs 2023 Weekday (Eikestad Mall Off-Street Parking Area)

From the above, a 20% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a further 85% increase was observed from 2021 to 2023 during typical weekdays. It was also noted that the usable capacity was exceeded in 2023.

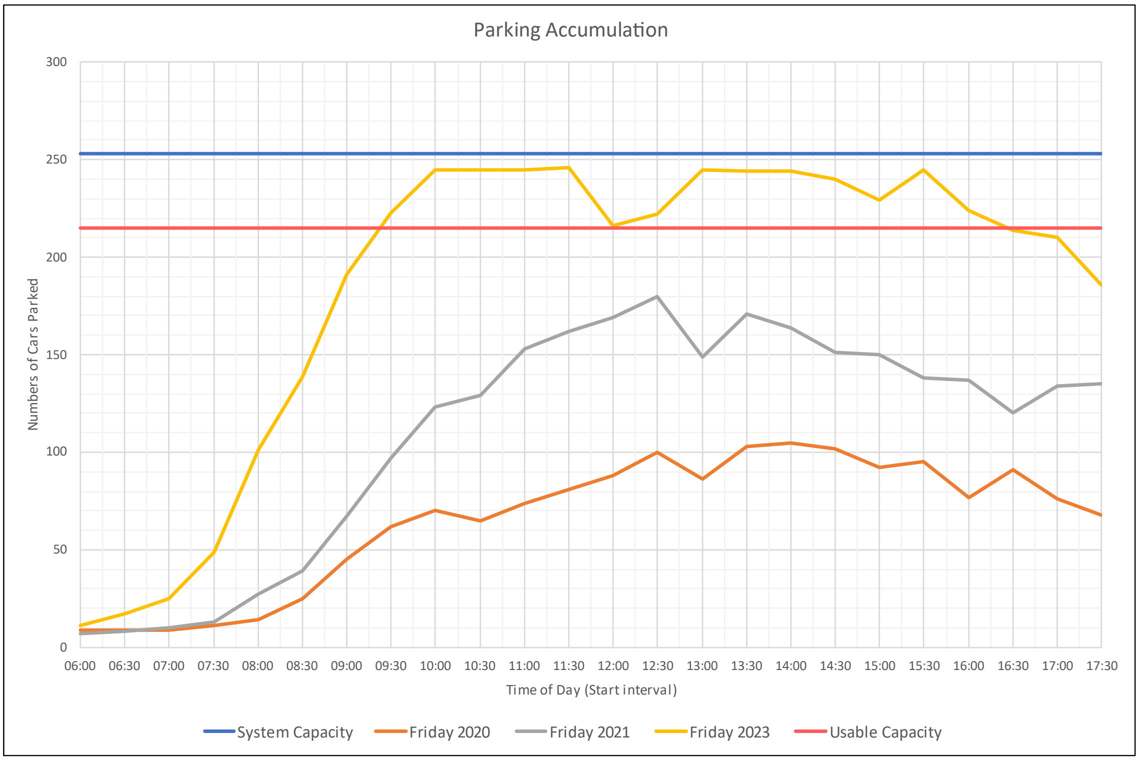


Figure 3-42: Parking Accumulation – 2020 vs 2021 vs 2023 Friday (Eikestad Mall Off-Street Parking Area)

From the above, a 71% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a further 37% increase was observed from 2021 to 2023 during a typical Friday. It was also noted that the usable capacity was exceeded in 2023.

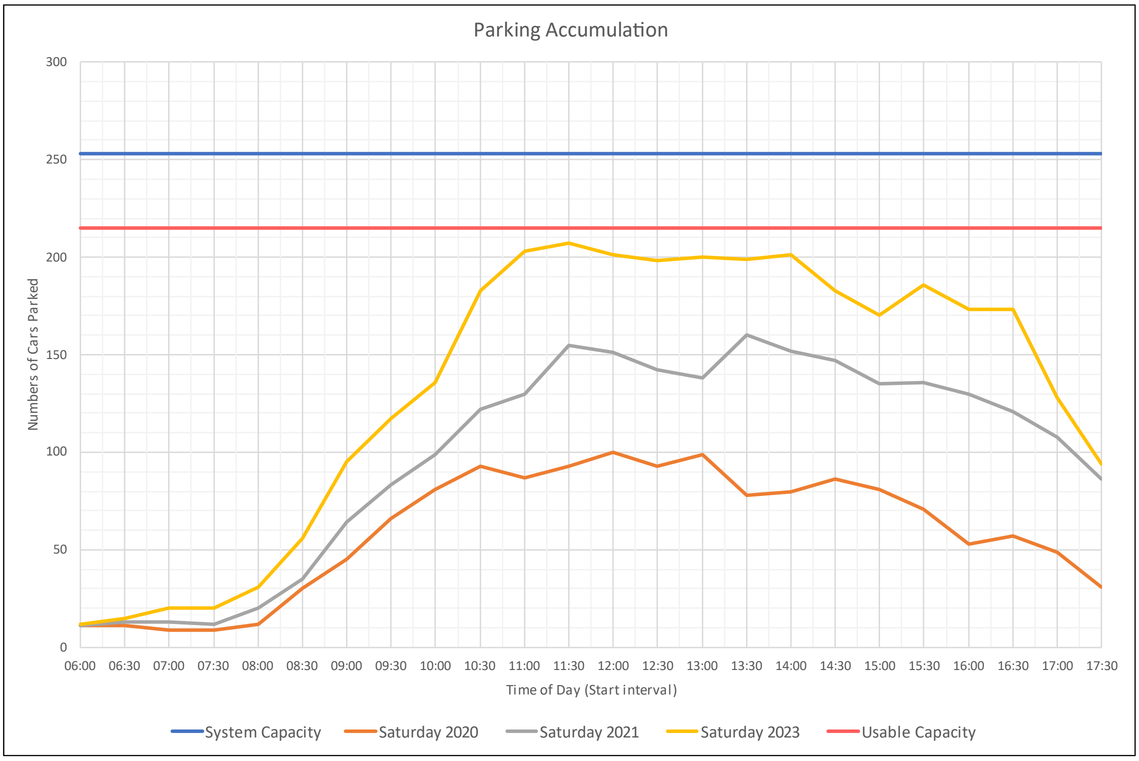


Figure 3-43: Parking Accumulation – 2020 vs 2021 vs 2023 Saturday (Parking Area L7)

From the above, a 60% increase in the peak Parking Accumulation was observed from 2020 to 2021 and a further 29% increase was observed from 2021 to 2023 during typical Saturday.

3.7 Parking Demand Calculations

Using the calibrated data above, the existing and future parking demands were calculated. For the purposes of this study, the parking requirements for the following existing and horizon years are being addressed:

- 2023 Status Quo;
- 2028 Horizon Year.

The COTO TMH 17 South African Trip Data Manual dated September 2012 provides typical growth rates to be used for growth areas based on the existing/anticipated rate of growth. Refer to Table 3-18.

Table 3-18: Typical Growth Rates

Development Area	Growth Rate
Low Growth Areas	0% - 3%
Average Growth Areas	3% - 4%
Above Average Growth Areas	4% - 6%
Fast Growing Ares	6% - 8%
Exceptionally High Growth Areas	> 8%

As indicated previously, a compounded traffic growth rate of 2.57%, calculated from the traffic surveys, was applied to the 2023 Base Year parking demand in order to derive the 2028 Design Year parking demands.

In this section, the peak occupancy based on the usable capacity was used to calculate the over/undersupply of parking. In addition, the focused study area was used to calculated the demand profile. This was based on the stated preference surveys were the reason for choosing the parking space and the purpose for parking were considered the define the major focus parking lots. The calculations were done in three methods. These were done to determine the current peak demand and off peak demand:

- Method 1: (is the parking's required)
    - All parking in CBD assessed and use in the demand calculations.
    - Additional bays based on overflow based of parking type in the peak and the practical capacity.
    - Assumes that all parking in the CBD is in play and that motorists will drive until any parking is available regardless of destination location within the CBD of the purpose of their visit.
- Method 2: (positive is additional bays needed)
    - Assess parking in a walkable distance of the proposed facility, based on the stated preference surveys.
    - Additional bays based on volumes and space calculations of all affected parking in the revised study area.

  - Works on the eight-hour parking distribution to refine the number of peak parking requirements due to parking preference duration.
  - Assumes that demand for the underground and new facility would be equal and that all available parking is in play between the new facility and underground parking.
- Method 3: (Most realistic approach)
  - Assess parking in a walkable distance of the proposed facility based on the stated preference surveys.
  - Calculate the volumes to use the facility based on preference between the existing Eikestad parking and the underground based on the existing utilisation of these facilities.
  - Uses space time volume calculations to determine parking demand from the surveyed volumes.
  - Overflow calculations based on practical capacity of each facility.
  - Works from the 8-hour parking distribution to refine the number of peak parking requirements due to parking preference duration.

3.7.1 2023 Base Year

For the purpose of this study, the 2023 base year scenario is being analysed in four (4) stages. Each additional stage incorporates the changes implemented in the preceding stage/stages. The four stages are:

1. **Stage 1**: 2023 Status Quo:
   a. The estimated percentage of the current illegal parking demand.
   b. Existing overflow estimated percentage.
   c. Current utilisation of the off street Eikestad Facility.
2. **Stage 2**: Incorporate projects and policies that will increase the parking demand, such as:
   a. Pedestrianisation of certain streets; and
   b. Elimination of parking to increase street capacity.
3. **Stage 3**: Optimise parking search time and utilization of parking areas with the implementation of a parking management system. This allows vehicles to find parking quicker and thus may reduce congestion in the CBD, it would however, not affect the max demand for parking in the CBD but would reduce waiting and circulating traffic there by allocating parking more effectively. For this scenario, it was estimated to have an effect of 10% of the parking bays required. This was estimated form the proportion of overflow vehicles that may utilise the paid off-street parking. However, this does not reduce the total demand for parking.
4. **Stage 4**: Incorporate measures and systems that will reduce the demand for parking, such as:
   a. Park and ride systems;

b. Shuttle routes; and

c. Public transport systems, etc.

3.7.2 2028 Horizon Year

For the purpose of this study, the 2028 horizon year scenario is being analysed in two (2) stages. Each additional stage incorporates the changes implemented in the preceding stage/stages. The two stages are:

1. **Stage 2**: Apply a compound growth of 2.57% per annum to the status quo peak parking demand to calculate the 2028 horizon year parking demand.
2. **Stage 3**: Incorporate measures and systems that will reduce the demand for parking, such as:
   A. Park and ride systems;
   B. Shuttle routes; and
   C. Public transport systems, etc.

The 2028 horizon year was chosen as the year in which the parking demand should stabilise after construction. This allows for teething and final construction finishes to have been completed and the facility should be functioning optimally. By no means does it suggest that the demand for parking in the CBD of Stellenbosch will peak in this year.

3.7.3 Results

3.7.3.1 Method 1

This method calculated the existing surplus and deficit. Therefore, the deficit indicates required bays for the facility. The required bays ranged from 7 to 292 bays depending on the scenario assessed.

Total CBD Parking Needs: Method 1						
Scenario		Parking area type		Capacity (bays)	Peak Occupancy	Surplus / Deficiency
2023 Status Quo	Stage 1	On-Street	Free	210	91%	-2
			Paid	465	93%	-14
		Off-Street	Free	44	95%	-4
			Paid	1069	73%	82
		Illegal Parking		69	100%	-69
		Total		**1788**	**85%**	**-7**
2023	Stage 2	On-Street	Free	210	91%	-2
			Paid	397	93%	-12
		Off-Street	Free	44	95%	-4
			Paid	1069	73%	82
		Illegal Parking		69	100%	-68
		Close Church Rd		68	100%	-69
		Total		**1720**	**88%**	**-73**
	Stage 3	On-Street	Free	210	77%	27

			Paid	397	79%	43
		Off-Street	**Free**	44	81%	2
			Paid	1069	73%	75
		Illegal Parking		68	100%	-68
		Close Church Rd		69	100%	-69
		Total		**1720**	**83%**	**10**
	Stage 4	**On-Street**	**Free**	210	71%	40
			Paid	397	73%	69
		Off-Street	**Free**	44	74%	5
			Paid	1069	73%	75
		Illegal Parking		68	100%	-68
		Close Church Rd		69	100%	-69
		Total		**1720**	**81%**	**51**
2028 Horizon Year	**Stage 2**	**On-Street**	**Free**	210	103%	-27
			Paid	397	106%	-63
		Off-Street	**Free**	44	108%	-10
			Paid	1069	83%	-34
		Illegal Parking		68	100%	-68
		Close Church Rd		69	100%	-69
		Total		**1720**	**99%**	**-272**
	Stage 3	**On-Street**	**Free**	210	88%	5
			Paid	397	90%	0
		Off-Street	**Free**	44	92%	-3
			Paid	1069	71%	99
		Illegal Parking		69	100%	-69
		Close Church Rd		68	100%	-68
		Total		**1720**	**86%**	**-36**

3.7.3.2 Method 2

Method two calculated the number of bays form the space time relations to determine the number of additional bays. However, this method equally distributed the excess parking to the existing underground parking and available bays. As indicated in the stated preference surveys and in the analysis of the individual parking bay demands, this method is flawed. As most users of the eaxing parking facilities are familiar users, the preference for a specific parking facility is pre-determined. The parking ranges from 2 to 314 additional bays.

Affected CBD Parking: Method 2						
Period	Stage	Parking criteria	Full Capacity	Parking Spaces needed Space Time Calc	Practical Utilisation	Additional Parking: Practical Capacity
2023 Status Quo	**Stage 1**	Eikestad	248	272	80%	74
		Overflow @6%	0	57		57
		Illegals @50%	0	39		39
		Underground	**520**	312	80%	-104

		Total Required				**66**
2023	Stage 2	Eikestad	248	272	80%	74
		Overflow @6%	0	57		57
		Illegals @50%	0	39		39
		Underground	**520**	312	80%	-104
		Church Rd	0	**70**		70
		Total Required				**136**
	Stage 3	Eikestad	248	231.2	80%	33
		Overflow @6%	0	-2		-2
		Illegals @50%	0	39		39
		Underground	520	286	80%	-130
		Church Rd	**0**	**70**		70
		Total Required				**10**
	Stage 4	Eikestad	248	213	80%	14
		Overflow @6%	0	-2		-3
		Illegals @50%	0	39		49
		Underground	520	270	80%	-146
		Church Rd	**0**	**70**		88
		Total Required				**2**
2028 Horizon Year	Stage 1	Eikestad	248	378	80%	163
		Overflow @6%	0	81		81
		Illegals @50%	0	42		42
		Underground	**520**	355	80%	-61
		Church Rd	0	0		0
		Total Required				**225**
	Stage 2	Eikestad	248	378	80%	163
		Overflow @6%	0	81		81
		Illegals @50%	0	42		42
		Underground	**520**	355	80%	-61
		Church Rd	0	89		89
		Total Required				**314**
	Stage 3	Eikestad	248	321.3	80%	123
		Overflow @6%	0	81		81
		Illegals @50%	0	42		42
		Underground	**520**	301.75	80%	-114
		Church Rd	0	89		89
		Total Required				**221**

3.7.3.3 Method 3

The space/time calculation used the surveyed volumes of the facilities to calculate the required bays to supply the demand. It is based on the existing volumes and calculations based on the current and forecasted demand. Furthermore, this method used the estimated demands based on the preference for parking and the purpose for parking.

Table 3-19: Method 3 Demand Analysis 2023

2023 Stage 1

Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	2934.5	Space-hours
Number of required parking spaces	=	306	parking spaces
Duration	=	8	hours
Space-hour	=	2176	Space-hours
Number of required parking spaces	=	**340**	parking spaces
2023 Stage 2			
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	3423	Space-hours
Number of required parking spaces	=	357	parking spaces
Duration	=	8	hours
Space-hour	=	3040	Space-hours
Number of required parking spaces	=	**475**	parking spaces
2023 Stage 3			
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	3001.5	Space-hours
Number of required parking spaces	=	313	parking spaces
Duration	=	8	hours
Space-hour	=	2439	Space-hours
Number of required parking spaces	=	**382**	parking spaces

Table 3-20: Method 3 Demand Analysis 2028

2028 Stage 1			
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	3959.5	Space-hours
Number of required parking spaces	=	413	parking spaces
Duration	=	8	hours

Space-hour	=	3501.5	Space-hours
Number of required parking spaces	=	**548**	parking spaces
2028 Stage 2			
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	3331.47	Space-hours
Number of required parking spaces	=	348	parking spaces
Duration	=	8	hours
Space-hour	=	2942.638	Space-hours
Number of required parking spaces	=	**460**	parking spaces
2028 Stage 3			
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average	=	0.8	

Legal parking			
Duration	=	12	hours
Space-hour	=	3468.5	Space-hours
Number of required parking spaces	=	362	parking spaces
Duration	=	8	hours
Space-hour	=	2812.5	Space-hours
Number of required parking spaces	=	**440**	parking spaces

The tables above indicated that the required parking demand ranges from 340-548 bays which is an additional 92 to 300 bays.

3.7.4 Summary Demand

The three methods used ranged from just 7 additional bays to 314 bays depending on the stages and method used. The average being around 148 additional bays over the three methods.

Table 3-21: Summary of stages and method facility size

Facility Size Three Methods	Stages	Additional Bays Required	Facility Size if Basement is used
Method 1 Total CBD Needs	2023 Stage 1	7	255
	2023 Stage 2	73	321
	2023 Stage 3	-10	248
	2023 Stage 4	-51	248
	2028 Stage 2	272	520
	2028 Stage 3	36	284
Method 2 Affected Area Needs	2023 Stage 1	66	314
	2023 Stage 2	136	384
	2023 Stage 3 (Assuming that the Underground will pick up all additional capacity)	10	258

	2023 Stage 4 (Assuming that the Underground will pick up all additional capacity)	2	250
	2028 Stage 1	225	473
	2028 Stage 2	314	562
	2028 Stage 3	221	469
Method 3 Space Time based on volume distribution to use the facility	2023 Parking Facility Stage 1	92	340
	2023 Parking Facility Stage 2	227	475
	2023 Parking Facility Stage 3	134	382
	2028 Eikestad Underground Stage 1	212	460
	2028 Eikestad Underground Stage 2	300	548
	2028 Eikestad Underground Stage 3	192	440

The table below indicates the size of the proposed facility based on the demand analysis for the different options for the different horizon years.

Table 3-22: Facility size based on method used

Stages	2023			Comments
	Method 1	Method 2	Method 3	
Stage 1	255	314	340	2023 is influenced by the available capacity in the underground for M1 and 2
Stage 2	321	384	**475**	
Stage 3	248	258	382	
Average	285	319	399	

Stages	2028			Comments
	Method 1	Method 2	Method 3	
Stage 1		473	460	Due to growth over the system, the M1 and M2 capacity for the underground is limited
Stage 2	520	562	**548**	
Stage 3	284	469	440	
Average	402	502	483	

4 Options Analysis

4.1 Locality of Options

The options for the CBD are shown in Figure 5-1.

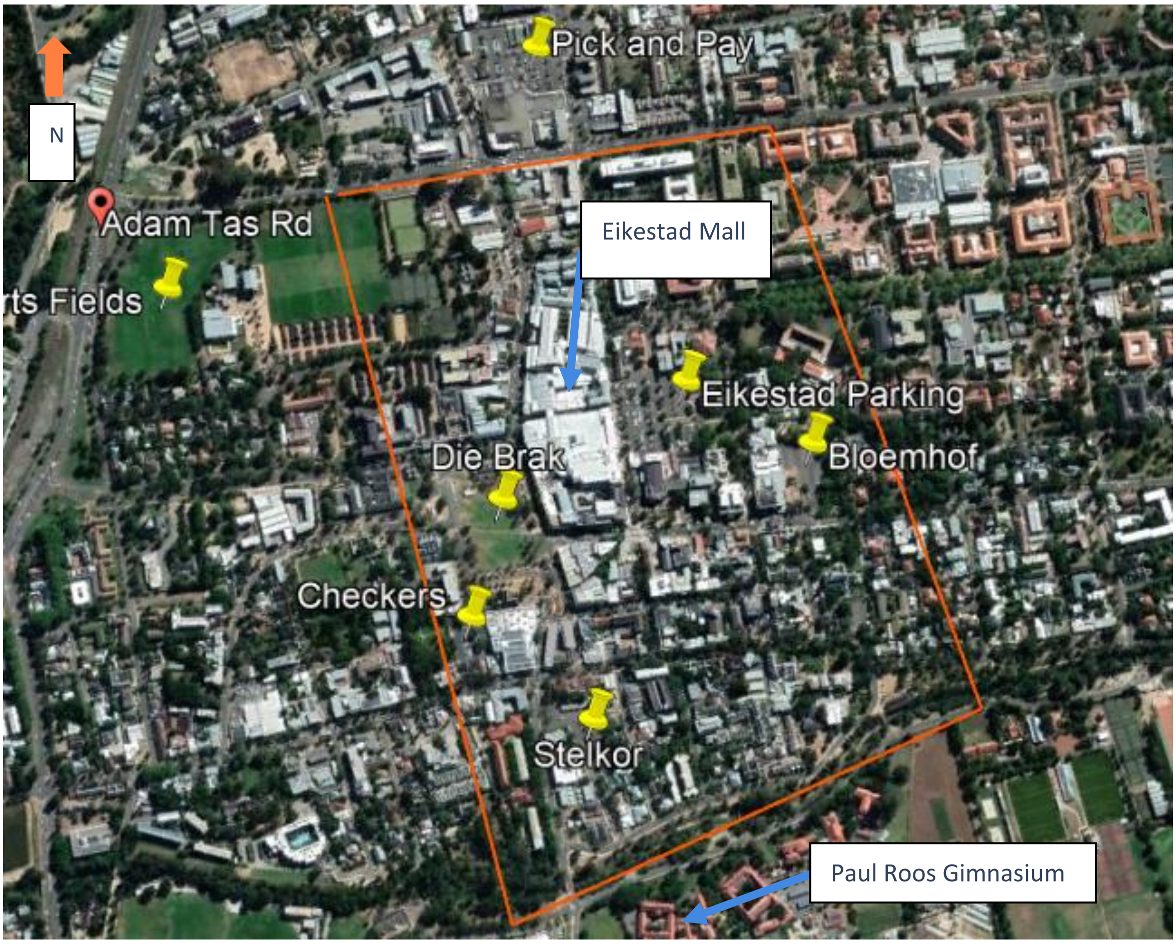


Figure 4-1: CBD Parking Options

There are seven locations identified for a multi-story parking garage in the CBD.

4.2 Proposed Solution Assessment

The proposed solutions for the CBD. The proposed solutions are assessed based on the following aspects:

- Project Description: Type of projects and location with regards to the CBD as defined in chapter 1.
- Financial impacts: Cost of the proposed facility.
- Funding and affordability: Available funding based on chapter financial assessment.
  - The 2021-2022 financial operational expenditure for Roads and Stormwater was R108 786 million with a 96% spend, the capital expenditure for road infrastructure was

95.6% at R71 300 million. Community facilities spend was R37 656 mil with a 200% spend of budget.

- The integrated development grant was further spent at 100% in R59 941 mil.
- From these budgets there is only a remaining budget of R7.65mil
- The total infrastructure spend was R253 878 mil at 89% with a total remaining budget of R29 708 mil.
- Yet, the majority of this budget is for water and housing projects.
- The budget for a parking facility would need to come from the municipality or an external loan.
- The R29 mil is not enough to construct the proposed facility.

- Risk identification: Based on high level risks associated with location, regulations and project description.
- Service Arrangements: Types of services.
- Transitional management issues: Difficulty in transitioning the project over at handover stage.
- Technical Summary: Description of technical aspects of the project.
- Site Issues, legislation and regulations: Issues such as zoning, heritage etc as assessed.
- Market capability and appetite: There are existing service providers for parking facilities management in Stellenbosch from the private sector.
- Qualitive factors: The qualitive factors were determined through the preference surveys and other non-qualitive assumptions and assessments conducted in Stellenbosch.
    - The preference surveys indicated the need to be close to shopping and the places of work for people.
    - The need for long term parking.
    - The willingness of people to pay for parking.
- Suitability for a PPP
    - Is it a long term?
        - Yes, the concession period is expected for 20 to 25 years
    - Are there measurable service outputs?
        - Yes, the reduction in congestion due to reduced circulation traffic and a modal shift to NMT and or PT.
        - Yes, the parking facility being utilised by persons parking their vehicles.
        - Level of service of parking facility based on utilisation.
        - Financial returns based on pay for parking.
    - Is there Innovation:

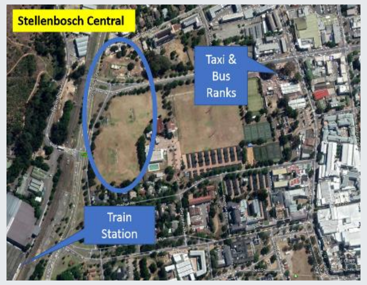
    - Yes, architecture innovation.
    - Yes, smart parking as a possibility.
  - Does it include the whole-of-life costing?
    - Yes, the possibility of a BOOT etc contract is possible.
    - Depending on solution needs.
  - Is there market appetite.
    - Yes, there are current companies that specialise in parking facilities and a business model.
  - Is there an opportunity for risk transfer?
    - Yes, the transfer of the construction, maintenance and operating risk from a capacity and financial sector, through a BOOT type contract. User-pays system.
  - Does it include a bundling of contracts?
    - Bunding of construction, operation and maintenance service providers.
  - Is the service a non-core service?
    - No, this is a core service of the municipality.
  - Is the service complementary for commercial development?
    - The parking is to aid commercial developments, such as Church Street pedestrianisation, shuttle services etc.

The options below in Table 4-1 for the most, achieve the above criteria. However, for this report, the most optimal solution that satisfies the requirements above will be the most feasible location for the proposed parking garage and or parking facilities. This does not eliminate the other locations from becoming parking facilities, but is to highlight the optimal solution for the current demand identified in chapter 3. In relation to Table 4-1, facilities there are 3 options that could satisfy a location for the CBD that are suitable for a PPP type project that is currently zoned for parking, located correctly and is being used as parking:

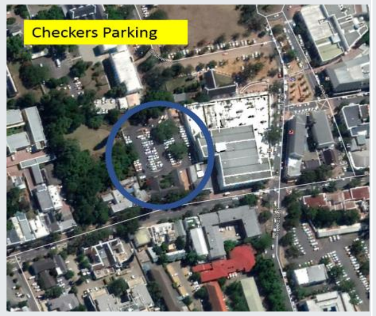
- Bloemhof parking facility
- Eikestad open parking facility
- Chekkers parking facility

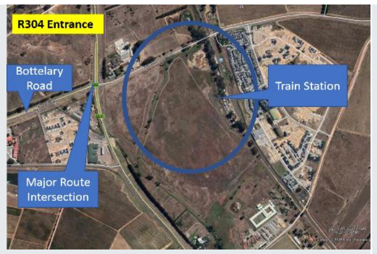
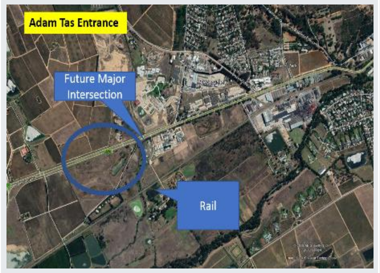
However, of these three options, in accordance with table 4-1, the Eikestad parking facility is the most optimum to develop the parking facility.

Table 4-1: Options analysis

Project Description	Location	Technical Summary	Financial impacts Estimate	Funding and affordability and Capacity	Risk identification	Service Arrangements	Transitional management issues	Site Legislation and regulations Issues	Zoned for Parking	Being Used for Parking/ Utilisation	Market capability and appetite	Qualitive factors	Parking Close to Shopping and Business	Suitability for a PPP	Preferred Option
Stellenbosch Central		Assumed a three floor Parking Garage with an estimated 1200 bays	R222 750 000	Capital budget available for R&S is R71mil. This facility would require 3 years to construct at R74mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	Availability risk, Environmental Risk, Geotechnical Risk, Regulatory Risk, Completion Risk, Cost Overrun Risk, Design Risk, Market Demand Risk (Due to location),	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Obtaining Land Use & Zoning Rights. Geotechnical & Environmental impact would need to be investigated	No	No	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Short Stay customers might not use this site due to its proximity to the CBD. Outside the study area of the CBD. Tourists might use this site if a good public transport link network is established to the CBD and other tourist sites. Public might perceive this site as unsafe due to close proximity to Station	No	Yes, but with significant risk to private sector due to location of the site. The site is approximately 1,2km walking distance to major restaurants and work areas. Difficulty to link to NMT.	No
Bloemhof Parking		Assumed a three floor Parking Garage with an estimated 480 bays	R89 100 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 2 years to construct at R44mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	Construction Cost ratio to possible revenue might not be feasible due to space that will be utilised by structure and ramps.	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	This size of this Site restricts the possibility of a multi-floor facility due to spatial requirement of ramps and structure.	Yes	Yes/ No public parking	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Due to the smaller size of the site it might be a more expensive and less profitable option.	Yes	Yes, but issues on size constraints may increase the cost with less parking space area to generate an income.	No

Eikestad Mall Parking		Assumed a three floor Parking Garage with an estimated 500 bays	R111 000 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 2 years to construct at R50mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	Traffic Congestion and accommodation , Geotechnical & Environmental impact low risk & Heritage, Cost overruns, Completion Risk	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Geotechnical & Scoping Environmental impact has been completed	Yes	Yes	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	This site has a prime link to the CBD, university and local tourist sites. Short stay customers will use this site for ease of Non-motorised transport within the CBD.	Yes	YES, The site size is adequate, most central location to link to NMT between restaurants, mall, CBD, university location. Zoned as parking and is currently in use.	Yes
Stelkor Parking		Assumed a three floor Parking Garage with an estimated 480 bays	R89 100 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 2 years to construct at R45mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage..	Construction Cost ratio to possible revenue might not be feasible due to space that will be utilised by structure and ramps.	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	This size of this Site restricts the possibility of a multi-floor facility due to spatial requirement of ramps and structure.	Yes	Yes/ 0,36	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Due to the smaller size of the site it might be a more expensive and less profitable option.	No	Yes, however, there is a risk for the demand as Stelkor sits to the south of the study area. There is another significant risk in the size of the facility and the shape may create an expensive cost to revenue income ratio.	No
Die Braak Parking		Assumed a three floor Parking Garage with an estimated 1200 bays	R222 750 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 3 years to construct at R74mil per year. The available budget split would not be sufficient. However, the project is a user cost project and	Heritage Application Rejection, Environmental Risk, Geotechnical Risk, Regulatory Risk,	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Due to the Heritage Value of this Site, obtaining Land use and Zoning rights for a development of this nature might receive rejection.	No	No	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	This site has a prime link to the CBD, university and local tourist sites. Short stay customers will use this site for ease of Non-motorised transport within the CBD. Public might perceive this development as in intrusion on the Heritage value of the site	Yes	Yes, regarding location, size and area. However, this site location has major heritage significance and the regulatory requirements may prohibit the site for becoming a parking garage.	No

				may be funded through public usage.											
Checkers Parking		Assumed a three floor Parking Garage with an estimated 240 bays	R44 550 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 2 years to construct at R22mil per year. The available budget split may be sufficient. However, the project is a user cost project and may be funded through public usage.	Construction Cost ratio to possible revenue might not be feasible due to space that will be utilised by structure and ramps.	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	This size of this Site restricts the possibility of a multi-floor facility due to spatial requirement of ramps and structure.	Yes	Yes/ 0,556	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Due to the smaller size of the site it might be a more expensive and less profitable option.	Yes	NO, the site is to small for a feasible multi story parking garage. It is currently an at grade parking facility	No
Pick n Pay Parking		Assumed a three floor Parking Garage with an estimated 840 bays	R155 925 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 2 years to construct at R74mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	PPP Attractive risk, Environmental Risk, Geotechnical Risk, Regulatory Risk,	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Separating road through the site might make it more expensive to develop. The site is currently used as a parking and the zoning rights should be in place. Location less ideal	Yes	Yes/ Outside of study area surveys	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	The integration to the CBD using NMT may be too far based on the location of the facility. It could be feasible if investigated using the university needs from the engineering facility.	No	Yes, there is a significant risk based on demand due to the site's location to the CBD.	No

R304 Entrance		Assumed a three floor Parking Garage with an estimated 1440 bays	R267 300 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 3 years to construct at R89mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	Location, Surrounding Attraction, Required Public Transport	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Obtaining Land Use & Zoning Rights. Geotechnical & Environmental impact unknown.	No	No	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Due to the proximity of the site to the CBD this might be a less viable option unless a good Public Transport link existing.	No	NO, unless the demand is created through a PT service and other regulatory restrictions for parking in the CBD and Stellenbosch	No
Adam Tas Entrance		Assumed a three floor Parking Garage with an estimated 1440 bays	R267 300 000	Capital budget available for R&S, Traffic and Transport is R71mil. This facility would require 3 years to construct at R89mil per year. The available budget split would not be sufficient. However, the project is a user cost project and may be funded through public usage.	Location, Surrounding Attraction, Required Public Transport	Due to the simpler nature of this project there are not many services involved. Access Control, Security, Cleaning, Facility Management & Landscaping. However, as it is a user pays, there will be a need for financial services as well as user admin interface.	Due to the simpler nature of this type project a transition will not be complex.	Obtaining Land Use & Zoning Rights. Geotechnical & Environmental impact unknown.	No	No	Exact Market appetite is unknown at this stage but there is a demand and business case. Private Sector Market Capability is existing	Due to the proximity of the site to the CBD this might be a less viable option unless a good Public Transport link existing.	No	NO, unless the demand is created through a PT service and other regulatory restrictions for parking in the CBD and Stellenbosch	No

4.3 Optimum Solution Selection

The optimum solution was found to be the Eikestad parking facility in the CBD as per Table 4-1. The initial Eikestad demand analysis was done in 2020 and 2021. During this phase, the analysis indicated that a demand for between 120-300 additional parking bays is required in the CBD for the then horizon years of 2023 and 2028. The most optimum location for the facility was determined at the existing above ground Eikestad parking facility. In 2023 additional surveys were conducted and a revised demand analysis was done. There are currently 248 bays at the Eikestad facility and based on chapter 4.4 an additional 148 to 314 bays are required. This amounts to a parking garage of between 350 and 550 bays as per the previous analysis. The actual demand analysis for the for 2023 and the forecasted demand analysis for 2028 correlated well with the forecasted growth of 2021.

The sizing of the facility was done using the scenarios and methods discussed in chapter 4.4 to access the most feasible design options for the facility. The scenarios were calculated using the daily volumes of the various assumptions and existing parking conditions and the surveyed time parking durations and distributions to determine the number of bays required. The assumptions made are as follows:

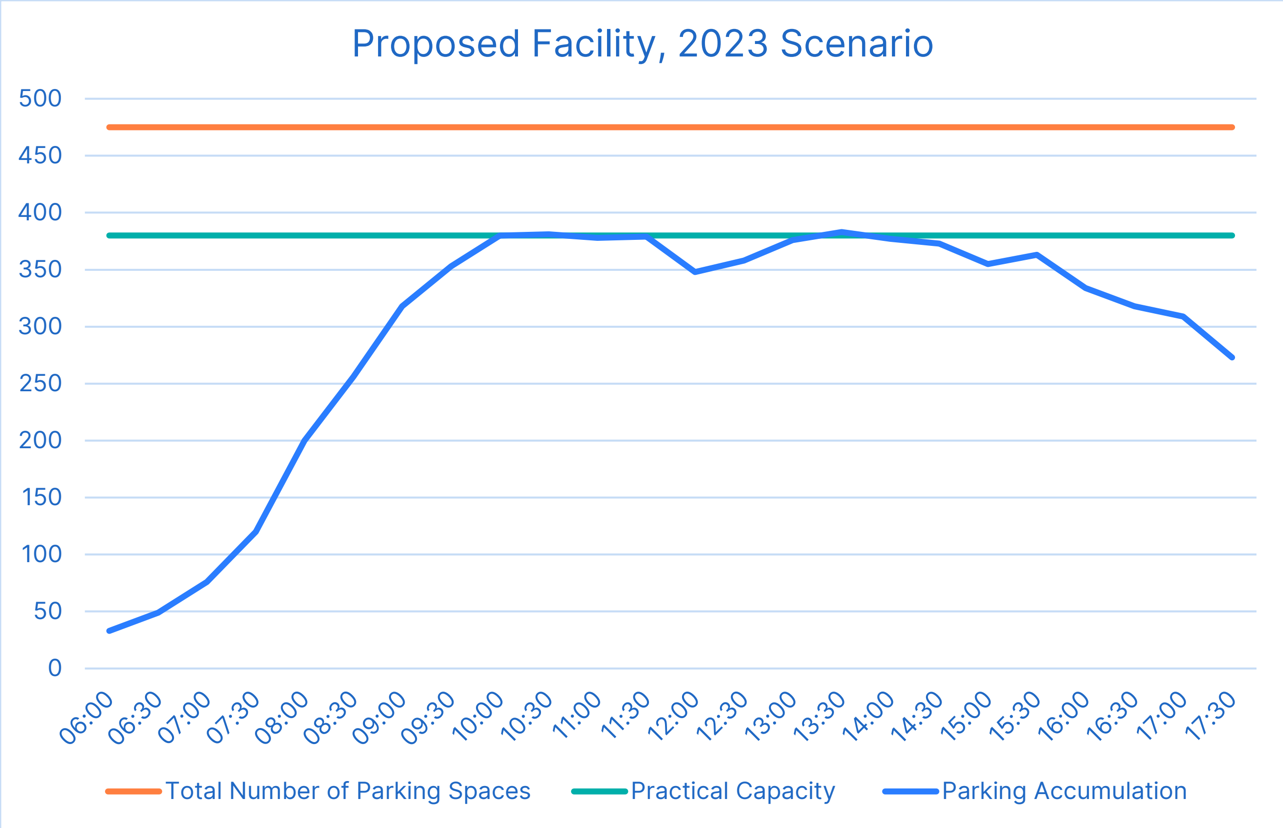
1. The current users of the Eikestad parking facility will still use the facility;
2. If the illegal parked vehicles in the CBD are policed, then approximately 30% will use the new facility. The 30% was based on the calculation of the available capacity in the underground vs the volume of illegal parking needs;
3. There is a calculated 2.57% pa growth in traffic in Stellenbosch that will require parking;
4. The existing overflow will use the new facility, if it is accessible and affordable; and
5. Initiatives like the pedestrianisation of Church Street will remove existing on-street parking and approximately 70% of these motorists will use the new parking garage at Eikestad.
6. Overflow and demand were based on the above three methods.

Based on the above assumptions, the following scenarios were developed:

- Base: Existing Eikestad Volumes only.
- Scenario 1: 30% of the Illegal surveyed parking volumes + Base scenario volumes.
- Scenario 2: Scenario 1 volumes + The 70% volumes for the pedestrianisation of Church St.
- Scenario 3: Overflow volumes for the existing facilities + Scenario 2
- Scenario 4: Scenario 3 + 2,57% pa traffic growth for 3 years.
- Scenario 5: Scenario 3 + 2,57% pa traffic growth till 2028.
- Scenario 6: Scenario 3 + A night demand and monthly parking demand estimates.
    - Night demand was calculated at an additional 15% of total day trips of scenario 3.
    - Monthly parking was calculated based on the volume of weekday traffic parking for 8 hours or more in the existing facilities from scenario 3.

The scenarios above were then included into the analysis through the three methods for the demand calculations. From Table 4-23 the method one is limited as this method does not assumes that available parking outside walking distance from the Eikestad parking will be used equally. Method two is further limited as it does not take into consideration the underground parking staff/ land load bays. This then does not adequately define the capacity analysis. Method three uses the assumptions that certain percentages of parking and overflows will use the new parking facility. It then calculates the parking requirements based on the space time durations based on existing volumes. This then calculates the most accurate and realistic approach to sizing the facility. As a result, the parking facility size was calculated to be between 475 and 548 bays. Based on the stage mitigation measures and the practical capacity of the site due to the floor levels, a parking facility of 498 bays was used as the proposed parking facility.

<table>
<tr><th colspan="6">2023 New Facility Calculations</th></tr>
<tr><td colspan="3">Duration</td><td>=</td><td>12</td><td>hours</td></tr>
<tr><td colspan="3">Total Number of Parking Spaces</td><td>=</td><td>475</td><td>Parking Spaces</td></tr>
<tr><td colspan="3">Parking Volume</td><td>=</td><td>1683</td><td>vehicles</td></tr>
<tr><td colspan="3">Peak Parking Saturation</td><td>=</td><td>0.806</td><td></td></tr>
<tr><td colspan="3">Parking Load</td><td>=</td><td>841.5</td><td>Veh hour</td></tr>
<tr><td colspan="3">Peak Parking Ratio</td><td>=</td><td>1.296</td><td></td></tr>
<tr><td colspan="3">Parking Duration (Average)</td><td>=</td><td>3.700</td><td>hours</td></tr>
<tr><td colspan="3">Parking Turnover</td><td>=</td><td>3.543</td><td></td></tr>
<tr><td rowspan="6">Parking index</td><td rowspan="2">Full day</td><td>Max</td><td>=</td><td>81%</td><td></td></tr>
<tr><td>Average (06:00 - 18:00)</td><td>=</td><td>62%</td><td></td></tr>
<tr><td rowspan="2">AM</td><td>Average (AM 06:00 - 12:00)</td><td>=</td><td>53%</td><td></td></tr>
<tr><td>AM Peak hour</td><td>=</td><td>80%</td><td></td></tr>
<tr><td rowspan="2">PM</td><td>Average (PM 12:00 - 18:00)</td><td>=</td><td>73%</td><td></td></tr>
<tr><td>PM Peak hour</td><td>=</td><td>81%</td><td></td></tr>
<tr><td colspan="3">Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average</td><td>=</td><td>0.8</td><td></td></tr>
<tr><td colspan="6"></td></tr>
<tr><td colspan="6">Legal parking</td></tr>
<tr><td colspan="3">Duration</td><td>=</td><td>12</td><td>hours</td></tr>
<tr><td colspan="3">Space-hour</td><td>=</td><td>3423</td><td>Space-hours</td></tr>
<tr><td colspan="3">Number of required parking spaces</td><td>=</td><td>357</td><td>parking spaces</td></tr>
<tr><td colspan="3">Duration</td><td>=</td><td>8</td><td>hours</td></tr>
<tr><td colspan="3">Space-hour</td><td>=</td><td>3040</td><td>Space-hours</td></tr>
<tr><td colspan="3">Number of required parking spaces</td><td>=</td><td>475</td><td>parking spaces</td></tr>
</table>



2028 New Facility Calculations					
Duration			=	12	hours
Total Number of Parking Spaces			=	543	Parking Spaces
Parking Volume			=	1923	vehicles
Peak Parking Saturation			=	0.801	
Parking Load			=	961.5	Veh hour
Peak Parking Ratio			=	1.295	
Parking Duration (Average)			=	3.700	hours
Parking Turnover			=	3.541	
Parking index	**Full day**	**Max**	=	80%	
		Average (06:00 - 18:00)	=	62%	
	AM	**Average (AM 06:00 - 12:00)**	=	53%	
		AM Peak hour	=	80%	
	PM	**Average (PM 12:00 - 18:00)**	=	73%	
		PM Peak hour	=	80%	
Efficiency Factor (90% for curb, 80% for garage and 85% for surface lots) - Average			=	0.8	
Legal parking					
Duration			=	12	hours
Space-hour			=	3959.5	Space-hours
Number of required parking spaces			=	413	parking spaces

Duration	=	8	hours
Space-hour	=	3501.5	Space-hours
Number of required parking spaces	=	**548**	parking spaces

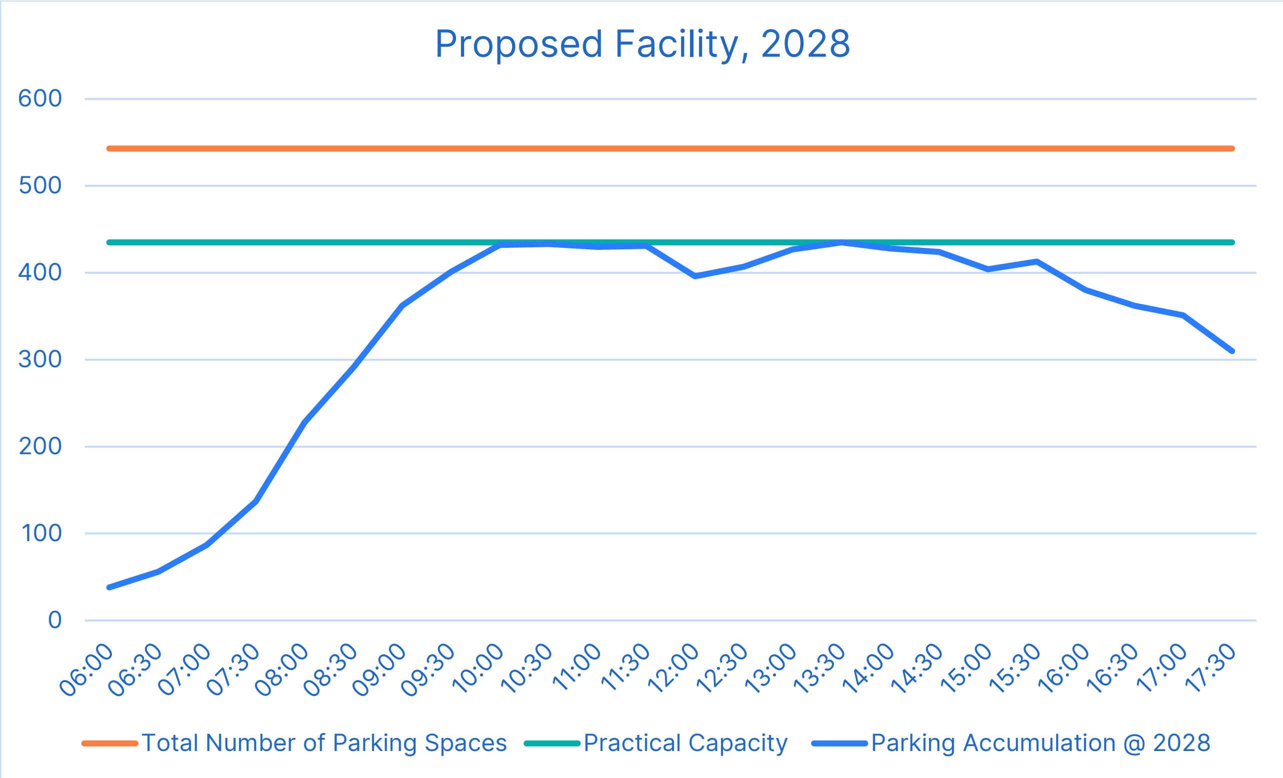


Table 4-2: Summary of Scenario's

Scenario	Description	Volumes/ day	Space hr/ duration	Parking Size (Bays)
Base	Existing Eikestad Volumes	1169	2304	**272**
1	Illegal surveyed parking + Base	1241	2542.5	**295**
2	Scenario 1 + Church Street Pedestrianization	1497	2792.5	**335**
3	Overflow + Scenario 2	1683	3423	**475**
4	Scenario 3 + 2,57% growth 3 years	1784	3686	**508**
5	Scenario 3 + 2,57% growth till 2028	1912	3900.5	**548**
6	Scenario 3 + Night Demand and Monthly estimates	1923	3959.5	**507**

In assessing the demand analysis, scenario's 3-6 are all in the region of 450-550bays. However, in assessing the demand parameters, scenario 6 is scenario 3 with additional night and monthly demand.

Some of the existing long-term parking is then converted to monthly parking and thus Scenario 6 requires less bays than Scenario 5. Scenario 6 is conservative regarding demand forecast, while it further allows for the inclusion of monthly users. Furthermore, scenario 6 allows for 85% of the calculated worst case scenario regarding the demand analysis. Therefore, scenario 6 is the most optimal design demand estimation. The architectural designs for the proposed facility then included the analysis above to allow for +-500 bays space dependent.

4.4 Eikestad Architectural Design

Based on the calculations done in section 5.2.1, the ideal amount of parking bays required are ±500. Within the available space, a number of 486 parking bays could be fitted. A 3-storey parking structure is proposed, which allows for this number of parking bays. The proposal is to design a sub-structure that will allow future addition of an extra level should the requirements grow. The Architectural concept report is detailed in Appendix C.

4.4.1 Architectural Aims

4.4.1.1 Site & Locality

Figure 4-2: Site Locality

1. Access – Vehicle and NMT
2. Street Level Parking within Facility

3. Multi-Level Parking Structure
4. Forecourt on Podium
5. Future Retail
6. Service access to buildings bordering southern edge of site.

The architectural aims are as follows:

- Create direct access to the facility from both Victoria & Ryneveld Streets. No entrance point is proposed from Andringa Street to allow for the possibility of changing Andringa Street into a pedestrian only street.
- Create direct pedestrian access to the facility from The Eikestad Mall, Ryneveld Street & Victoria Street.

Figure 4-3: Access

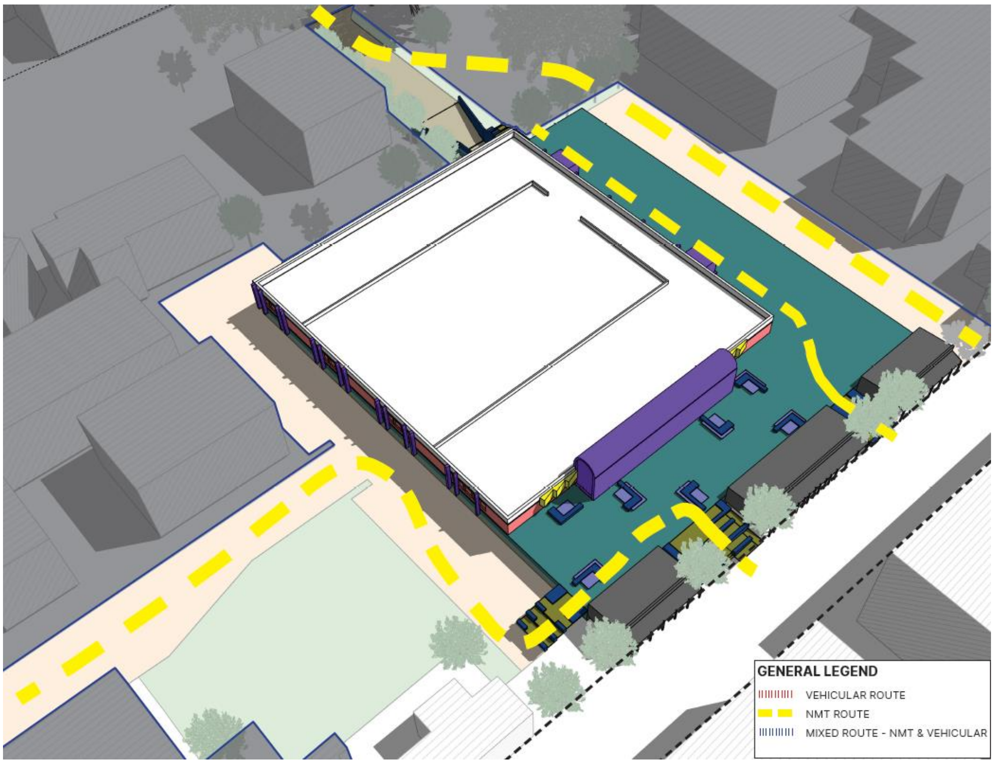


Figure 4-4: Access

- Create a parking structure that sits on top of a half-basement with a recessed structure that elevates to 2 additional storeys.
- Create a forecourt for the bigger mass of the building. This will serve as a landscape pedestrian friendly area that will connect the different parking areas. From the forecourt the main parking structure is accessed by pedestrians.

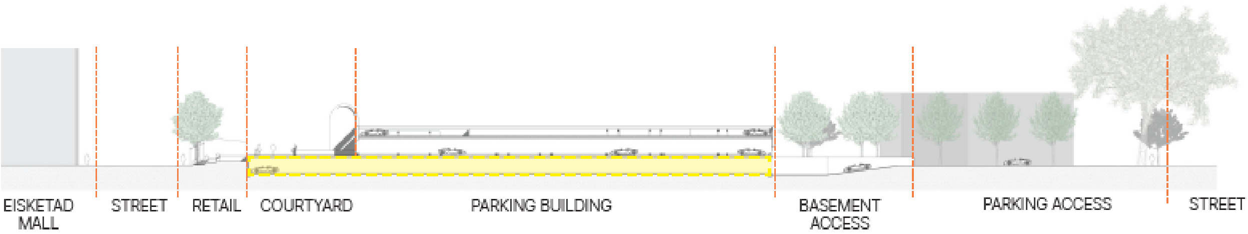


Figure 4-5: Diagrammatic Section indicating Half-Basement

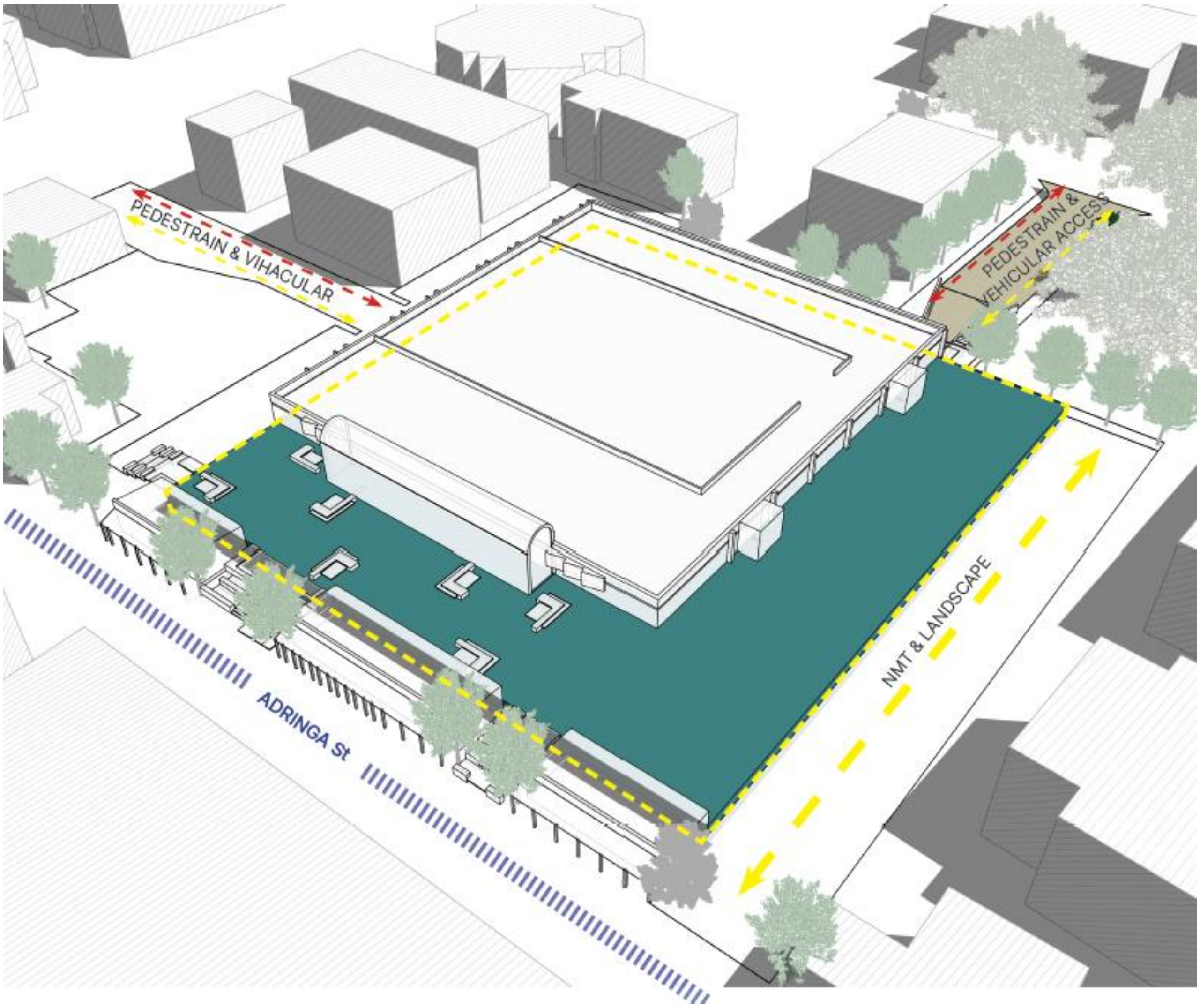


Figure 4-6: Diagrammatic Axonometric View – Indicating Half-Basement

- The building has to fit into a rich Heritage context. The aim of this proposal is to create a building that will be secondary in its importance to the context. In order to achieve this, the building mass has been pushed to the back and centre of the site. By doing this there is available space on the site and to utilise the available space to the full available capacity, street level parkings are proposed at this level.

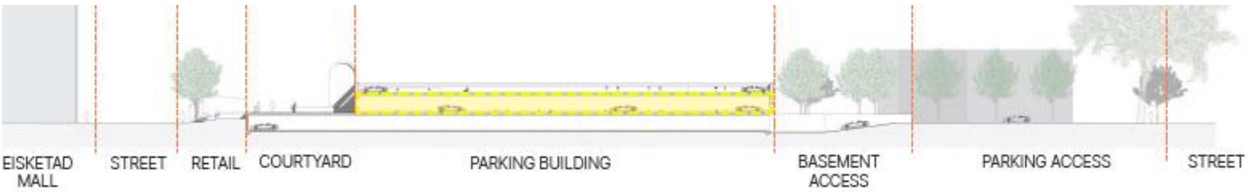


Figure 4-7: Diagrammatic Section – Indicating Parking Structure setback.

Figure 4-8: Diagrammatic Axonometric View – Indicating Parking Structure setback.

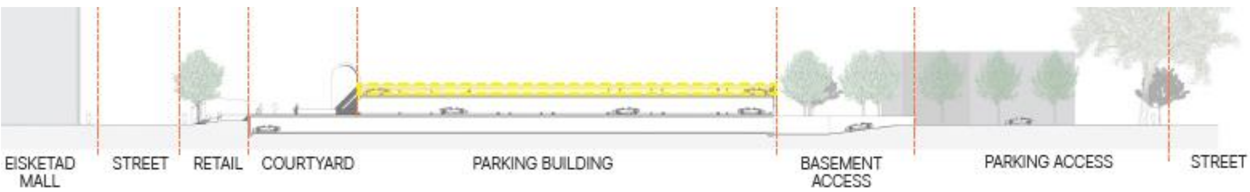


Figure 4-9: Diagrammatic Section – Indicating Roof Top Parking.

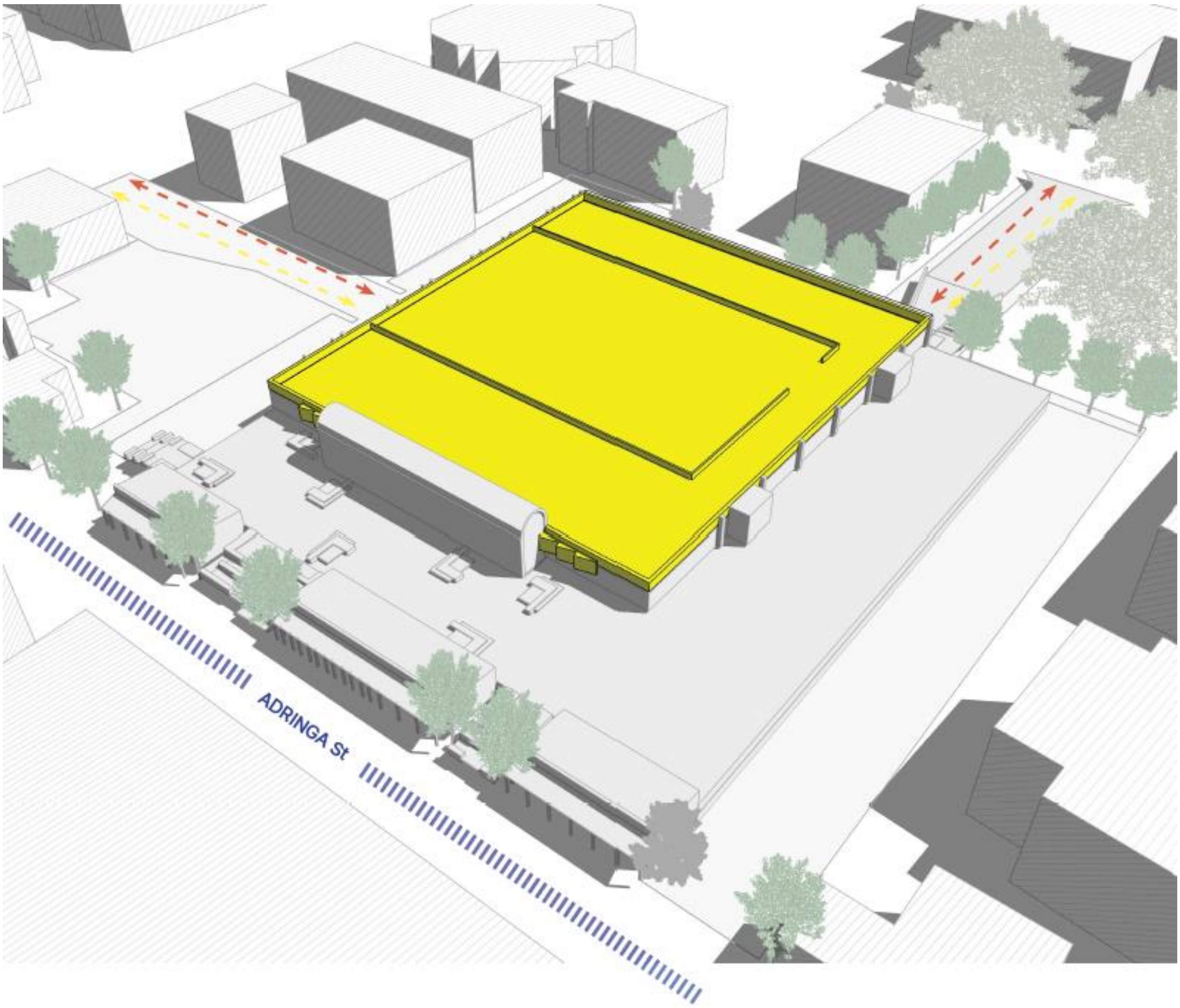


Figure 4-10: Diagrammatic Axonometric View – Indicating Roof Top Parking

- Create a layout that connects with the rich heritage value of the immediate surrounding context. The 2 bordering buildings along Andringa Street are of a high historical value. The aim is to create a lower-level street façade that connects these to neighbouring buildings.

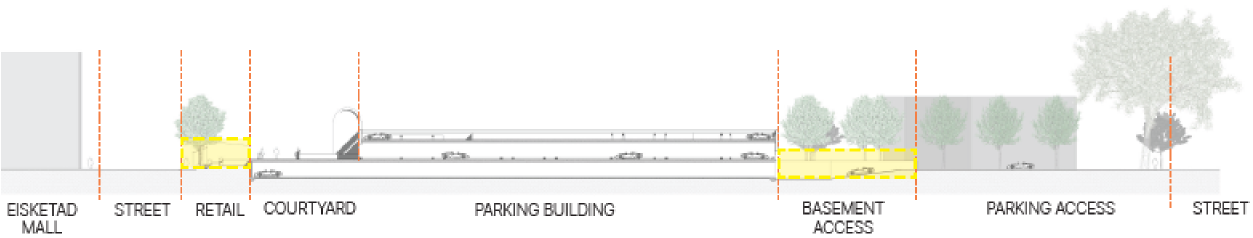


Figure 4-11: Diagrammatic Section View – Andringa Street Façade

Figure 4-12: Diagrammatic Axonometric View – Street Facade

- Create a service zone to the southern side of the site. The aim of this is to create a service access to the buildings on the southern side. Furthermore, the aim is to create a breathing space between the parking structure and these buildings, which are also of a high historical value.

Figures 5-4 to 5-9 contain the site layout plans and elevations.

Figure 4-13: Site Layout

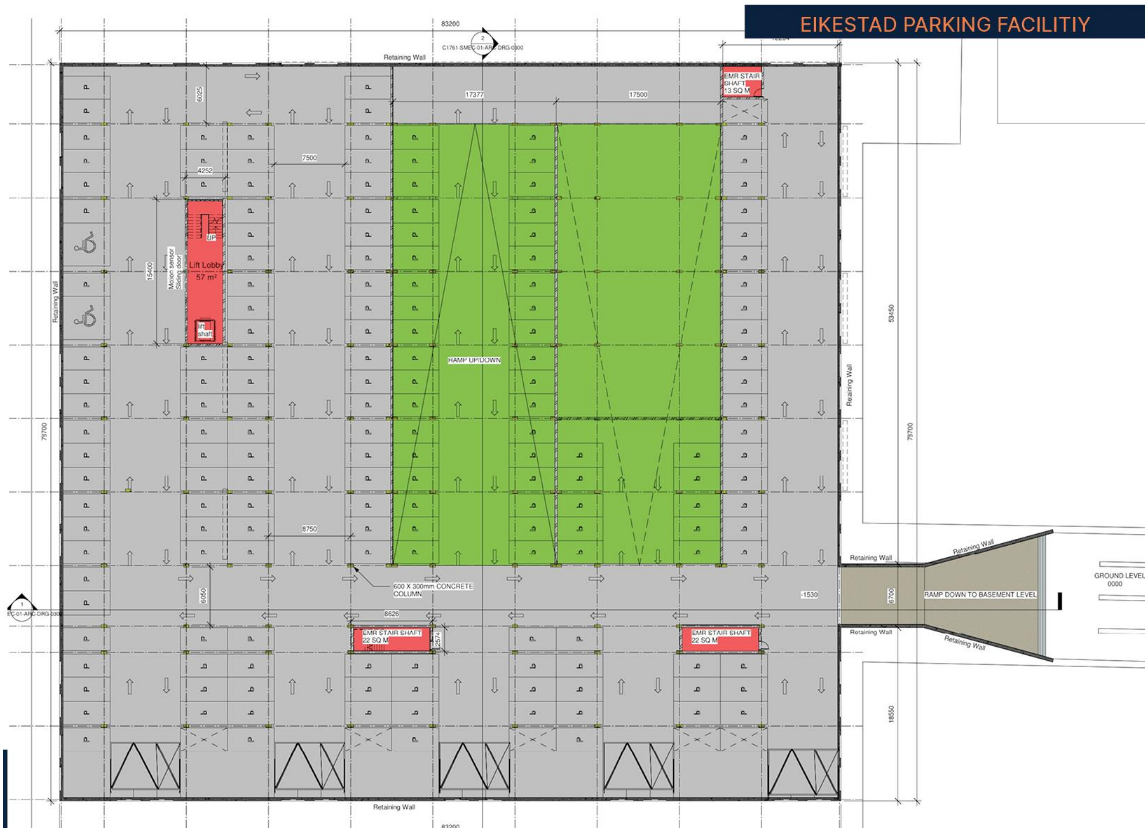


Figure 4-14: Basement Parking Level

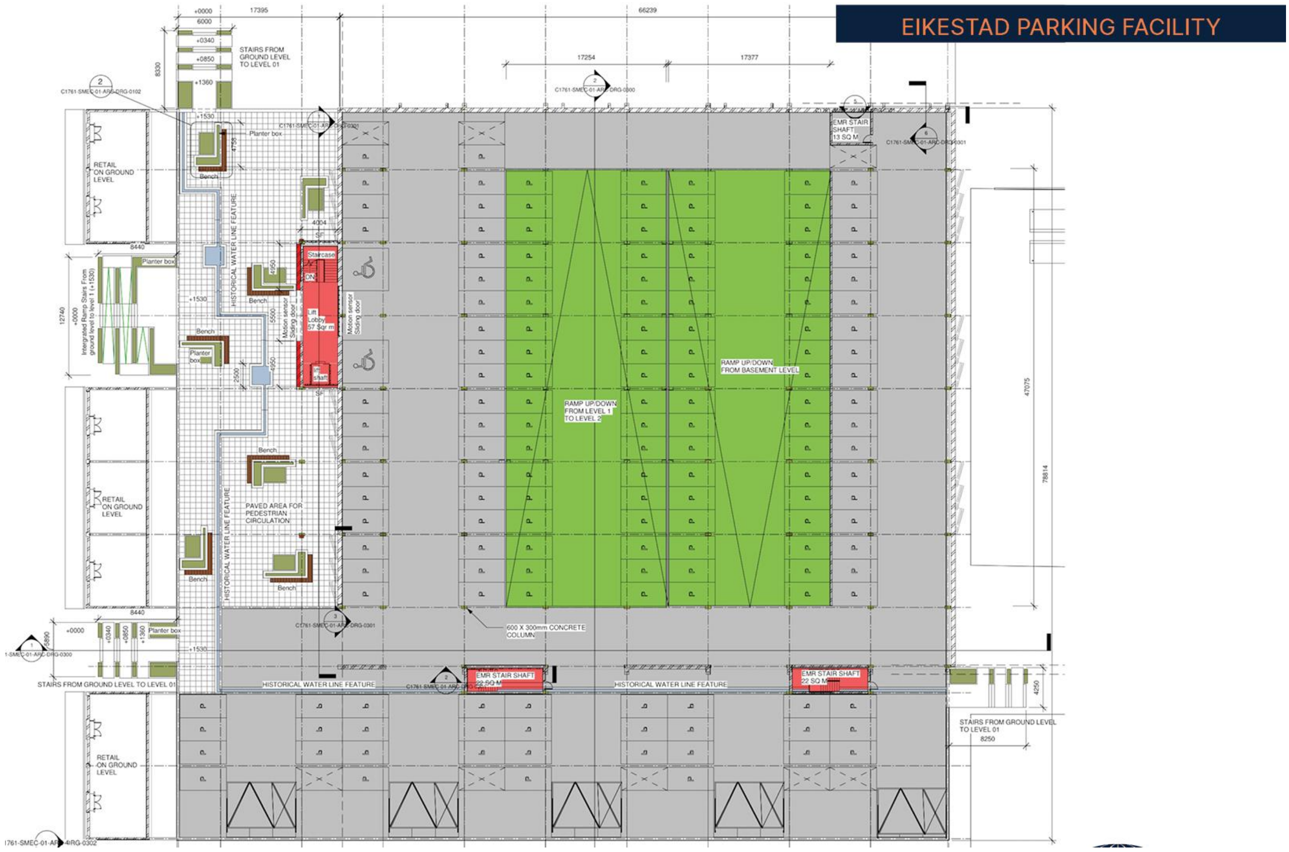


Figure 4-15: First Parking Level

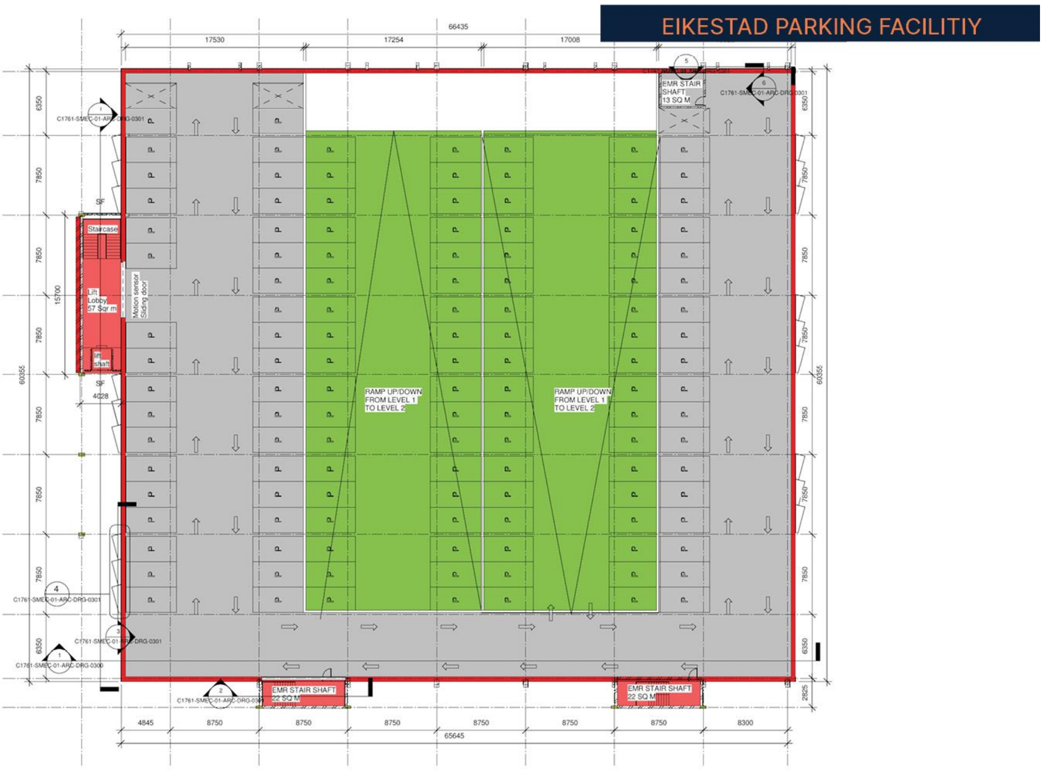


Figure 4-16: Second Parking Level

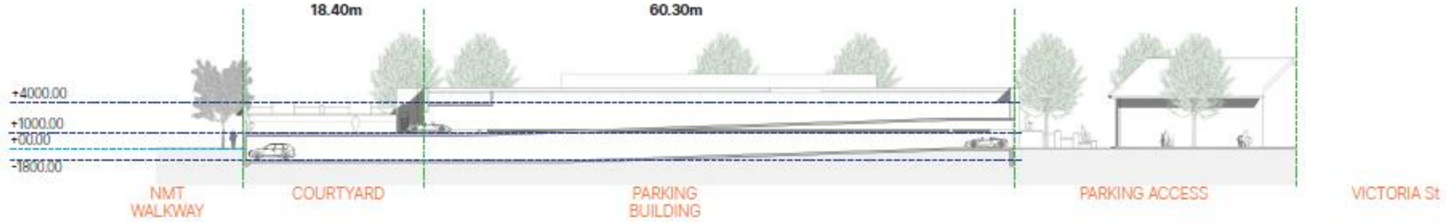


Figure 4-17: Sections

4.4.2 Guiding Principles

Historical Cape Vernacular streetscape design components introduced for Stellenbosch Eikestad parking:

These Historical streetscape design elements used in this design can be seen as guidelines for the design of this development from pedestrian scale to user functionality.

1. Building form
2. Building platform
3. Scale
4. Urban courtyard
5. External envelope treatment: Wall opening and closure.
6. External finish: Walls and balustrade typology
7. Linking elements: Visual, physical, pedestrian, symbolic links, walls and arch ways

4.4.2.1 Building form:

Building form follows the typology of the existing buildings in the area, which is a flat roof serving as a parking area to fit in with the building scale of the surrounding historical context.

4.4.2.2 Building platform

To reduce the building height and slope in the existing context a sunken basement was introduced.

4.4.2.3 Scale

The scale of the building consists out of a sunken natural ventilated half basement and 2 levels of which level 2 is roof parking.

The total building mass rises 5.2m above natural ground level.

4.4.2.4 Urban courtyard

Typically to the courtyard "werf" architecture of the Winelands an urban courtyard was designed between the existing Street and the new Eikestad parking, which is also the linking visual element between the old and new on an urban and pedestrian scale with a visual connection to a lobby space and vertical circulation for physical pedestrian access.

4.4.2.5 External envelope treatment:

As per Cape Vernacular architecture openings and closures are vertically proportioned as 1:1.5 to 1.2 proportion which form part of the external envelope treatment for this parking building.

4.4.2.6 External finish:

Typically to the Winelands Architecture and context the external finish will be a plaster finish painted white with natural wood finish for architectural elements. Thick walls will serve as linking elements to define the courtyard elements and to link these areas with the building structure. Thick solid walls will also be used as balustrades on the roof level to resembles the old Cape werf walls.

4.4.2.7 Linking elements:

Visual

Visual links are created through existing building openings in the streetscape and the vertical circulation visible from the surrounding streets by way of a main lobby and stairs.

In this historical context the use and identification of physical pedestrian and vehicle pathways connect the new parking building to the existing surrounding areas creating focal points with the surrounding historical buildings.

Pedestrian

Pedestrian links/ NMT routes are created from the existing areas to the new parking building that pulls you into the urban courtyard “werf” and from there secondary pathways to the rest of the area.

Symbolic

As per Historical Stellenbosch context a symbolic water line feature is created around the building through street side water channels that resembles the Drooge River, Millstream that cross the site underground and connect the new with the old in courtyard “werf” through low cape werf walls/benches and water features.

Walls and Archways

Walls that serve as linking elements are used to define the “werf” area of the parking building and at the entrance from the Eikestad mall and to link building structures between the existing streetscape and new.

Boundary Walls

The use of low boundary walls to define the to a maximum height of 0.75 m to 1.2 m and a minimum thickness of 0.44 m are used to define the “werf” in the new courtyard and to be used as balustrades on the parking roof deck. This solid Cape walls used as balustrade on the roof parking area also screen the cars form the surrounding historical street context.

5 Traffic analysis

The traffic analysis was conducted to assess the proposed accesses to the facility regarding congestion and accessibility based on the parking demand and optimisation analysis.

5.1 Background

The parking area is located to the east of the Eikestad Mall. It is proposed to construct a multi-level parking facility on this municipal parking area in the Stellenbosch CBD. The site is located between Victoria Street to the north, Ryneveld Street to the east, and Eikestad Mall and Andringa Street to the west. The site is zoned for parking.

The site has two existing accesses. The one access is located on Victoria Street and the second on Ryneveld Street. Both accesses are two-way accesses and are proposed to be used for the multi-story parking facility.

5.2 Study Area

The site will be referred to as the Eikestad Parking Facility. The site is situated on erven 1969 to 1976, Erf 6636, as well as on part of the Remainder of Erf 1962, Stellenbosch. A consolidation application will need to be submitted to consolidate these erven. The development site is located as follows:

- Within the Stellenboch Local Municipality.
- Area between Andringa Street, Victoria Street and Ryneveld Street, Stellenbosch.
- Access from Victoria Street to the north and Ryneveld Street to the east.
- Adjacent to Eikestad Mall.

The exact location can be seen in Figure 3-1 and 3-2 below.

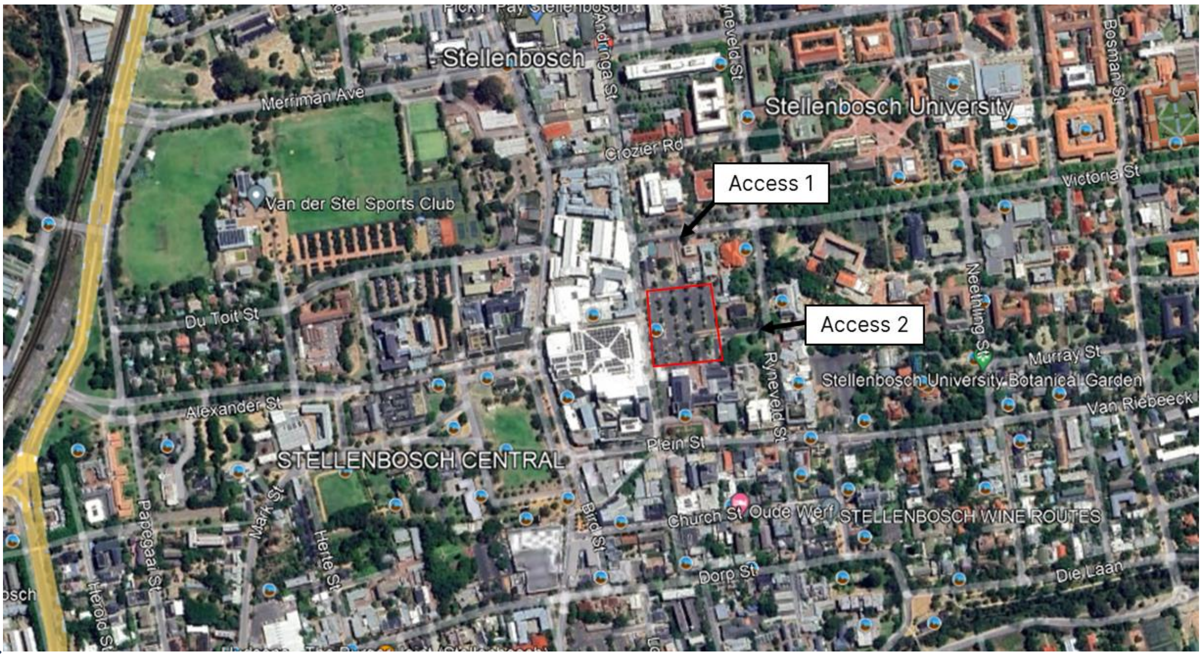


Figure 5-1: Locality in greater Stellenbosch Area.

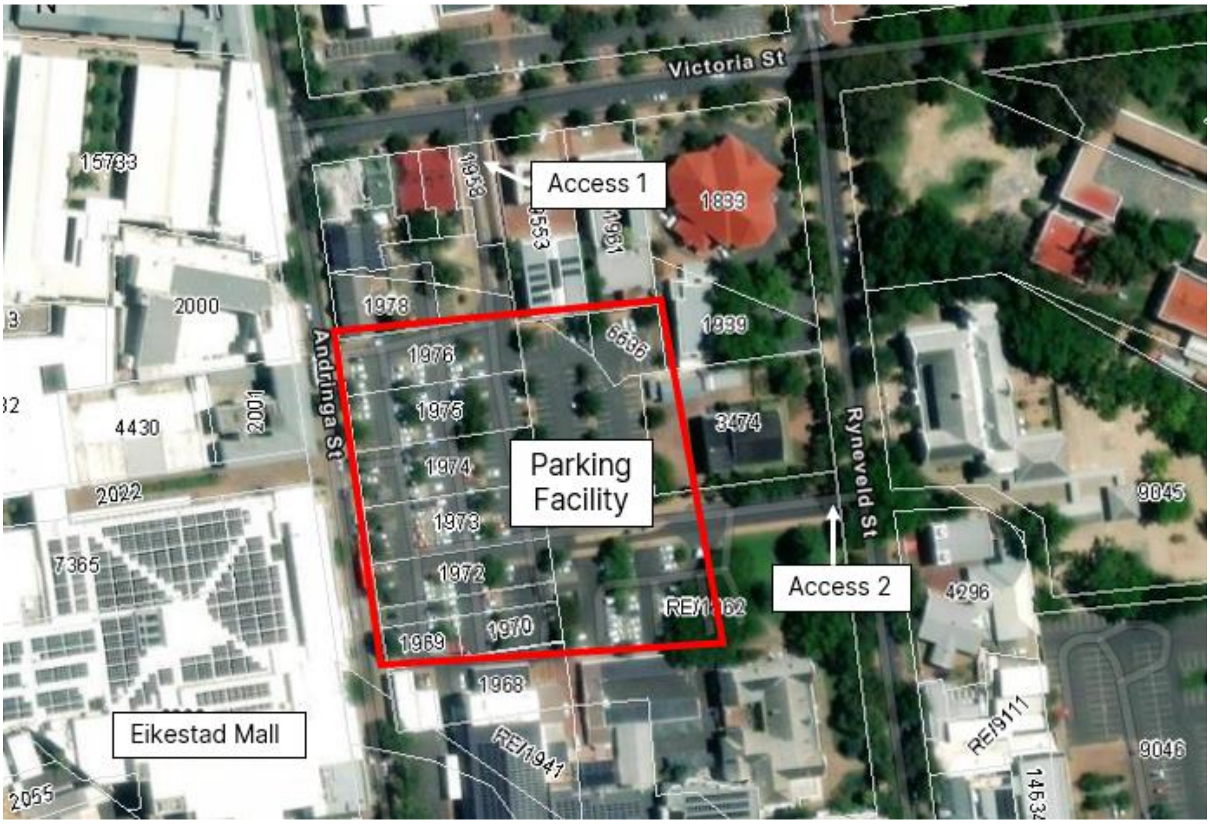


Figure 5-2: Locality Plan

The GPS coordinates of the above-shown drop pin are as follows:

- Latitude; 33°56'7.41"S
- Longitude; 18°51'40.81"

The site contains an existing entrance and exit from Victoria Street and Ryneveld Street. The parking is paid parking, and is available for public use. Ryneveld Street is a one-way street in the southern direction. Victoria Street is a two-way street, and vehicles can access the parking facility from any direction.

The intersections adjacent to the accesses are included as part of the study area to ensure that there is sufficient capacity on the road to accommodate the turning movements in and out of the parking facility. The study area can be seen in Figure 5-3.

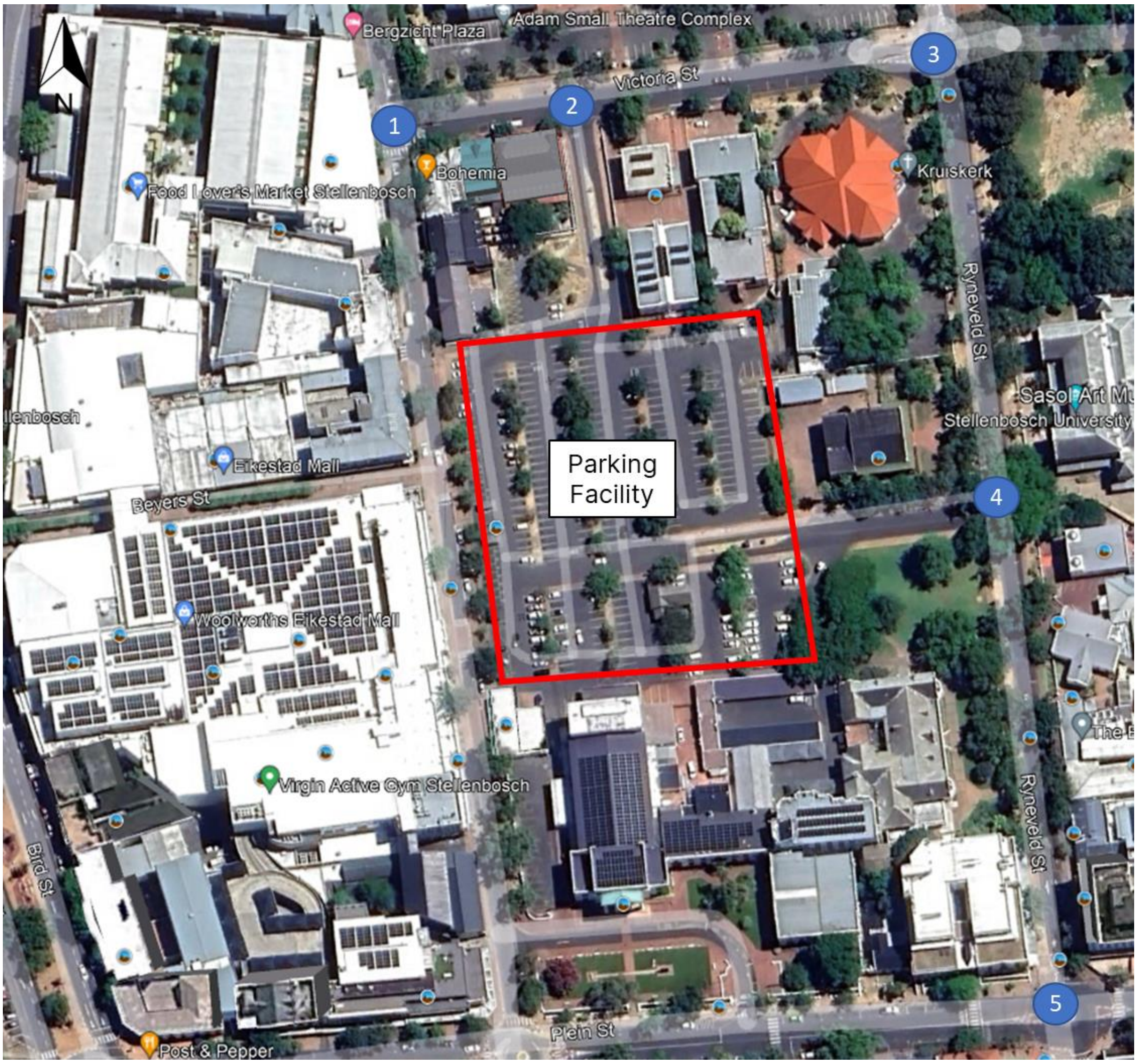


Figure 5-3: Study Area

The parking facility will be a multi-level facility. Two ramps will be provided in the facility to allow vehicles to enter the first and second level from the ground level. A third ramp will be provided on the western side of the building to allow vehicles to travel from the ground level to the basement level. The isles in the parking facility will be two-way, enabling vehicles to easily enter and exit the building.

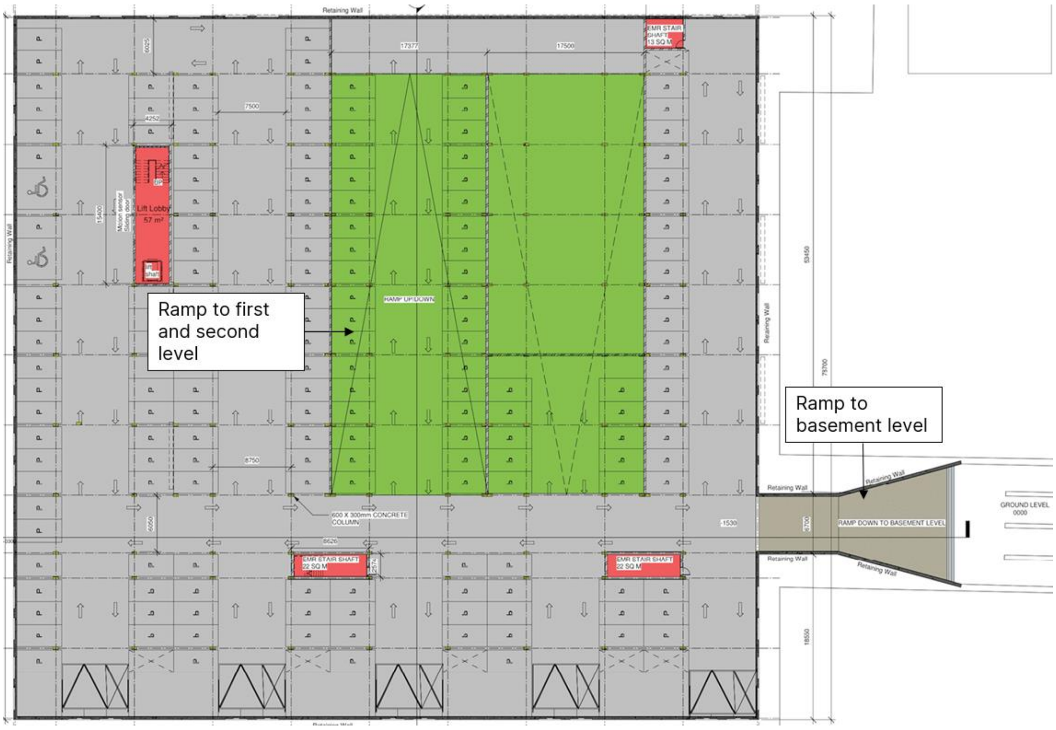


Figure 5-4: : Ramps to be provided for the Parking Facility

There are no new roads to be constructed on the external road network to the site. The accesses to the site will remain, however, the accesses will be converted to boom gate-controlled accesses. A total of 498 parking bays will be provided, resulting in an additional 250 parking bays to what is currently provided at the existing parking area.

Pedestrian accommodation is made at the accesses to the existing parking area. These walkways will be retained when the proposed parking facility is in place. Elevators and stairs will be provided in the parking facility to allow pedestrians to walk from their vehicles to the ground level.

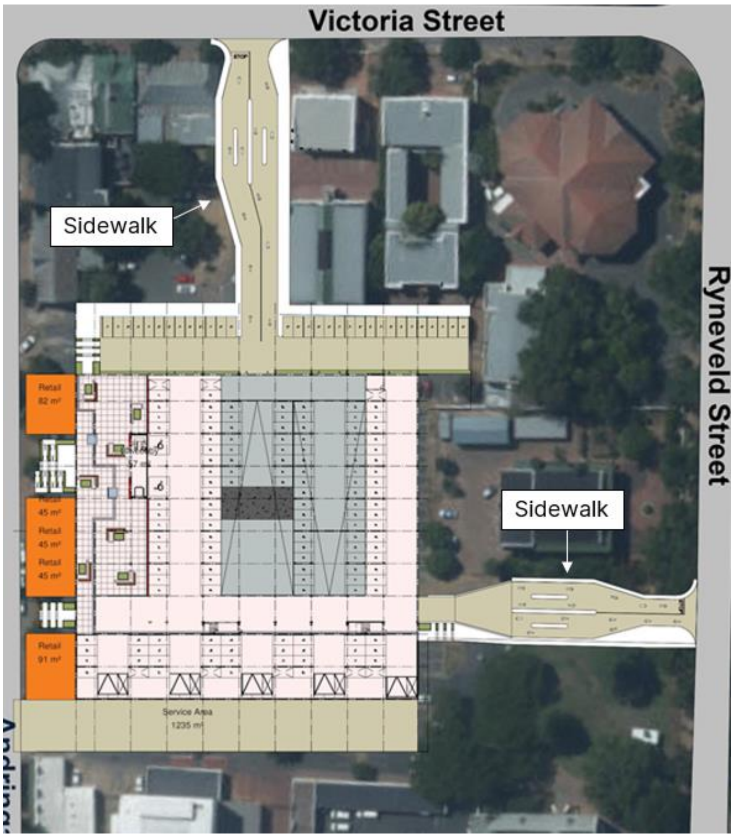


Figure 5-5: Walkways along the access road to the parking facility

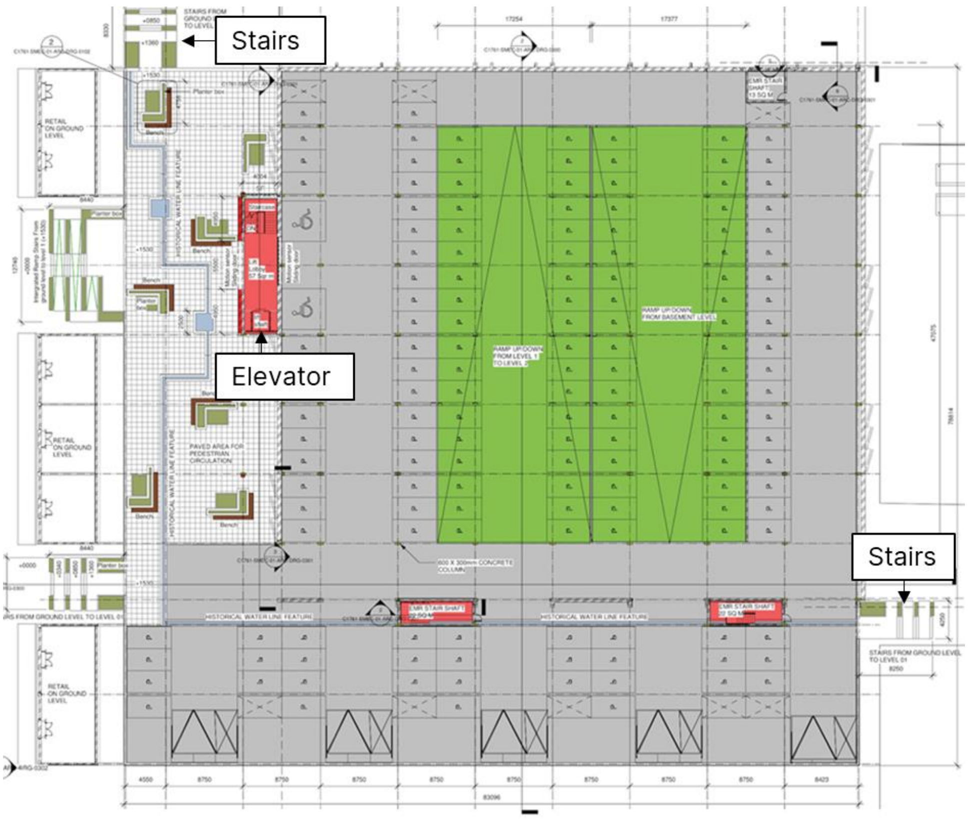


Figure 5-6: Pedestrian Accommodation in Parking Facility

5.2.1 Required Information

The following information is relevant to this study:

- Number of parking bays: 498 bays, with at least 11 disabled parking bays
- Three Ramps:
    - Width: 6 - 7m
    - Length of ramp on western side: 25m
    - Length of ramps inside facility: 49m
    - Gradient: not exceeding 12%
- Design vehicle: Light vehicle: Passenger vehicles.
- Existing access
    - Throat length:

      In accordance with the TMH 16 Vol 2, the existing access is an access to a public facility from a class 5 road. More than 50 vehicles enter and / or exit this facility during the peak hours on weekdays and weekends.

      Egress: The current access egress length is 34m at the Victoria Street Access and 74m at the Ryneveld Street Access. The minimum egress throat length for priority-controlled accesses is between 15 – 25m. The existing egress throat length at the accesses are therefore sufficient.

      Table 29 Minimum egress throat length

Minimum egress throat lengths (m) for control types and number of egress lanes				
Control type:	Priority control	Traffic signal control		
Number of egress lanes:	All	1-2 Lanes(*)	3 Lanes(*)	4 Lanes(*)
Minimum throat length (m):	15 – 25 (**)	25	60	95

      (*) Excluding taper lengths
      (**) 6 – 25 m for Driveways

      The existing ingress throat length of the Victoria Street Access is 34m while the ingress throat length at the Ryneveld Street Access is 74m. The TMH 16 Vol 2 manual specify that an ingress throat length of at least 15m should be provided on class 5a roads. It is evident that the existing ingress throat length provided at the parking facility is sufficient.

      Table 30 Minimum ingress throat lengths

Minimum ingress access throat lengths (m) from different road classes							
Road Class	Class 2	Class 3	Class 4a	Class 4b	Class 5a	Class 5b	Driveways
Service Station	50	25	15	N/A	10	N/A	N/A
Other developments	100	75	25	15	15	10	5

      (*) The requirements of the Municipality or authority will apply to Class 1 roads

      Both the egress and ingress throat lengths are acceptable.
    - Control: Boom gate controlled with automatic ticket dispenser.

5.2.2 Site Assessment

The existing parking area is located on various erven, namely on Erven 1969 – 1976 as well as on Erf 6636 and part of the Remainder of Erf 1962. A consolidation application will need to be submitted to consolidate these erven. This is unpacked in the environmental report.

The existing accesses are stop controlled. A security house with a guard is provided at the accesses to this parking. Parking tickets are provided by the guards at the entrance of the parking area. The proposed parking facility will be provided with boom gates and an automatic ticket dispenser.

Figure 5-7: Victoria Street Access

Figure 5-8: Ryneveld Street Access

5.2.2.1 Non-motorised transport

The area surrounding the proposed parking facility is provided with sidewalks on both sides of the road. Pedestrian crossings are provided at the Victoria Street / Andringa Street and at the Victoria Street / Ryneveld Street intersections. A midblock pedestrian crossing leading to the Eikestad Mall is provided on Andringa Steet. Refer to Figure 5-9 to Figure 5-11 for the pedestrian crossings.

Figure 5-9: Midblock Pedestrian Crossing on Andringa Street

Figure 5-10: Pedestrian Crossing at the Victoria Street / Andringa Street Intersection

Figure 5-11: Pedestrian Crossing at the Victoria Street / Ryneveld Street intersection

As mentioned in Section 5.2.1, NMT facilities, including stairs and an elevator, will be provided at the parking facility to accommodate pedestrians that walk from the parking facility to their destinations along Victoria Street, Ryneveld Street and Andringa Street, refer to section 4 of this report. The existing sidewalks along the accesses to the facility will be retained.

5.2.2.2 Public Transport

It is not expected that public transport users will make use of the parking facility or that the parking facility users will make use of public transport, however, a taxi rank is located within walking distance to the parking facility. Pedestrian sidewalks lead from the parking facility to the taxi rank, providing safe walking environments for the public transport users. Refer to Figure 5-12 for the locality of the taxi rank.

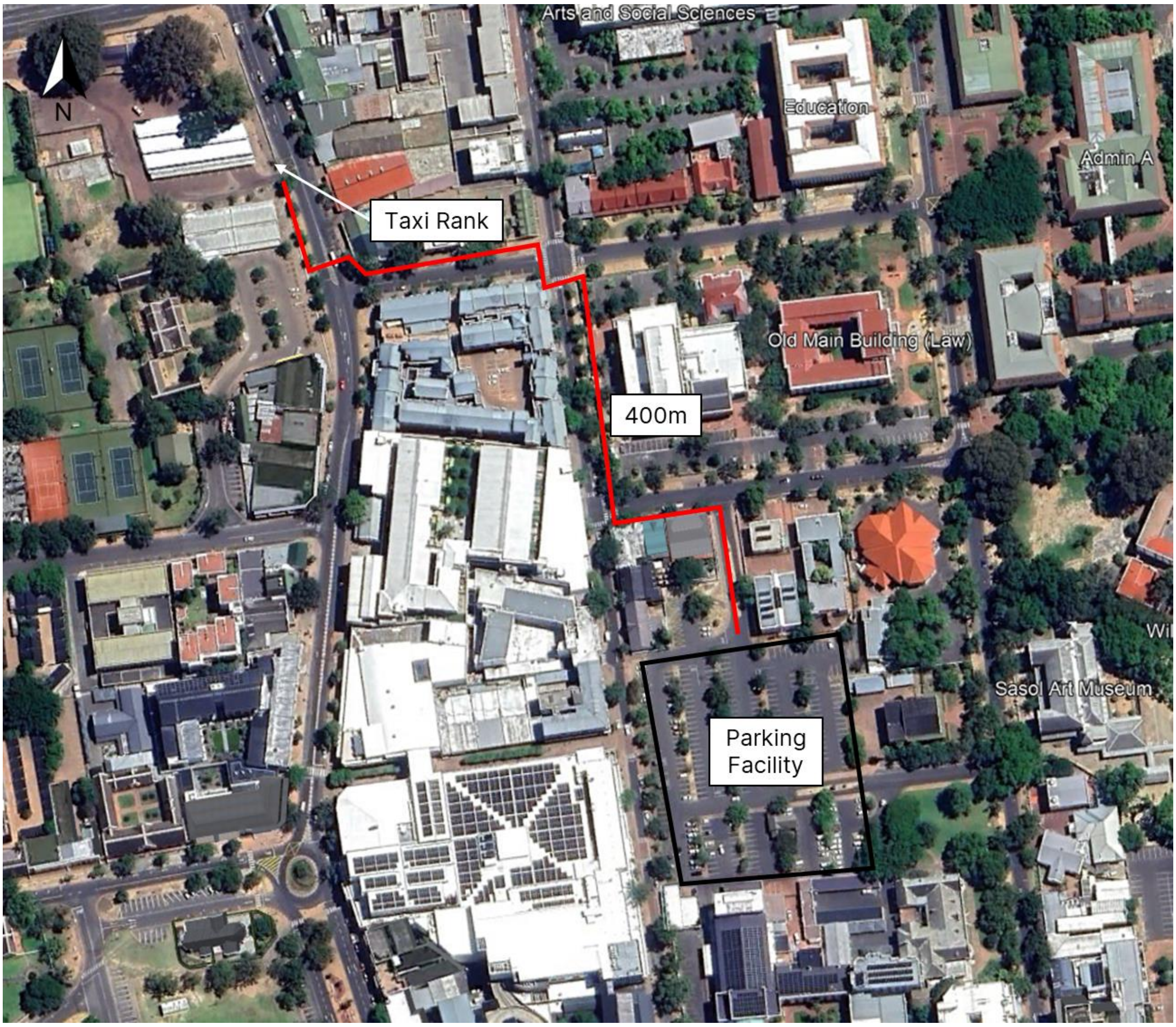


Figure 5-12: Stellenbosch Taxi Rank

5.2.3 Background Traffic Volumes

Traffic counts were conducted at the various intersections in the Stellenbosch CBD on Tuesday 31 October 2023. The AM peak, PM peak counts were performed and categorized according to light vehicles, minibus taxis, buses and heavy vehicles. The traffic counts were conducted at the following intersections in the study area:

- Victoria Street / Andringa Street;
- Victoria Street / Ryneveld Street;
- Ryneveld Street / Plein Street / Van Riebeeck Street; and
- Andringa Street / Plein Street / Van Riebeeck Street.

It is observed from the traffic count volumes that for the study area, the volumes peaked within the following hours that are chosen for the study area:

- Weekday AM Peak: 07h45-08h45
- Weekday PM Peak: 16h00-17h00

The future background traffic is estimated using the growth rate expected. According to the TMH17 Volume 1: South African Trip Data Manual, the following growth rates are applicable to urban environments:

Development Area	Growth rate
Low growth areas	0 - 3%
Average growth areas	3 - 4%
Above average growth areas	4 - 6%
Fast growing areas	6 - 8%
Exceptionally high growth areas	> 8%

Source: City Council of Pretoria (1998)

Based on the guidelines provided by (COTO:TMH16 v2, 2012, p. B2) a 5-year design horizon (2028) is selected. Furthermore, historic traffic data from 2007 to 2019 was used to calculate the average traffic growth rate for the Stellenbosch CBD. It was determined that the traffic grew with an average growth rate of 2.57% per annum from 2007 to 2019. A growth rate of 2.57% will therefore be applied to the 2023 traffic counts to determine the horizon year traffic.

5.2.4 Latent Rights

The area is built up and no additional latent rights were used. The 2.57% growth as indicated above accounted additional trips generated for any developments within the area and surrounding area.

5.3 Traffic Demand Estimate

5.3.1 Existing Traffic Demand

Parking facilities are not trip generators and the TMH 17 Trip data manual can therefore not be used to calculate the trip generation and traffic demand for the Eikestad Parking Facility. The vehicles that will access the facility is traffic volumes that are already on the road network (i.e. traffic that is generated by other land uses). The traffic demand was therefore determined by conducting 12-hour parking demand surveys in the CBD as indicated in chapter 3. The existing parking demand and supply was derived using the survey data which was then assessed based on the proposed facility size of chapter 3 and 4 of this report. The arrival and departure rates were based on the existing survey data. The parking surveys indicated that the AM and PM peak hour for the parking facility is:

- AM Peak Hour:08h30-09h30
- PM Peak Hour: 15h30-16h30

Based on the actual volumes and distribution of parking volumes that are estimated to use the facility based on the survey data, the trip generation and trip distributions were estimated, Tables 5-1 and 5-2.

Table 5-1: 12hr actual estimated arrival and departure volumes

Time	06:00	06:30	07:00	07:30	08:00	08:30	09:00	09:30	10:00	10:30	11:00	11:30	12:00	12:30	13:00	13:30	14:00	14:30	15:00	15:30	16:00	16:30	17:00	17:30
Total Number of Parking Spaces	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500	500
Practical Capacity	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435	435
Parking Accumulation @ 2028	**38**	**56**	**87**	**137**	**228**	**291**	**362**	**401**	**432**	**433**	**430**	**431**	**396**	**407**	**427**	**435**	**428**	**424**	**404**	**413**	**380**	**362**	**351**	**310**

Table 5-2: Peak Hour Demand

AM Peak		
Arrival Peak Hour	264	8:30-9:30
Departing	52	8:30-9:30
PM Peak		
Arrival Peak Hour	66	15:30-16:30
Departing	218	15:30-16:30

5.3.2 Future Traffic Demand

Since a parking facility is not a trip generator, the future traffic demand was calculated using the additional number of parking bays that will be provided at the parking facility together with the existing parking demand that was surveyed at the parking areas. It is assumed that the proposed Eikestad Parking Facility will have a similar in-out split that was surveyed at the existing parking area. The expected traffic demand can be seen in Figure 5-13 and 5-14.

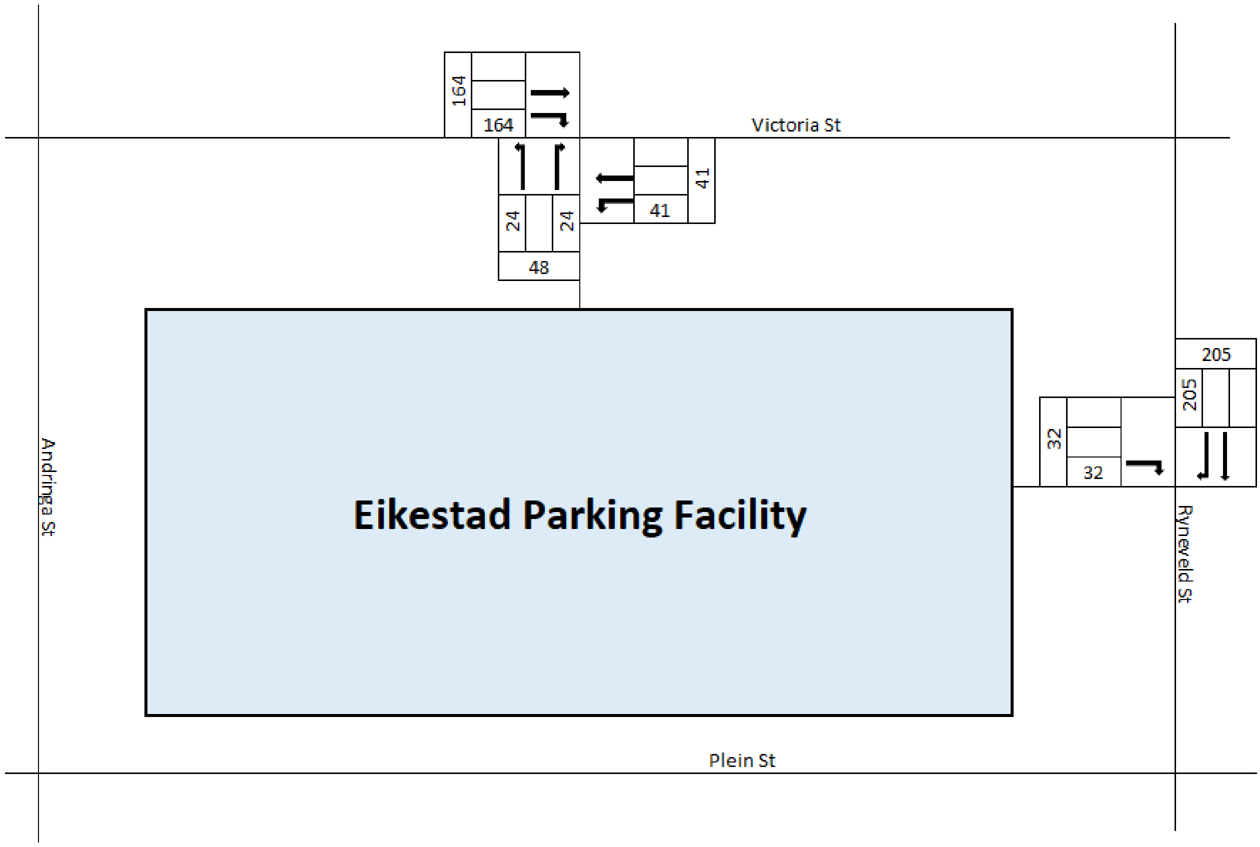


Figure 5-13: Future AM Peak Hour Traffic Demand at the Eikestad Parking Facility

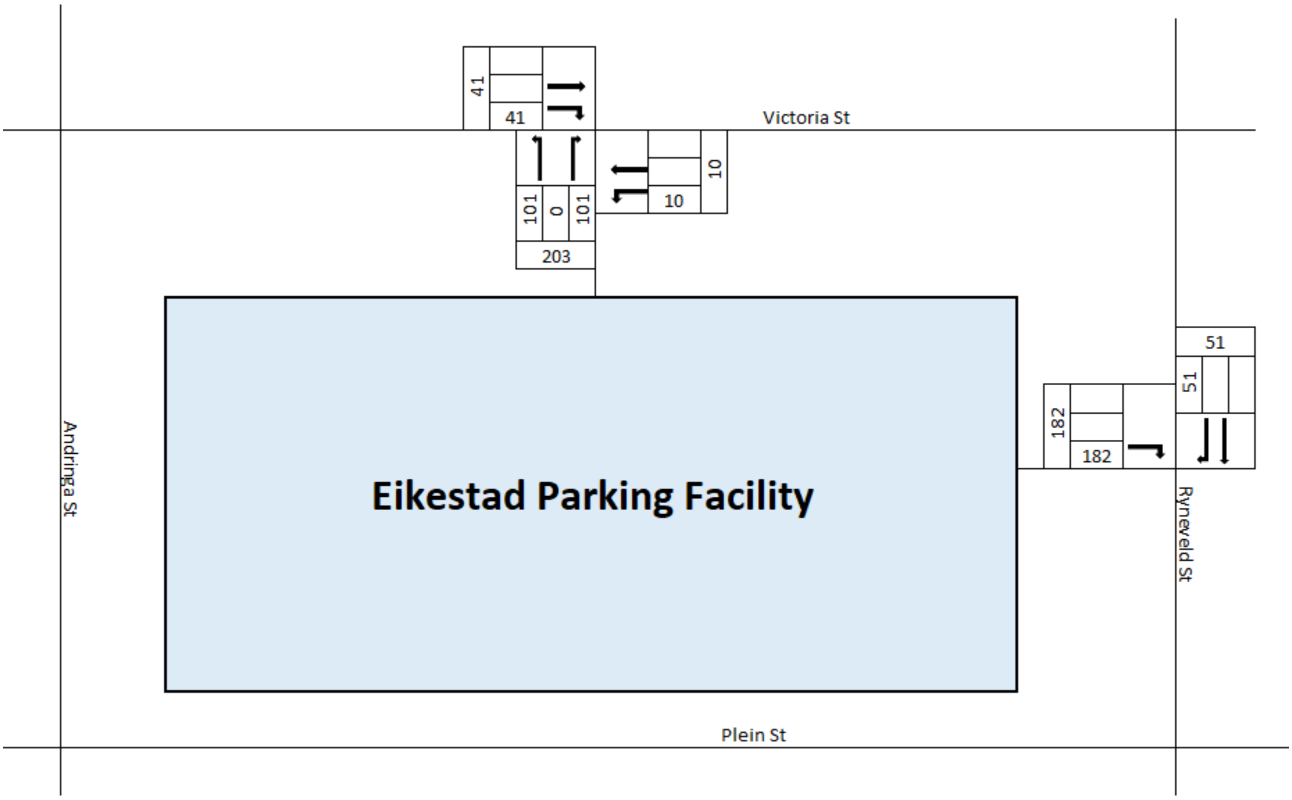


Figure 5-14: Future PM Peak Hour Traffic Demand at the Eikestad Parking Facility

5.3.3 Modal Split

The modal split for the facility was assumed to be private vehicles only. This parking area will not be used by delivery vehicles since specific loading facilities for loading and offloading are provided along Andringa Street. This parking area will also not be utilised by public transport vehicles since this facility is not earmarked for parking only and not as a public transport node.

5.3.4 Trip Distribution and Trip Assignment

The directional split, or in other words the trip distribution for the parking facility was derived using the parking survey data. It was assumed that the trip distribution that was surveyed at the existing parking area will remain the same for the proposed parking facility. The expected trip distribution can be seen in Figure 5-15. The traffic volumes that are expected to arrive and depart at the parking facility during the AM and PM peak hours are indicated in the diagrams below.

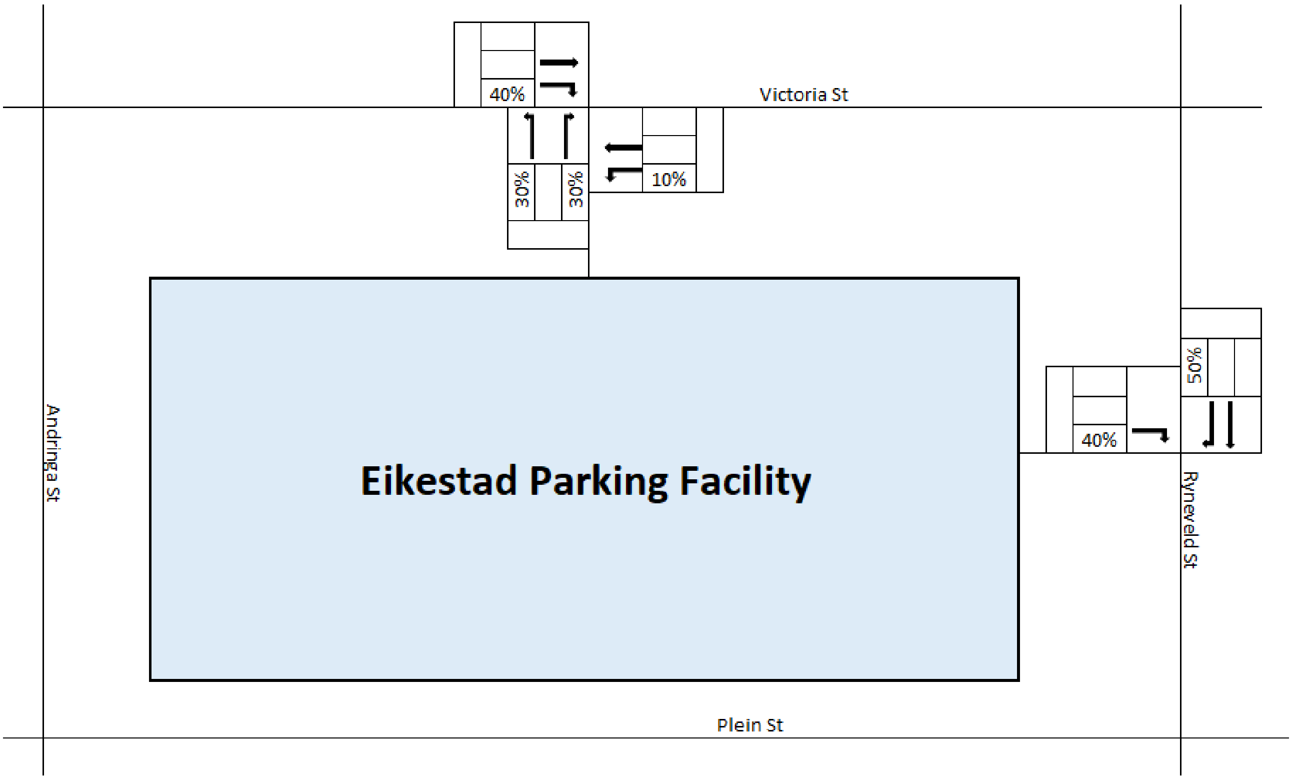


Figure 5-15: Trip Distribution at the Accesses to the Parking Facility

5.3.5 Scenarios

The Eikestad Parking Facility does not generate additional trips on the external network. It will merely be utilised by traffic that is already on the road network. The following scenarios were therefore included as part of this study:

- 2023 AM Peak Hour Base Year Traffic
- 2023 PM Peak Hour Base Year Traffic
- 2028 AM Peak Hour Future Year Traffic
- 2028 PM Peak Hour Future Year Traffic

5.4 Site Traffic Assessment

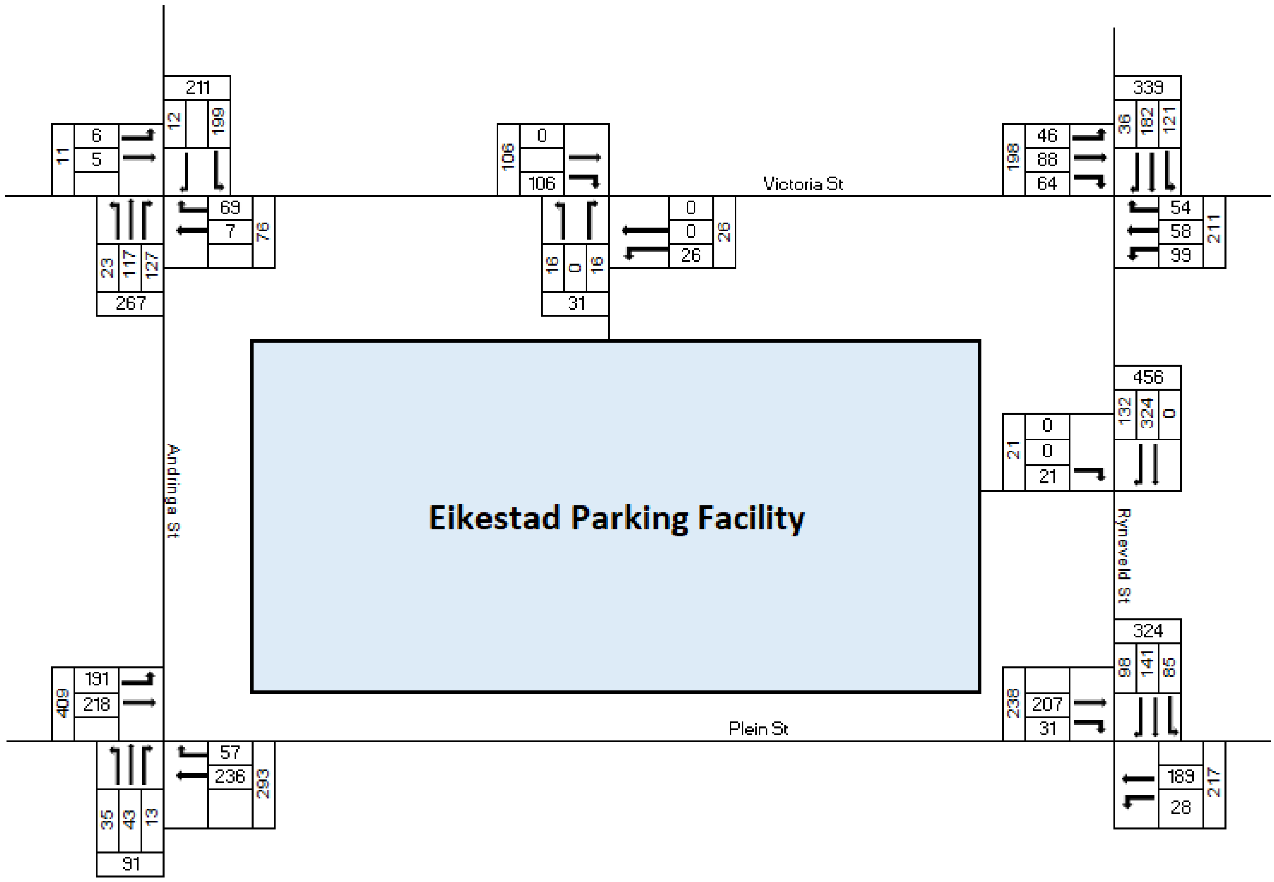
5.4.1 Investigation of other road elements

No other road elements are included that experience traffic capacity constraints due to the development.

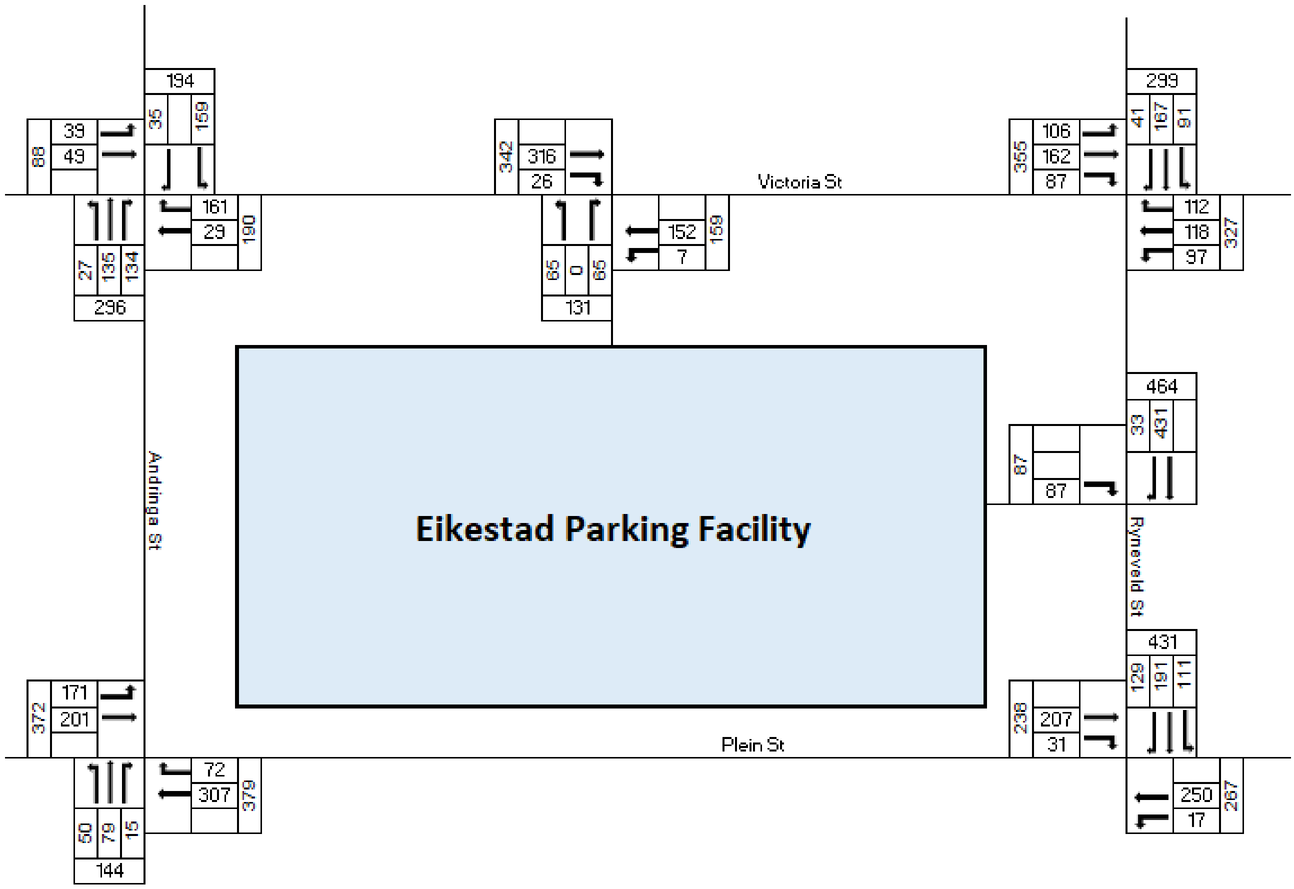
5.4.2 Traffic Volumes

The traffic volumes for the different scenarios are indicated below.

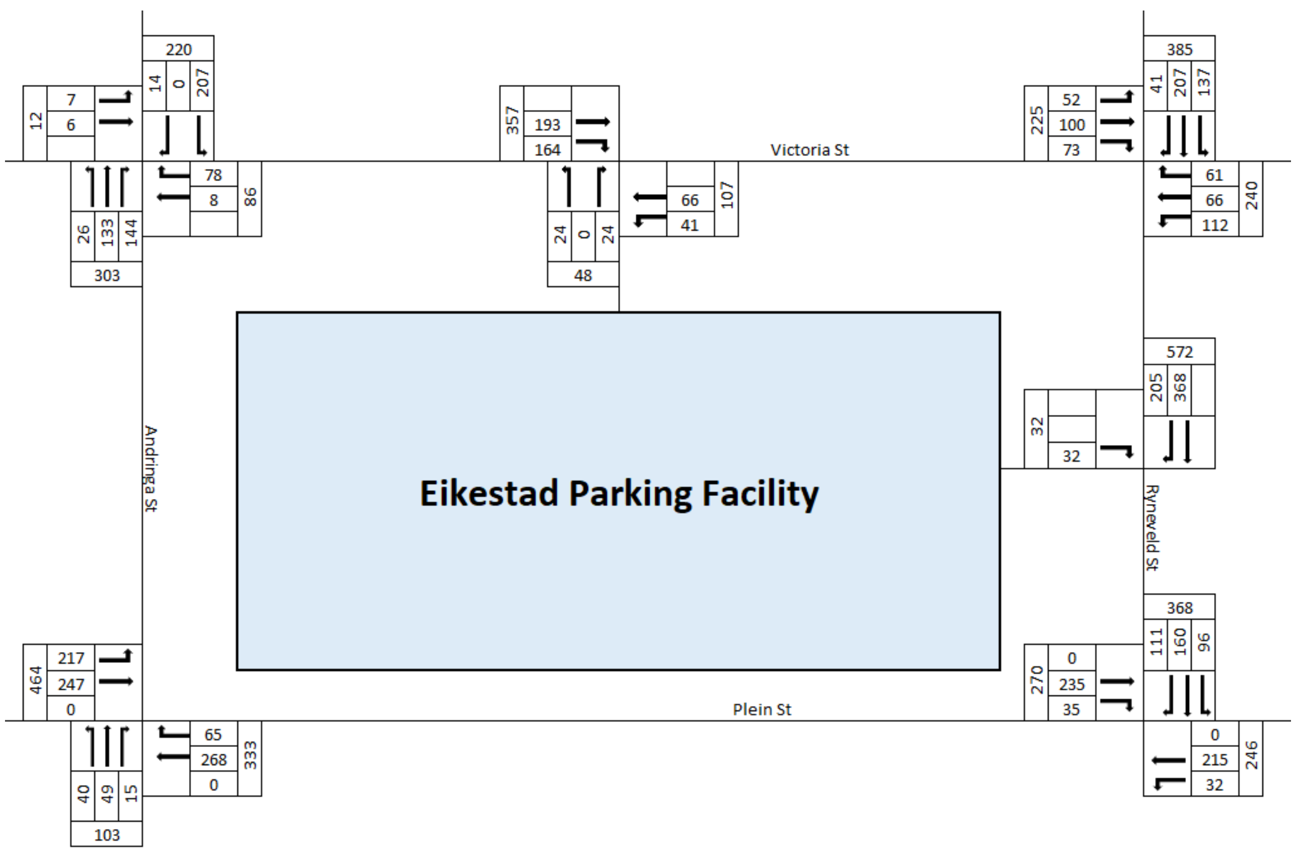
Scenario 1: 2023 AM Peak Hour Base Year Traffic



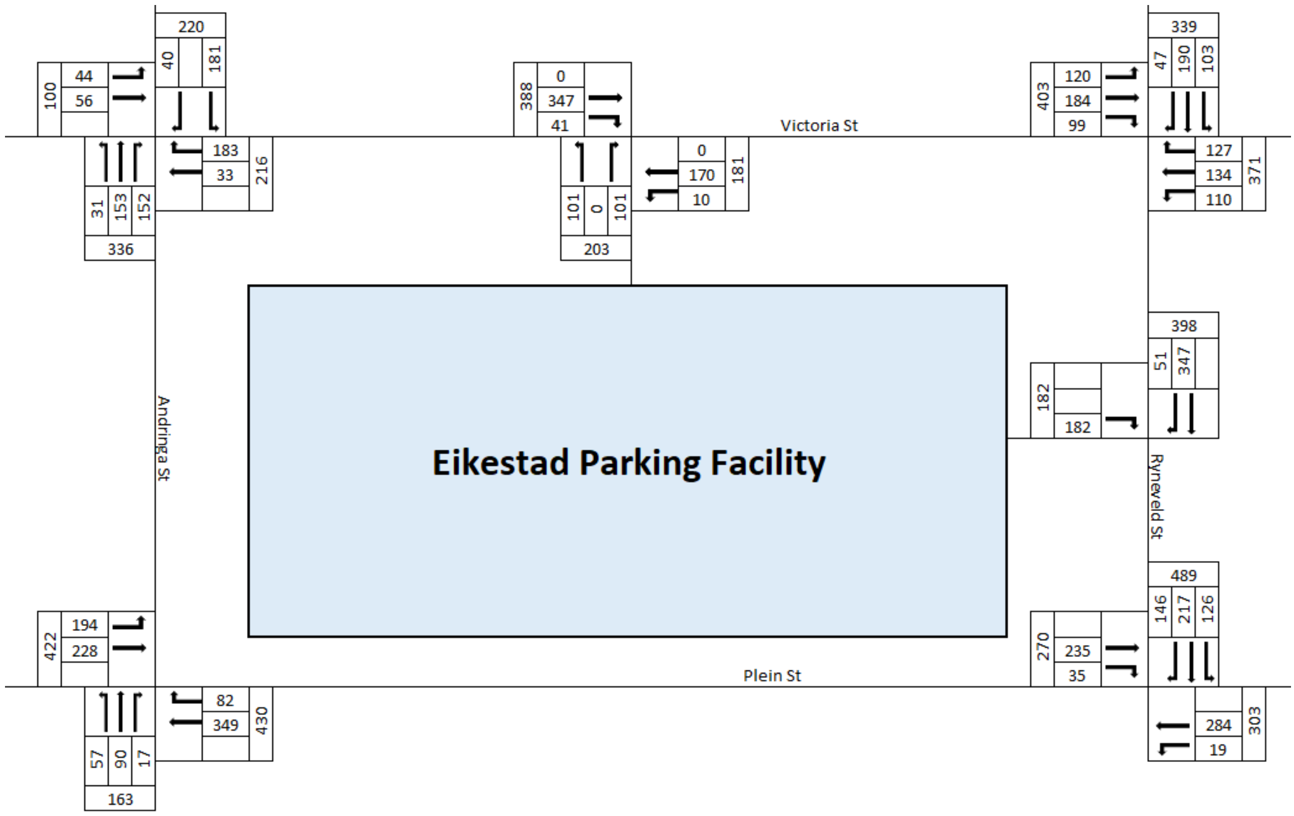
Scenario 2: 2023 PM Peak Hour Base Year Traffic



Scenario 3: 2028 AM Peak Hour Future Year Traffic



Scenario 4: 2028 AM Peak Hour Future Year Traffic



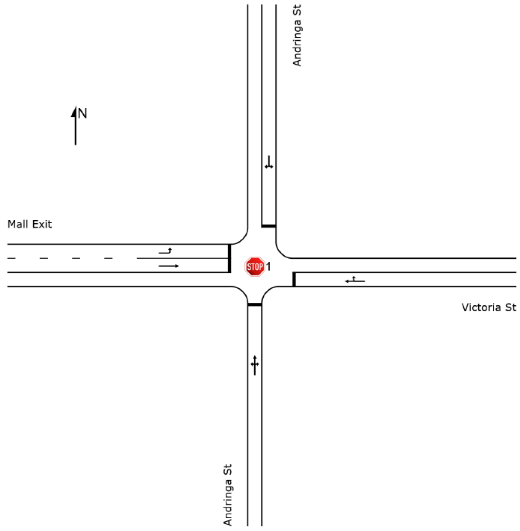
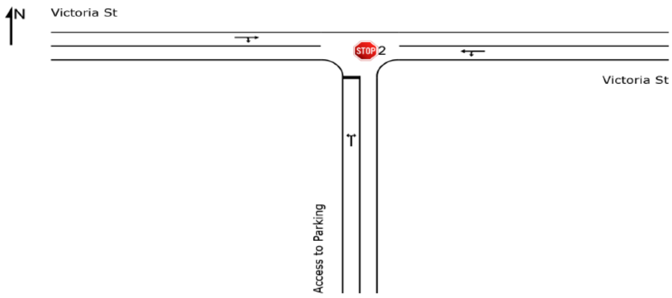
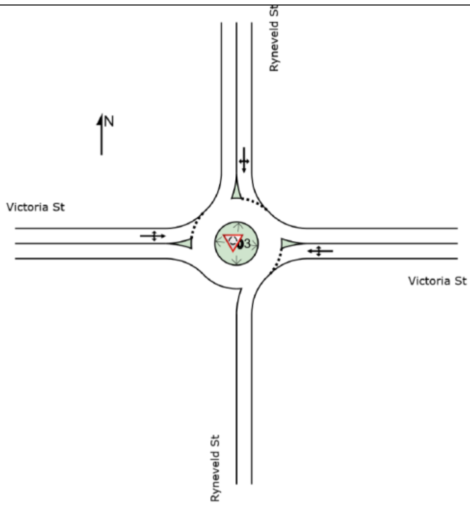
5.5 Intersection Layouts and Measures of Effectiveness

The results of the traffic analysis will be based on a Level of Service (LOS) measurement, which uses measured delay experienced by a vehicle at the intersection and compares it to a scale of values defining the LOS. The Level of Service (LOS) is based on Table 5-3 below, which has been taken from the (HCM , 2010) manual. The type of intersection affects the allowable delay in each LOS bracket resulting in different values for a traffic signal and non-signalized intersection. An acceptable LOS is on an intersection where a LOS D and above (A, B and C) is achieved. An unacceptable LOS is represented by an E and an F.

Table 5-3: Level of Service

Level of Service	Average Overall Delay per Vehicle (seconds) Signals and Roundabouts	Stop Signs and Give-Way (Yield) Signs
A	<= 10	<= 10,0
B	10,1 to 20,0	10,1 to 15,0
C	20,1 to 35,0	15,1 to 25,0
D	35,1 to 55,0	25,1 to 35,0
E	55,1 to 80,0	35,1 to 50,0
F	> 80,0	> 50,0
Desirable / Maximum Recommended	**55/ 80**	**35 / 50**

In addition, the queue lengths at the access will be assessed in terms of the (COTO: TRH 26, 2012). This will lead to the correct assessment of the access and the relevant control warrants. The analysis will be conducted on the layouts of the proposed facility accesses and existing intersection configurations.

Intersection	Schematic Layout
Victoria St / Andringa St	
Victoria St / Access	
Victoria St / Ryneveld St	

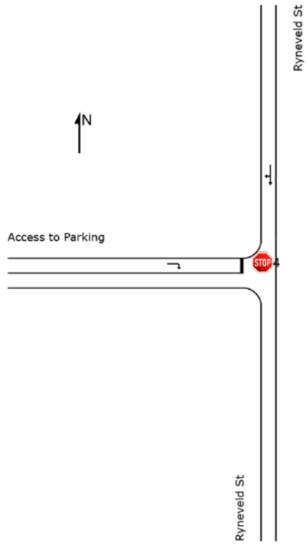
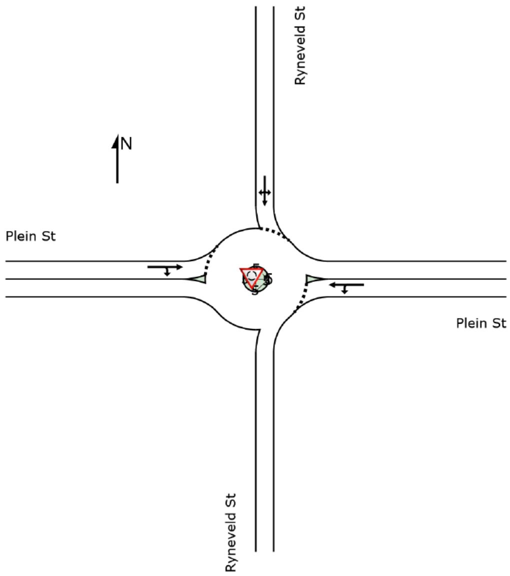
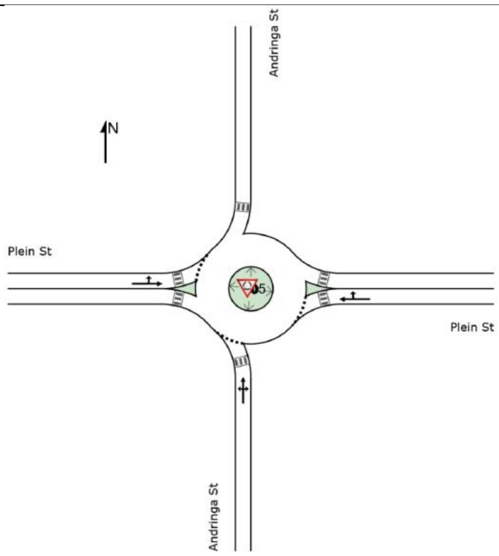
Ryneveld St / Access	
Ryneveld St / Plein St	
Andringa St / Plein St	

Figure 5-16: Schematic Intersection layouts

5.5.1 Capacity Analysis Results

The overall intersection capacity analysis results for the four intersections and two accesses can be seen in Table 5-4. The detailed intersection capacity results per movement can be seen in Annexure B.

Table 5-4: Average Intersection Level of Service Results

Intersection	Scenario	Intersection control	AM Peak Hour			PM Peak Hour		
			LOS	Del (s)	v/c	LOS	Del (s)	v/c
Victoria St / Andringa St	2023 Base	All-way Stop	D	26	0,7	C	19	0,61
	2028 Future		D	25	0,71	C	25	0,69
Victoria St / Access	2023 Base	Priority Stop	N/A	3	0,17	N/A	2	0,19
	2028 Future		N/A	3	0,21	N/A	3	0,22
Victoria St / Ryneveld St	2023 Base	Traffic Circle	A	6	0,28	A	7	0,37
	2028 Future		A	7	0,37	A	8	0,44
Ryneveld St / Access	2023 Base	Priority Stop	N/A	2	0,25	N/A	2	0,25
	2028 Future		N/A	3	0,32	N/A	3	0,22
Ryneveld St / Plein St	2023 Base	Traffic Circle	A	7	0,34	A	7	0,43
	2028 Future		A	7	0,39	A	8	0,51
Andringa St / Plein St	2023 Base	Traffic Circle	A	6	0,35	A	6	0,34
	2028 Future		A	6	0,4	A	6	0,4

It is evident from the table above that the intersections operate at acceptable levels of service during the base and horizon years.

The 95% queue lengths at the accesses to the Eikestad Parking Facility can be seen in Table 5-5. It is evident that the queue lengths at the two accesses are acceptable for the existing control.

Table 5-5: Access 95 Percentile Queue Length (vehicles)

Victoria St / Access												
Scenario	South			East			North			West		
	L	S	R	L	S	R	L	S	R	L	S	R
2023 AM	0,6		0,6	0.0	0.0						4,8	4,8
2028 AM	0,9		0,9	0.0	0.0						7	7
2023 PM	2,9		2,9	0.0	0.0						1,5	1,5
2028 PM	5		5	0.0	0.0						2,4	2,4
Ryneveld St/ Access												
Scenario	South			East			North			West		
	L	S	R	L	S	R	L	S	R	L	S	R
2023 AM	0		0	0.0	0.0						0.0	0,2
2028 AM	0		0	0.0	0.0						0.0	0,4
2023 PM	0.0		0.0	0.0	0.0						0	1
2028 PM	0		0	0.0	0.0						0.0	2,2

5.6 Results

The findings of the traffic analysis are as follows:

- The proposed accesses are acceptable to accommodate the additional trips.

- The proposed accesses have acceptable throat lengths.
- The NMT and internal walkways, existing and proposed, links to the road network, buildings and parking bays are adequate.
- The are no issues regarding the design vehicle’s ability to navigate the internal road network.
- Due to the demand analysis, a wider traffic analysis would be required to assess the closure of church road on the wider CBD area.

Based on the above accesses and surrounding intersections can accommodate the additional traffic.

6 Financial Value Assessment

The value assessment is the pivotal stage of the feasibility study. The value assessment of the Eikestad parking facility consists of two main components, namely a financial value assessment and an economic value assessment. This section deals with the financial value assessment and the economic value assessment is dealt with in Section 7 of this report.

This section will assess the financial viability of the Eikestad parking facility on whether it is:

- Affordable
- Transferring risk appropriately
- Value for money

As the proposed facility at Eikestad is a parking garage, the feasibility will be assessed in terms of the PPP process as per module 4. The financial value assessment consists of two components as follows:

- Component 1: Development of the Base Public Service Comparator (PSC) model. This model is then expanded into 6 additional scenarios based on demand estimate variations;
- Component 2: Based on the risk analysis, the Risk Adjusted PSC model is developed (for the base and the six scenarios);
- Component 3: Based on the re-allocation of risks to other parties than the Municipality, a PRC Risk Retained model is developed for the Base PSC model and the six scenarios;
- Component 4: Development of the PPP Reference model, also for a base case and six scenarios; and
- Component 4: based on the risk analysis, the PPP Risk Adjusted model is developed, also for the PPP Reference model and the six scenarios.

All models are developed for a 20-year and a 25-year project timeline.

The Public Sector Comparator (PSC) Model is a costing of the project as per the specified outputs with the public sector as the supplier. The costs are based on recent and or actual costs of similar projects.

The PPP reference model is a costing from first principles, of the project with identical outputs, but from the private sector.

The risk transfer is to assess the effect risk has on the project due to cost implications for the public sector. The PSC model is then updated with the risk adjusted matrix. Hereafter, the affordability of the project is tested by calculating if the total cost of the project can be accommodated in the whole project term by the Stellenbosch municipality.

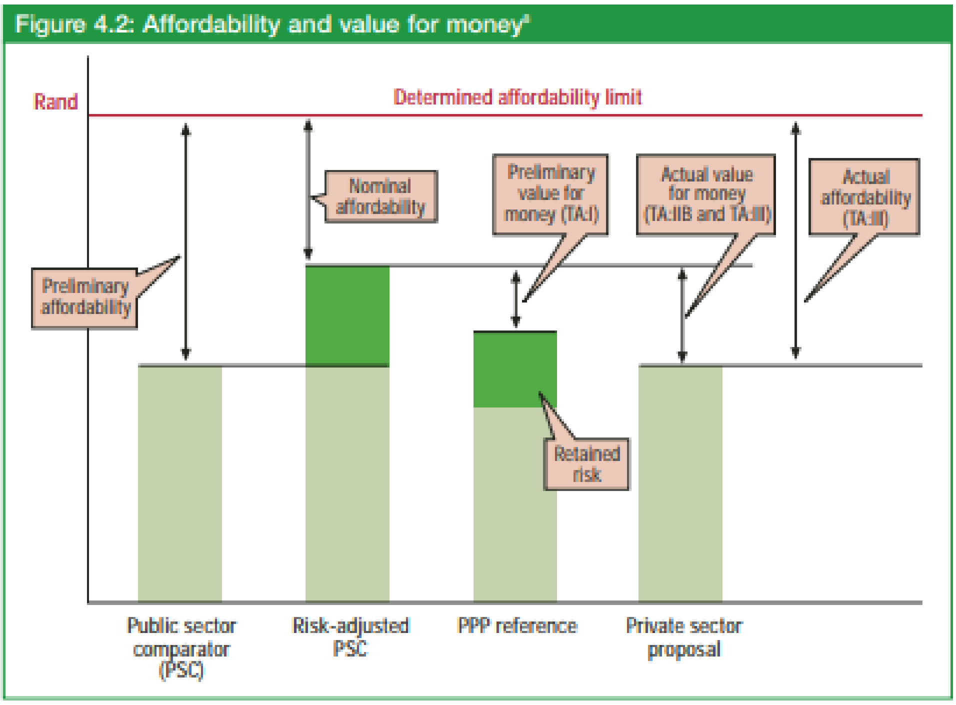


Figure 6-1: Extract, Affordability and value for money: Source PPP manual

The project value for money is the assessment of the Stellenbosch Parking function by the private sector as a net benefit, as defined in terms of cost, price, quality, quantity, risk transfer or a combination of these. However, affordability remains the major driving forces behind the feasibility of the proposed parking facilities in Stellenbosch.

6.1 PSC Model

The PSC model follows six steps as highlighted below:

- Step 1: Provide a technical definition of the project.
- Step 2: Calculate direct costs.
- Step 3: Calculate indirect costs.
- Step 4: Calculate any revenue.
- Step 5: Explain all assumptions used in the construction of the model.
- Step 6: Construct the base PSC model and describe its results.

These steps are as per the PPP manual model 4 as stipulated by National Treasury.

6.1.1 Step 1: Technical Definition of the Project

The project is a multi-story Parking Garage for the Stellenbosch CBD located at the current open parking site across of the Eikestad mall. The project costs are for a three-story building with 498 parking bays. The parking structure will be a concrete structure. The design and construction phase will include, but not limited to, the following disciplines and associated codes to design and construct the 3-story parking garage on the site known as the Eikestad Mall:

- Transportation and Geometric Engineer
    - TRH 26 (South Africa Road Classification and Access Manual),
    - TRH 17 (Geometric Design of Rural Roads),
    - Department of Transport Chief Directorate Roads
    - Human Settlement Planning and Design.
    - Drainage Design Guidelines
- Pavement and Geotechnical Engineer
    - South African Pavement Design Guide TRH4 and TRH 26
- Architect
    - SANS 10400
- Electrical Engineer
    - SANS 10142-1 - THE WIRING OF PREMISES PART 1: LOW-VOLTAGE INSTALLATIONS
    - SANS 10142-2 - THE WIRING OF PREMISES PART 2: MEDIUM-VOLTAGE INSTALLATIONS
    - SANS 10098-1 – PUBLIC LIGHTING
    - SANS 10098-2 – PUBLIC LIGHTING
    - SANS 10114-1 – INTERIOR LIGHTING
    - SANS 10114-2 – EMERGENCY LIGHTING
    - SANS 10389-1 – EXTERIOR LIGHTING
    - SANS 10389-2 – SECURITY LIGHTING
    - SANS 10139 – FIRE DETECTION AND ALARM SYSTEMS FOR BUILDINGS
    - SANS 62305 – PROTECTION AGAINST LIGHTNING
- Mechanical Engineer
- Geotechnical Engineer
- Topographical survey
- Structural Engineer
    - SANS 10160 – Loading code
    - SANS 10100 – Structural use of concrete
    - SANS 10162 – Structural use of steel
    - SANS 10163 – Structural use of timber
    - SANS 10164 – Structural use of masonry
    - SANS 10400 – National Building Regulations

    - SANS 1200 – Specifications for Civil Engineering Construction
- Environmentalist
    - The Environmental Impact Assessment (EIA) Regulations (Section 21 of Government Gazette No 18261)
- Construction Supervision

Post construction and implementation, a maintenance cycle will be required. For parking garages, routine maintenance is important, as the garage undergoes continuous use and daily exposure to the elements. Under these circumstances, even the sturdiest construction materials will deteriorate over time. As with all large-scale pavement and concrete assets, routine preventative maintenance is the key to the longevity and structural integrity of a parking garage, parking structure maintenance guide, 2017. Preventative services can help prolong the functionality of a garage over an extended period of time, limiting damage, keeping cash flow steady and costs down. With accurate cost and timeline projections, routine maintenance will minimize disruptions. As per the Department of Public Works, National Immovable Asset Maintenance Management Planning Guidelines, a maintenance framework consists of both preventative and corrective maintenance as reflected in Figure 6-2.

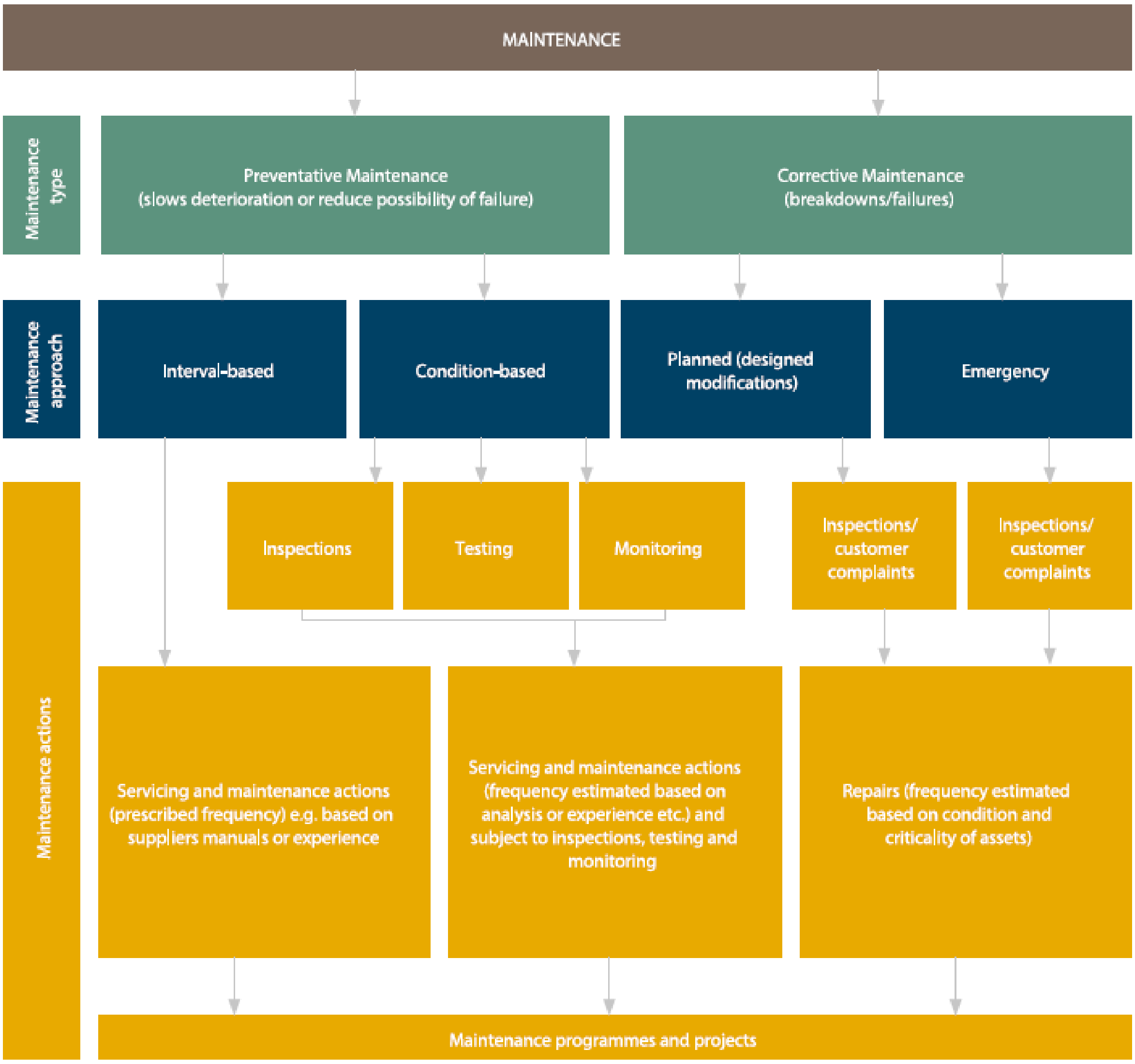


Figure 6-2: Maintenance Hierarchy NIAMM Maintenance Planning Guidelines

In accordance with the Effective Repairs and Maintenance strategies for parking structures 2014, the loads and environmental conditions in enclosed buildings do not change rapidly, most buildings deteriorate slowly over time. This is illustrated by Figures 6-3 and 6-4. Essentially, the figures indicate that the correct implementation of maintenance can significantly extend the facilities life.

As a result, a comprehensive maintenance program requires that an annual budget be established. This budget should begin on the first day of operation and account for costs, such as operating expenses, routine and preventative maintenance, and structural repairs, rehabilitation, and restoration. The two main components of effective repair planning are routine/ preventative maintenance and corrective maintenance as well as structural repairs, rehabilitation, and restoration.

Preventative maintenance as indicated in the Effective Repairs and Maintenance strategies for parking structures 2014, can be completed either quarterly or annually by in-house personnel. As a minimum, a routine walk-through inspection should be conducted at least once a year. This should be in conjunction with a washdown of the structure, so that any active leakage can be noted and its source identified. Areas of concern such as cracks, leaks, joint sealant failures, and general surface deterioration can be recorded on plan sheets for each floor. An example of a routine checklist is shown in Figure 6-5.

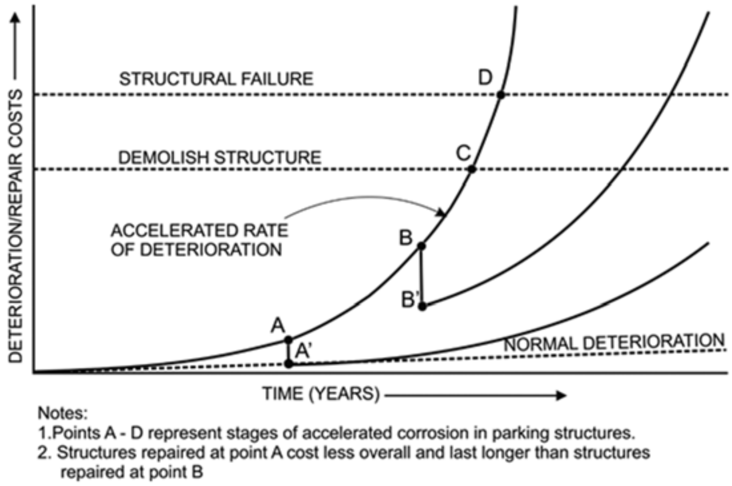


Figure 6-3: Parking structure deterioration curve, Source, Parking Structures: Planning, Design, Construction, Maintenance and Repair, third edition,

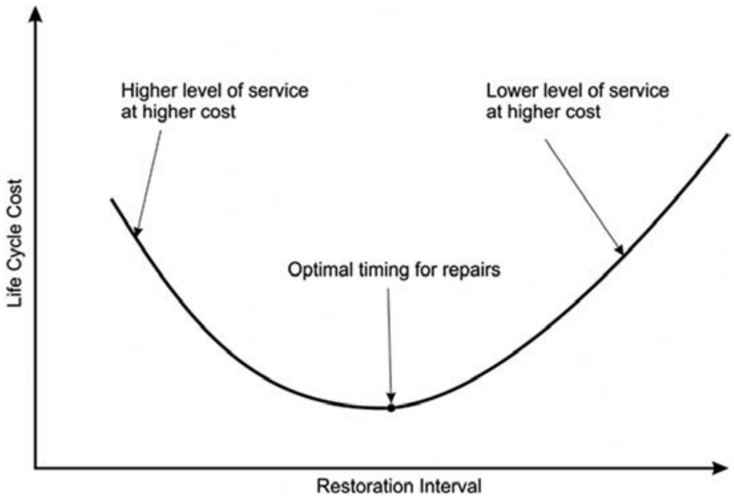


Figure 6-4: Life-cycle cost of a parking structure, Source Effective Repairs and Maintenance strategies for parking structures 2014

ANNUAL STRUCTURAL CHECKLIST

PARKING STRUCTURE NAME
INSPECTOR DATE
OWNER CITY, STATE

FLOORS

_____ When was the last floor sealer application? (Typically applied every 3 to 5 years)
_____ Are there rips, tears, debonded areas, or signs of embrittlement in the traffic topping?
_____ Are there cracks in the floor slab? If yes, where are they located and how wide are they?
_____ Are there signs of leaking?
_____ Any spalls or delaminations? If yes, how big and where are they located?
_____ Has chloride ion content testing been performed this year?

BEAMS AND COLUMNS

_____ Are there cracks? If yes, are they vertical or horizontal and how wide?
_____ Are there any signs of leaking?

STAIR/ELEVATOR TOWERS

_____ Are there any signs of a leaking roof?
_____ Are there any cracks in the exterior brick?
_____ Are there any cracks in the mortar joints?
NOTES AND CORRECTIVE ACTION NEEDED:

JOINTS

_____ Are there any signs of leaking, loss of elasticity or separation from adjacent surfaces?
_____ Expansion joints
_____ Control joints
_____ Construction joints
_____ Tee-to-tee joints

ARCHITECTURAL SEALANTS

_____ Are there any signs of leaking, loss of elasticity, or separation from adjacent surfaces?
_____ Between windows and doors
_____ In block masonry
_____ Exterior sealants
_____ Concrete walks, drives, and curb landings

EXPOSED STEEL

_____ Is there any exposed steel? If yes, where is it located and is it rusted?

MASONRY

_____ Are there any cracks in the brick?
_____ Are there any cracks in the mortar?
_____ Are there any brick spalls? If yes, where are they located and how big are they?
NOTES AND CORRECTIVE ACTION NEEDED:

BEARING PADS

_____ Are bearing pads squashed, bulging, or out of place? If yes, where?
After answering the above questions, please consult a qualified engineer to discuss your answers.
NOTES AND CORRECTIVE ACTION NEEDED:

Figure 6-5: Typical structural checklist for parking structures, Source: Effective Repairs and Maintenance strategies for parking structures 2014

With regards to the structural repairs, rehabilitation and restoration for parking garages, the maintenance cycle as per the recommendation of the parking structure garage maintenance guide, 2017 is recommended that a formal structure be assessed every 3-5 years focusing on the following:

Wall & Column Repairs

Signs of deterioration are structural cracks in the concrete, spalling or chipping, defection of the structure, or corrosion appearing on the column/ wall surface. Depending on the severity of the damage, epoxy injection may be sufficient, but other instances might require a re-pour.

Expansion Joint

Deck expansion joints provide room for the concrete structure to flex independently under heavy loads. Malfunctioning expansion joints can restrict the necessary movement in the slabs or allow water to enter the structure.

Post Tension Repairs

Post tension repairs are required to restore strength and integrity to the structure. Visible signs that a structure needs post tension repairs are broken tendons that are coming out of the structure, excessive deflection, cracking that runs parallel to the post tension strands, and diagonal shear cracks in beams and joints.

Deck Repairs

Deck repairs are needed when the cast surface of the concrete is compromised. Typically, the damaged section is removed, and concrete is reapplied into the void. This should typically be done by a restoration engineer and approved contractor.

Based on the above maintenance needs and types of maintenance requirements, a proposed maintenance schedule is indicated below in Table 6-1.

Table 6-1: Proposed Maintenance Schedule

Maintenance Structure		Daily	Weekly	Monthly	Quarterly	Semi- Annually	Other
Structural Maintenance							
A. Structural Systems							
Check For:	Floor Surface Deterioration				●		
	Water leakage				●		
	Cracking of concrete				●		
	Rusting of steel				●		
Repair		As per engineers' recommendations					
Replace protective concrete floor coating		As per engineers' recommendations					
B. Roofing and Waterproofing							
Check for leaks	Roofing			●			
	Joint Sealant in floors			●			
	Expansion joints			●			
	Windows, doors and walls			●			
	Floor membrane areas			●			
Check for wear and deterioration				●			
Operational Maintenance							

A. Cleaning							
	Sweeping-localized	•					
	Sweeping-all areas (including curbs)		•				
	Expansion joints		•				
	empty bins	•					
	Toilets	•					
	Cashier booths	•					
	Elevators, doors, tracks, windows, glass back etc	•					
	Stairs	•		•			
	Lobby, offices, floors windows etc	•	•				
	Wash down parking floors			•			To occur monthly in coastal areas and quarterly elsewhere
	Parking control equipment		•				
B. Doors and Hardware							
	Doors close and latch properly	•					
	Mechanised doors	•					
	Panic hardware at security doors	•					
	Lubricate mechanised doors			•			

C. Electrical systems							
	Check light fixtures and exposed conduit		•				
	Re-lamp fixtures		•				
	Special units-inspect						As per the needs of the equipment
	Distribution panels					•	
D. Elevators							
	Check normal operation	•					
	Check indicators and other lights	•					
	Preventive maintenance service					•	Note: Under service contract for regular maintenance and safety checks
E. Heating ventilation and air conditioning							
	Check for proper operation		•				
	Check ventilation in enclosed or underground garage	•					
	Preventive maintenance service				•		
G. Parking System and Control equipment							
	Check for proper operation	•					

	Preventative maintenance				•	•	Generally, under a service contract and maintenance is done through this contract.
H. Plumbing/ Drainage systems							
Check for proper operation	Sanitary facilities	•					
	Irrigation		•				
	Floor drains		•				
	Sump pump		•				
	Fire protection systems			•			
I. Safety Checks							
	Carbon monoxide monitor	•					
	Handrails and guardrails		•				
	Exit lights	•					
	Emergency lights	•					
	Tripping hazards	•					
J. Security Systems							
Check for proper operation							
	Closed circuit TV	•					
	Audio surveillance	•					
	Panic buttons	•					

	Stair door locks and alarms	●					
K. Signs							
Check signs for							
	In place		●				
	Clean				●		
	Legible				●		
	Illuminated	●					
Aesthetic Maintenance							
A. Landscaping							
	Remove trash	●					
	Garding- mow, trim, weed		●				
B. Painting							
Check for rust spots	Doors and door frames				●		
	Handrails and guardrails				●		
	Pipe guardrails				●		
	Pipe guards				●		
	Exposed pipes				●		
	Conduits				●		

	Other metal				•		
Check for appearance				•			
	Striping			•			
	Signs				•		
	Walls			•			
	Curbs			•			
	Touch-up paint			•			
Re-paints							As and when required

6.1.2 Step 2: Direct costs

The direct costs are split into direct capital costs (construction, relocation of civil engineering services, smart parking system), maintenance costs, operating costs and BBBEE Costs.

6.1.2.1 Capital Costs

The direct capital costs for the construction of the facility are calculated in both the PSC and PPP Modes according to industry standards for structures in Stellenbosch. Construction costs have been calculated based on type of space, services and the quality of finishes required. Industry standard space requirements for parking areas were used in determining the amount of space required in each respective area and costs for each area calculated, accordingly. The costs were split into the different structures of the proposed facility. The capital cost estimates as shown in Table 6-2 exclude:

- Abnormal foundations
- Loose equipment
- Perimeter walls
- Power generators
- Refuse yard
- Fire sprinkler
- Escalation
- Professional fees (which were included as a separate cost item in the models)
- Property cost
- Services relocation cost
- VAT

Table 6-2: Eikestad Parking Structure Cost estimate

EIKESTAD PARKING FACILITY : ELEMENTAL ESTIMATE 1 REV 2

Monday, 11 September 2023

	Basement	Structure	Other services	External Works	TOTAL
Primary items	**R 18 218 000**	**R 33 186 000**	**R -**	**R 1 172 000**	**R 52 576 000**
- Substructure	R 54 000	R 6 555 000	R -	R 221 000	R 6 830 000
- Ground floor	R 115 000	R 4 024 000	R -	R 473 000	R 4 612 000
- Structural frame	R 11 205 000	R 15 115 000	R -	R -	R 26 320 000
- External facades & lateral support	R 5 218 000	R 2 856 000	R -	R 160 000	R 8 234 000
- Roofs	R -	R 1 489 000	R -	R -	R 1 489 000
- Floor finishes	R 63 000	R 211 000	R -	R -	R 274 000
- Internal wall finishes	R 63 000	R 120 000	R -	R -	R 183 000
- Ceiling finishes	R 478 000	R 568 000	R -	R -	R 1 046 000
- Fittings	R -	R -	R -	R 318 000	R 318 000
- Electrical installation	R 668 000	R 1 114 000	R -	R -	R 1 782 000
- Fire protection	R 248 000	R 503 000	R -	R -	R 751 000
- Balustrading, handrails etc	R 76 000	R 601 000	R -	R -	R 677 000
- Miscellaneous items	R 30 000	R 30 000	R -	R -	R 60 000
Specialist items	**R 795 000**	**R 611 000**	**R 1 873 000**	**R -**	**R 3 279 000**
- Special fire protection	R 730 000	R 258 000	R -	R -	R 988 000
- HVAC	R 65 000	R 128 000	R -	R -	R 193 000
- Lift	R -	R -	R 1 017 000	R -	R 1 017 000
- CCTV	R -	R -	R 535 000	R -	R 535 000
- Access control	R -	R -	R 321 000	R -	R 321 000
- Signage (road signage elsewhere)	R -	R 225 000	R -	R -	R 225 000
External works	**R 11 806 000**	**R 3 648 000**	**R -**	**R 10 733 000**	**R 26 187 000**
- Alterations & demolitions	R -	R -	R -	R 1 345 000	R 1 345 000
- Site clearance	R -	R -	R -	R 114 000	R 114 000
- Earthworks	R 9 960 000	R 75 000	R -	R -	R 10 035 000
- Sub-soil drainage	R 1 352 000	R 688 000	R -	R -	R 2 040 000
- Storm water drainage	R 212 000	R 368 000	R -	R 100 000	R 680 000
- Water supply	R -	R -	R -	R 55 000	R 55 000
- Electrical installation	R -	R -	R -	R 3 210 000	R 3 210 000
- Roads, paving, etc	R 282 000	R 467 000	R -	R 3 195 000	R 3 944 000
- Covered parking	R -	R 1 550 000	R -	R -	R 1 550 000
- Minor construction work	R -	R 500 000	R -	R 1 019 000	R 1 519 000
- Water features	R -	R -	R -	R 1 017 000	R 1 017 000
- Garden works	R -	R -	R -	R 678 000	R 678 000
Sub-total (excl. VAT)	**R 30 819 000**	**R 37 445 000**	**R 1 873 000**	**R 11 905 000**	**R 82 042 000**
- Preliminaries (say 10%)	R 3 082 000	R 3 744 000	R 187 000	R 1 190 000	R 8 204 000
- Price and detail development (say 7.5%)	R 2 543 000	R 3 089 000	R 155 000	R 982 000	R 6 769 000
TOTAL CURRENT ESTIMATED CONSTRUCTION COST (excl VAT)	**R 36 444 000**	**R 44 278 000**	**R 2 215 000**	**R 14 077 000**	**R 97 014 000**
- Contingencies (say 2.5%)	R 911 000	R 1 107 000	R 55 000	R 352 000	R 2 425 000
TOTAL CURRENT ESTIMATED CONSTRUCTION COST (excl VAT)	**R 37 355 000**	**R 45 385 000**	**R 2 270 000**	**R 14 429 000**	**R 99 439 000**
Escalation	**R -**	**R -**	**R -**	**R -**	**R -**
- Pre-contract (excluded)	R -	R -	R -	R -	R -
- Post contract (excluded)	R -	R -	R -	R -	R -
TOTAL CURRENT ESTIMATED CONSTRUCTION COST (excl VAT)	**R 37 355 000**	**R 45 385 000**	**R 2 270 000**	**R 14 429 000**	**R 99 439 000**

EXCLUSIONS

- See cover letter for the exclusions list

In addition to the above cost estimates, the following costs (excluding VAT) were also included in the models at 2023 costs:

- Consultant costs (12%, of the 2023 capital cost estimate), amounting to R12 927 070 at 2023 prices.
- Relocation of civil engineering services (R 1 714 073.56).
- Smart parking system (R1 999 141.00 at 2023 prices), to be replaced every 8 years in full according to industry best practice.
- Fibre installation costs (R5000.00)

The total 2023 capital cost estimate amounts to R115 295 583.39. When the assumed inflation rate of 5% per annum and the planning and construction period of 2 years are taken into consideration, the capital investment amounts to R124.1m (R126 270 691.87). Costs were allocated over the construction period as follows:

- Year 1 (2024) Full portion of consultant fees and 70% of construction costs;
- Year 2: (2025): Fibre provision, Smart parking system and 30% of the construction cost.

6.1.2.2 Building Price Escalations

The capital cost estimates are based on September 2023 prices. It is anticipated that construction is scheduled to commence in June 2024 to November/December 2025 based on an anticipated 18-month construction program. It is convention in the construction industry for contractors to apply escalation to the quoted price from the date of the price submission up to commencement of construction (pre-contract escalation) and then to apply escalation on the price escalated to commencement of construction to cover price increases from the contractor's subcontractors during the contract period (during contract escalation).

The Bureau for Economic Research (BER) at Stellenbosch University publishes a quarterly report on building costs, which tracks construction price escalation. The BER Building cost index is based on the analysis of accepted building tenders.

The underlying philosophy is that tender prices should follow the movement in 22 representative items carefully selected for this purpose. The selected items are common to all buildings and should therefore reflect the movement in tender prices. Research has shown that tender prices are influenced by the business cycle. This is the case because of fluctuations in the profit margins of building contractors, the degree of competition in tendering and the level of building demand generally. A 5% escalation factor was assumed for this study.

6.1.2.3 Maintenance Costs

The calculation of the direct maintenance costs used for the model is based on industry-related costs and best practice replacement intervals for each of the maintenance items. The following maintenance items and replacement horizons were identified and used in the model:

- Painting: internal and external wall surface areas to receive touch up and repairs to high traffic areas every 3rd year with complete repaint every 6 years.
- Roof refurbishment; repairs, flashings, gutters and downpipes every 5th year with total full maintenance coat/ roof refurbishment every 10 years.
- Air-conditioning: replace filter medium, dosing equipment 3-4 years, cooling tower replacement and fan motor replacement every 5th year with total chiller replacement in year 18. Full service every year
- Lifts: full replacement of installation in year 20, control panel upgrades every 10 years, ropes and sheave replacement every 9 years and floor and wall upgrade every 7 years. Total lift replacement every 10 years
- Electrical installations: internal: infra-red scanning every two years, switchgear replacement/ service every 8 years, replace all light fittings after 5-year period over the rest of the contract with upgrades to DB’s every 8 years, complete rewire, new distribution boards, switchgear and fittings over one year in year 22.
- Electrical installations: external: replace light fittings and supports every 8 years, transformer service every 5 years, rewire allowance for roadway/ parking alterations every 8 years.
- Roads and paved areas: repair kerbs, roadways parking lines and stop signage after 4 years with continual upgrading and major maintenance every 3-years. A premix overlay every 10 years.
- Cabling: replace backbone cabling after a maximum of 5 years. Move previous backbone downstream to replace smaller distribution cables.
- Facilities repair, maintenance and operational costs incurred as a result of normal wear and tear.
- SMART tech parking sensors are to be fully replaced over the 20-year cycle with ad hoc replacements and maintenance annually. The cost of each sensor and installation is approximately R2100 to R2800.
- A Smart Parking System is provided for, with maintenance based on industry quotes, replaceable every 8 years as per industry best practice advice.

General maintenance, repairs and inspections to be conducted as per Table 6-1 above. Due to the expense of maintenance and the planed replacement costs, the following yearly maintenance costs that will increase based on inflation was estimated as follows for 2023 (current costs) and escalated to 2026, which is the first year that the facility will be in full operation and generating revenue.

Table 6-3: Yearly Maintenance Costs

Description of Item	2023 Cost Estimate / Year	2026 Escalated Cost Estimate/Year
Inflation rate %	**5%**	
DIRECT MAINTENANCE COSTS		
Routine and Replacement Maintenance Costs		
Cleaning	R6 174.00	R7 147.18
Mechanical Replacement Maintenance	R36 382.50	R42 117.29
Electrical both routine and Replacement	R28 665.00	R33 183.32
Plumbing	R6 174.00	R7 147.18
Fire Protection	R6 174.00	R7 147.18
Security	R16 537.50	R19 144.22
Elevators Replacement Maintenance	R41 895.00	R48 498.70
Signage and SMART Tech sensors Replacement Maintenance	R74 970.00	R86 787.15
Inspections	R6 174.00	R7 147.18
Aesthetic Maintenance Costs		
Doors	R4 410.00	R5 105.13
Finishes	R8 820.00	R10 210.25
Painting	R8 820.00	R10 210.25
Landscaping	R5 512.50	R6 381.41
Structural Maintenance Costs		
Floors	R19 845.00	R22 973.07
Corrosion	R19 845.00	R22 973.07
Beams	R19 845.00	R22 973.07
Walls	R19 845.00	R22 973.07
Columns	R19 845.00	R22 973.07
Bearing pads	R19 845.00	R22 973.07
Barriers	R19 845.00	R22 973.07
Drainage	R19 845.00	R22 973.07

Sealants	R19 845.00	R22 973.07
Roofing	R19 845.00	R22 973.07
Membranes	R19 845.00	R22 973.07
	R469 003.50	R542 930.18

The total monthly maintenance cost is estimated at R469 000.00 for the 2023 base year and almost R 543 000.00 for the 2024 year. Over a 20-year productive lifecycle of the project (to 2045) this is a total estimated cost of R17.95m, which amounts to approximately 14.5% of the original capital investment as at the end of the construction period

6.1.2.4 Operating Costs (Direct and Indirect)

The direct operating costs were calculated from industry applicable salaries and operations. The salaries below do not take into consideration back-office staff regarding financial procurement etc. Tasks such as security, cleaning and gardening will be contracted out and are listed in the maintenance section. The operating costs were divided as follows:

- Management Salaries: 1 Manager
- Staff Salaries: 6 general labourers: 2 Customer Care officers, four general maintenance, aesthetics and cleaning. Included in the staff salaries is a 1.3 multiplier for sick days, leave days and portable equipment such as laptops for management and customer care personal.
- 13th Cheque: Applicable to all staff
- Electricity and water
- Sanitation
- Rates and Taxes
- Insurance
- Miscellaneous

The yearly costs (2023 base cost estimates escalated to 2026 which is the first year of the facility being fully operational) are shown in Table 6-4 below:

Table 6-4: Operational Cost

OPERATIONAL COSTS (DIRECT&INDIRECT)	Budget (2023)	Budget (2026)
Management and audit fees	R330 750.00	R382 884.47
Staff salaries	R515 970.00	R597 299.77
13th cheque	R60 637.50	R70 195.49
Smart Parking Maintenance	R0.00	R68 310.68
Electricity and Water	R132 300.00	R153 153.79
Sanitation	R6 615.00	R7 657.69

Rates and Taxes	R59 535.00	R68 919.20
Insurance	R105 840.00	R122 523.03
Miscellaneous	R46 305.00	R53 603.83

The total operational costs amount to just more than R1.52m per annum in the facility's first year of operation, namely 2026.

6.1.3 BEE Targets

The question that needs to be addressed in this section is whether or not the proposed BBBEE targets will increase the cost of the Eikestad parking facility, i.e. is there a premium that will need to be priced for the inclusion of BBBEE to the extent envisaged in this Project. For the PSC base model, the cost of BBBEE may increase the bid price slightly due to the nature of the requirements for SMME and QSE involvement in the project. Approximately 30% is allocated of the construction cost for SMME and or QSE partners. This itself should not increase the cost. However, 10% management fee is allowed from the main contractor to manage the SMME and QSE partners and facilitate training for the smaller partners. The BBBEE cost was then estimated at 10% of 30% of the project total amounting to a capital increase cost of 3%.

Regarding the PPP reference model, the targets are far different. The PPP reference model BBBEE targets are discussed below:

Again, the question that needs to be addressed in this section is whether or not the proposed BBBEE targets (as set out in Table 6-5) will increase the cost of the Project, i.e. is there a premium that will need to be priced for the inclusion of BBBEE to the extent envisaged in this Project. Table 6-5 is an example of BBBEE targets for this project.

Table 6-5: Estimated BBBEE targets for the Project

BBBEE CORE COMPONENT	BBBEE TARGETS FOR THE PROJECT					
OWNERSHIP	**PRIVATE PARTY**		**CONSTRUCTION SUBCONTRACTOR**		**OPERATIONS SUBCONTRACTOR**	
	VOTING RIGHTS					
	Exercisable voting rights in Enterprise of Black People	40 %	Exercisable voting rights in Enterprise of Black People	27.5 %	Exercisable voting rights in Enterprise of Black People	26 %
	Exercisable voting rights in the Enterprise of Black Women	10 %	Exercisable voting rights in the Enterprise of Black Women	10%	Exercisable voting rights in the Enterprise of Black Women	10 %
	ECONOMIC INTEREST					

	Economic interest of Black People in the Enterprise	25 %	Economic interest of Black People in the Enterprise	25%	Economic interest of Black People in the Enterprise	25 %
	Economic interest of Black Women in the Enterprise	10 %	Economic interest of Black Women in the Enterprise	10%	Economic interest of Black Women in the Enterprise	10 %
	Economic interest of Black Designated Groups, Black Employee Share Participation Schemes, Black Broad Based Ownership Schemes & Black Cooperatives in the Enterprise	2.5 %	Economic interest of Black Designated Groups, Black Employee Share Participation Schemes, Black Broad Based Ownership Schemes & Black Cooperatives in the Enterprise	2.5%	Economic interest of Black Designated Groups, Black Employee Share Participation Schemes, Black Broad Based Ownership Schemes & Black Cooperatives in the Enterprise	2.5 %
	As part of the Ownership Core Component, the cost of Black Equity and the timing of Project cash flows to Black Shareholders will be measured.					

MANAGEMENT CONTROL	**BOARD PARTICIPATION**	
	Exercisable voting rights of Black Board Members, using the Adjusted Recognition for Gender	50%
	Black Executive Directors using the Adjusted Recognition for Gender	50%
	TOP MANAGEMENT	
	Black Senior Top Management using the Adjusted Recognition for Gender	40%
	Black Other Top Management using the Adjusted Recognition for Gender	40%
	BONUS POINTS	
	Black Independent Non-Executive Board Members	40%
EMPLOYMENT EQUITY	**MEASUREMENT CATEGORY & CRITERIA**	
	Black disabled employees as a percentage of all employees using the Adjusted Recognition for Gender	Year 0-5: 2%
		Year 6-10: 3%

	Black employees in Senior Management as percentage of all such employees using the Adjusted Recognition for Gender	Year 0-5: 43% Year 6-10: 60%
	Black employees in Middle Management as a percentage of all such employees using the Adjusted Recognition for Gender	Year 0-5: 63% Year 6-10: 75%
	Black employees in Junior Management as a percentage of all such employees using the Adjusted Recognition for Gender	Year 0-5: 68% Year 6-10: 80%
	Involvement of local people (South African) as a percentage of all Employees to give preference to people residing in the Site Area	Year 0-5: 80% Year 6-10: 90%
	Involvement of labour (skilled & unskilled) to be procured from the Site Area	Year 0-5: 40% Year 6-10: 50%
	Involvement of labour (skilled and unskilled who are Black Women) to be procured form the Site Area	Year 0-5: 10% Year 6-10: 15%
SKILLS DEVELOPMENT	Skills Development Expenditure on Learning Programmes specified in the Learning Programmes Matrix for Black Employees as a percentage of Leviable Amount using the Adjusted Recognition for Gender	3%
	Skills Development Expenditure on Learning Programmes specified in the Learning Programmes Matrix for Black Employees with disabilities as a percentage of Leviable Amount using the Adjusted Recognition for Gender	0.3%
	Number of Black Employees participating in Learnerships or Category B, C and D Programmes as a percentage of total employees using the Adjusted Recognition for Gender	7.5%
PREFERENTIAL PROCUREMENT	BBBEE Procurement Spend from all Suppliers based on the BBBEE Procurement Recognition Levels as a percentage of Total Measured Procurement Spend	Year 0-5: 50% Year 6-10: 70%
	BBBEE Procurement Spend from all Suppliers based on the BBBEE Procurement Spend from Qualifying Small Enterprises or Exempted Micro Enterprises based on the applicable BBBEE	Year 0-5: 10% Year 6-10:

	Procurement Recognition Levels as a percentage of Total Measured Procurement Spend	15%
	BBBEE Procurement Spend from any of the following Suppliers as a percentage of Total Measured Procurement Spend: Suppliers that are 50% Black Owned Suppliers that are 30% Black Women Owned	Year 0-5: 15% Year 6-10: 20%
	BBBEE Procurement Spend from all Suppliers located within the Site Area	Year 0-5: 15% Year 6-10: 20%
	BBBEE Procurement Spend from all Suppliers who are Black Women, located within the Site Area	Year 0-5: 5% Year 6-10: 10%
ENTERPRISE DEVELOPMENT	Average annual value of all Enterprise Development Contributions and Sector Specific Programmes made by the measured entity as a percentage of the target	1% of Net Profit After Tax
	Average annual value of all Enterprise Development Contributions and Sector Specific Programmes made by the measured Entity on Enterprises within the Site Area, as a percentage of the target	1% of Net Profit After Tax
SOCIO-ECONOMIC DEVELOPMENT	Average annual value of all Socio-Economic Development Contributions by the Measured Entity as a percentage of the target	1% of Net Profit After Tax

There are three observable costs which arise out of the facilitation of BBBEE into projects such as this.

Firstly, the cost of raising BBBEE equity required to fulfil BBBEE equity obligations to the Private Party, if BBBEE participants are unable to raise this finance off their own balance sheets, the cost and access to BBBEE financing for equity has the potential to directly increase project costs, (e.g. because this might cause delays in reaching Financial Close), but also can result in a project and financial structure, which is less than desirable (e.g. less “pure” equity in the deal; BBBEE participants having a substantially lower return on their investment than other shareholders).

This can be rectified through immediate operational distributions to BBBEE shareholders are non-interest-bearing loans with payments made initially that will be repaired back to the company through shareholder declarations later in the life of the project. This has an effect on the cash flow of the project and is an expense in early years, but as an overall cost should be recovered through dividend declarations.

In addition, this problem could be alleviated if financial institutions were to offer less onerous terms for BBBEE financing, as is being envisaged for this Project, thereby reducing BBBEE financing costs. A further source of alleviation of this problem could lie in the provision of technical assistance to BBBEE companies, who would be empowered to structure more favourable participation terms with the other shareholders.

Dependent on the BBBEE partner and the structures employed, the 40% target can add up to 4% additional cost to the total cost. **The model runs presented in this feasibility have assumed that no additional cost will be generated through the application of the higher threshold.**

The second cost refers to the cost of training empowerment contractors/workers lacking the necessary skills to undertake their obligations. This cost is typically borne by the large contractor/sponsor. Although this cost must be acknowledged, it is important also to note that this is offset by the broader socio-economic benefits accruing to the industry through the increase in levels of skill and experience to disadvantaged groups.

Thirdly, the financial facilitation provided by the larger contractors (typically the sponsor), for performance bonds and guarantees to banks, and guarantees to suppliers (in addition to bearing the full costs of bid preparation). These costs are typically borne by the large contractors/sponsor, who in turn can pass it on to the BBBEE contractors, (thereby reducing their margins from their operations), thus ultimately not increasing the project costs.

In determining whether or not these additional costs offer Stellenbosch Value for Money, a number of points need to be considered: firstly, as demonstrated here, these costs are not necessarily borne by the Government or Stellenbosch, since financial institutions and sponsors tend to bear the brunt of these facilitation costs. Secondly, there are important broader spin-offs that flow from the facilitation of BBBEE into the Project, notably the socio-economic benefits gained from raising the level of BBBEE/engendered participation (as owners, managers, contractors etc.) in the mainstream of economic activity in the country.

For the PPP model, it is assumed that the BBBEE partner may need to take a full loan for the fancier. This will result in difficult repayment amounts and little returns. As a result, a minimum amount was considered as the return on the BBBEE component. A loan account could be established a payment to the BBBEE partner in the initial stages of the business. Essentially this could be 1.6% of the capital investment + the bond amount that will form part of the bonded amount.

6.1.4 Step 4: Revenue Estimation

The revenue estimation was done for the seven scenarios as described in chapter 4. Each scenario was based on the demand surveys conducted in chapter 3 and calculated in chapter 4. Revenues are estimated for the 2023 base year and escalated at an assumed rate of 8% every second year. This is considered a conservative way of estimating revenue.

The tariffs for the parking were taken as per the existing Eikestad parking tariffs. The split of parking duration was calculated as per the existing CBD parking splits. Revenue was estimated on a monthly basis with the main distinction being peak months of the year and off-peak months of the year. The peak months was considered to be 9 months of the year (taking the students and tourists into account) and the off-peak period was then 3 months. For each of these two periods revenue was calculated on a weekday basis (5 working days) and a Saturday basis where allowance was made for 4.33 Saturdays in a month. Parking volumes (and thus revenue) were estimated for the period 05:00-19:00 each day. The Sunday tariff was assumed to be R0 and thus was not included in the volume analysis.

Only scenario 6, included night parking with a tariff estimated additional volumes for night parking. Furthermore, only scenario 6 allowed for additional monthly parking for employees in the area. The results of the monthly revenue scenarios are reflected in Table 6-6 to Table 6-26 below for the base year of 2023 and the estimated escalated rate in 2026 which has been assumed as the first year of operation of the parking facility. All revenues are based on a 12-month period.

Table 6-6: Base Scenario: Weekday parking

Base Scenario (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	538	41%	R 3 228.00	R7.00	R 3 766.00
30 – 60 min	R10.00	265	20%	R 2 650.00	R11.00	R 2 915.00
1 – 2 hours	R20.00	230	17%	R 4 600.00	R22.00	R 5 060.00
2 – 3 hours	R25.00	60	5%	R 1 500.00	R27.00	R 1 620.00
3 – 4 hours	R30.00	36	3%	R 1 080.00	R33.00	R 1 188.00
4 – 5 hours	R40.00	19	1%	R 760.00	R44.00	R 836.00
5 – 6 hours	R80.00	14	1%	R 1 120.00	R87.00	R 1 218.00
6+ hours	R150.00	157	12%	R 23 550.00	R162.00	R 25 434.00
Parking from 19:00 – 05:00				**R 38 488.00**		**R 42 037.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 846 736.00**		**R 924 814.00**

Table 6-7: Base Scenario: Saturday parking

Base Scenario (Saturdays)

Time				2023	2025	2025
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	645	50%	R 3 870.00	R7.00	R 4 515.00
30 – 60 min	R10.00	278	22%	R 2 780.00	R11.00	R 3 058.00
1 – 2 hours	R20.00	208	16%	R 4 160.00	R22.00	R 4 576.00
2 – 3 hours	R25.00	55	4%	R 1 375.00	R27.00	R 1 485.00
3 – 4 hours	R30.00	25	2%	R 750.00	R33.00	R 825.00
4 – 5 hours	R40.00	15	1%	R 600.00	R44.00	R 660.00
5 – 6 hours	R80.00	7	1%	R 560.00	R87.00	R 609.00
6+ hours	R150.00	52	4%	R 7 800.00	R162.00	R 8 424.00
Parking from 19:00 – 05:00				**R 21 895.00**		**R 24 152.00**
R10.00						
Lost Ticket	R160.00					

	Monthly Income	**R 94 148.50**		**R 103 853.60**

Table 6-8:Base Scenario: Off-peak

Base Scenario (off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	452	40%	R 2 712.00	R7.00	R 3 164.00
30 – 60 min	R10.00	255	23%	R 2 550.00	R11.00	R 2 805.00
1 – 2 hours	R20.00	198	18%	R 3 960.00	R22.00	R 4 356.00
2 – 3 hours	R25.00	57	5%	R 1 425.00	R27.00	R 1 539.00
3 – 4 hours	R30.00	32	3%	R 960.00	R33.00	R 1 056.00
4 – 5 hours	R40.00	18	2%	R 720.00	R44.00	R 792.00
5 – 6 hours	R80.00	10	1%	R 800.00	R87.00	R 870.00
6+ hours	R150.00	100	9%	R 15 000.00	R162.00	R 16 200.00
Parking from 19:00 – 05:00				**R 28 127.00**		**R 30 782.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 731 302.00**		**R 800 332.00**

The total revenues per year for the base Scenario is estimated at: R10 661 866.50 for 2023 (base year) and R11 659 004.00 for 2026.

Table 6-9: Scenario 1: Weekday parking

Scenario 1 (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	538	41%	R 3 228.00	R7.00	R 3 766.00
30 – 60 min	R10.00	265	20%	R 2 650.00	R11.00	R 2 915.00
1 – 2 hours	R20.00	230	17%	R 4 600.00	R22.00	R 5 060.00
2 – 3 hours	R25.00	60	5%	R 1 500.00	R27.00	R 1 620.00
3 – 4 hours	R30.00	36	3%	R 1 080.00	R33.00	R 1 188.00
4 – 5 hours	R40.00	19	1%	R 760.00	R44.00	R 836.00
5 – 6 hours	R80.00	14	1%	R 1 120.00	R87.00	R 1 218.00
6+ hours	R150.00	157	12%	R 23 550.00	R162.00	R 25 434.00
Parking from 19:00 – 05:00				**R 38 488.00**		**R 42 037.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 846 736.00**		**R 924 814.00**

Table 6-10: Scenario 1: Saturday parking

Scenario 1 (Saturdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	645	50%	R 3 870.00	R7.00	R 4 515.00
30 – 60 min	R10.00	278	22%	R 2 780.00	R11.00	R 3 058.00
1 – 2 hours	R20.00	208	16%	R 4 160.00	R22.00	R 4 576.00
2 – 3 hours	R25.00	55	4%	R 1 375.00	R27.00	R 1 485.00
3 – 4 hours	R30.00	25	2%	R 750.00	R33.00	R 825.00
4 – 5 hours	R40.00	15	1%	R 600.00	R44.00	R 660.00
5 – 6 hours	R80.00	7	1%	R 560.00	R87.00	R 609.00
6+ hours	R150.00	52	4%	R 7 800.00	R162.00	R 8 424.00
Parking from 19:00 – 05:00				**R 21 895.00**		**R 24 152.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 94 148.50**		**R 103 853.60**

Table 6-11: Scenario 1: Off Peak parking

Scenario 1 (Off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	452	40%	R 2 712.00	R7.00	R 3 164.00
30 – 60 min	R10.00	255	23%	R 2 550.00	R11.00	R 2 805.00
1 – 2 hours	R20.00	198	18%	R 3 960.00	R22.00	R 4 356.00
2 – 3 hours	R25.00	57	5%	R 1 425.00	R27.00	R 1 539.00
3 – 4 hours	R30.00	32	3%	R 960.00	R33.00	R 1 056.00
4 – 5 hours	R40.00	18	2%	R 720.00	R44.00	R 792.00
5 – 6 hours	R80.00	10	1%	R 800.00	R87.00	R 870.00
6+ hours	R150.00	100	9%	R 15 000.00	R162.00	R 16 200.00
Parking from 19:00 – 05:00				**R 28 127.00**		**R 30 782.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 731 302.00**		**R 800 332.00**

The total revenues per year for Scenario 1 is estimated at: R10 661 866.50 for 2023 (base year) and R11 659 004.00 for 2026.

Table 6-12: Scenario 2: Weekday parking

Scenario 2 (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	623	41%	R 3 738.00	R7.00	R 4 361.00
30 – 60 min	R10.00	297	20%	R 2 970.00	R11.00	R 3 267.00
1 – 2 hours	R20.00	259	17%	R 5 180.00	R22.00	R 5 698.00

2 – 3 hours	R25.00	72	5%	R 1 800.00	R27.00	R 1 944.00
3 – 4 hours	R30.00	43	3%	R 1 290.00	R33.00	R 1 419.00
4 – 5 hours	R40.00	25	2%	R 1 000.00	R44.00	R 1 100.00
5 – 6 hours	R80.00	19	1%	R 1 520.00	R87.00	R 1 653.00
6+ hours	R150.00	176	12%	R 26 400.00	R162.00	R 28 512.00
Parking from 19:00 – 05:00				**R 43 898.00**		**R 47 954.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 965 756.00**		**R 1 054 988.00**

Table 6-13: Scenario 2: Saturday parking

Scenario 2 (Saturdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	645	50%	R 3 870.00	R7.00	R 4 515.00
30 – 60 min	R10.00	278	22%	R 2 780.00	R11.00	R 3 058.00
1 – 2 hours	R20.00	208	16%	R 4 160.00	R22.00	R 4 576.00
2 – 3 hours	R25.00	55	4%	R 1 375.00	R27.00	R 1 485.00
3 – 4 hours	R30.00	25	2%	R 750.00	R33.00	R 825.00
4 – 5 hours	R40.00	15	1%	R 600.00	R44.00	R 660.00
5 – 6 hours	R80.00	7	1%	R 560.00	R87.00	R 609.00
6+ hours	R150.00	52	4%	R 7 800.00	R162.00	R 8 424.00
Parking from 19:00 – 05:00				**R 21 895.00**		**R 24 152.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 94 148.50**		**R 103 853.60**

Table 6-14: Scenario 2: Off-peak parking

Scenario 2 (Off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	452	40%	R 2 712.00	R7.00	R 3 164.00
30 – 60 min	R10.00	255	23%	R 2 550.00	R11.00	R 2 805.00
1 – 2 hours	R20.00	198	18%	R 3 960.00	R22.00	R 4 356.00
2 – 3 hours	R25.00	57	5%	R 1 425.00	R27.00	R 1 539.00
3 – 4 hours	R30.00	32	3%	R 960.00	R33.00	R 1 056.00
4 – 5 hours	R40.00	18	2%	R 720.00	R44.00	R 792.00
5 – 6 hours	R80.00	10	1%	R 800.00	R87.00	R 870.00
6+ hours	R150.00	100	9%	R 15 000.00	R162.00	R 16 200.00
Parking from 19:00 – 05:00				**R 28 127.00**		**R 30 782.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 731 302.00**		**R 800 332.00**

The total revenues per year for Scenario 2 is estimated at: R11 733 046.50 for 2023 (base year) and R12 830 570.40 for 2026.

Table 6-15: Scenario 3: Weekday parking

Scenario 3 (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	710	40%	R 4 260.00	R7.00	R 4 970.00
30 – 60 min	R10.00	349	20%	R 3 490.00	R11.00	R 3 839.00
1 – 2 hours	R20.00	327	18%	R 6 540.00	R22.00	R 7 194.00
2 – 3 hours	R25.00	101	6%	R 2 525.00	R27.00	R 2 727.00
3 – 4 hours	R30.00	52	3%	R 1 560.00	R33.00	R 1 716.00
4 – 5 hours	R40.00	28	2%	R 1 120.00	R44.00	R 1 232.00
5 – 6 hours	R80.00	27	2%	R 2 160.00	R87.00	R 2 349.00
6+ hours	R150.00	190	11%	R 28 500.00	R162.00	R 30 780.00
Parking from 19:00 – 05:00				**R 50 155.00**		**R 54 807.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 1 103 410.00**		**R 1 205 754.00**

Table 6-16: Scenario 3: Saturday parking

Scenario 3 (Saturdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	709	46%	R 4 254.00	R7.00	R 4 963.00
30 – 60 min	R10.00	334	22%	R 3 340.00	R11.00	R 3 674.00
1 – 2 hours	R20.00	276	18%	R 5 520.00	R22.00	R 6 072.00
2 – 3 hours	R25.00	81	5%	R 2 025.00	R27.00	R 2 187.00
3 – 4 hours	R30.00	33	2%	R 990.00	R33.00	R 1 089.00
4 – 5 hours	R40.00	20	1%	R 800.00	R44.00	R 880.00
5 – 6 hours	R80.00	13	1%	R 1 040.00	R87.00	R 1 131.00
6+ hours	R150.00	62	4%	R 9 300.00	R162.00	R 10 044.00
Parking from 19:00 – 05:00				**R 27 269.00**		**R 30 040.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 117 256.70**		**R 129 172.00**

Table 6-17: Scenario 3: Off-peak parking

Scenario 3 (Off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	511	38%	R 3 066.00	R7.00	R 3 577.00
30 – 60 min	R10.00	305	23%	R 3 050.00	R11.00	R 3 355.00

1 – 2 hours	R20.00	258	19%	R 5 160.00	R22.00	R 5 676.00
2 – 3 hours	R25.00	77	6%	R 1 925.00	R27.00	R 2 079.00
3 – 4 hours	R30.00	48	4%	R 1 440.00	R33.00	R 1 584.00
4 – 5 hours	R40.00	27	2%	R 1 080.00	R44.00	R 1 188.00
5 – 6 hours	R80.00	12	1%	R 960.00	R87.00	R 1 044.00
6+ hours	R150.00	116	9%	R 17 400.00	R162.00	R 18 792.00
Parking from 19:00 – 05:00				**R 34 081.00**		**R 37 295.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 886 106.00**		**R 969 670.00**

The total revenues per year for Scenario 3 is estimated at: R13 644 318.30 for 2023 (base year) and R14 923 344.00 for 2026.

Table 6-18: Scenario 4: Weekday parking

Scenario 4 (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	710	40%	R 4 260.00	R7.00	R 4 970.00
30 – 60 min	R10.00	349	20%	R 3 490.00	R11.00	R 3 839.00
1 – 2 hours	R20.00	327	18%	R 6 540.00	R22.00	R 7 194.00
2 – 3 hours	R25.00	101	6%	R 2 525.00	R27.00	R 2 727.00
3 – 4 hours	R30.00	52	3%	R 1 560.00	R33.00	R 1 716.00
4 – 5 hours	R40.00	28	2%	R 1 120.00	R44.00	R 1 232.00
5 – 6 hours	R80.00	27	2%	R 2 160.00	R87.00	R 2 349.00
6+ hours	R150.00	190	11%	R 28 500.00	R162.00	R 30 780.00
Parking from 19:00 – 05:00				**R 50 155.00**		**R 54 807.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 1 103 410.00**		**R 1 205 754.00**

Table 6-19: Scenario 4: Saturday parking

Scenario 4 (Saturdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	746	46%	R 4 476.00	R7.00	R 5 222.00
30 – 60 min	R10.00	352	22%	R 3 520.00	R11.00	R 3 872.00
1 – 2 hours	R20.00	291	18%	R 5 820.00	R22.00	R 6 402.00
2 – 3 hours	R25.00	86	5%	R 2 150.00	R27.00	R 2 322.00
3 – 4 hours	R30.00	35	2%	R 1 050.00	R33.00	R 1 155.00
4 – 5 hours	R40.00	22	1%	R 880.00	R44.00	R 968.00
5 – 6 hours	R80.00	15	1%	R 1 200.00	R87.00	R 1 305.00
6+ hours	R150.00	74	5%	R 11 100.00	R162.00	R 11 988.00
Parking from 19:00 – 05:00				**R 30 196.00**		**R 33 234.00**

R10.00						
Lost Ticket	R160.00					
			Monthly Income	R 129 842.80		R 142 906.20

Table 6-20: Scenario 4: Off-peak parking

Scenario 4 (Off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	538	37%	R 3 228.00	R7.00	R 3 766.00
30 – 60 min	R10.00	321	22%	R 3 210.00	R11.00	R 3 531.00
1 – 2 hours	R20.00	272	19%	R 5 440.00	R22.00	R 5 984.00
2 – 3 hours	R25.00	82	6%	R 2 050.00	R27.00	R 2 214.00
3 – 4 hours	R30.00	51	4%	R 1 530.00	R33.00	R 1 683.00
4 – 5 hours	R40.00	29	2%	R 1 160.00	R44.00	R 1 276.00
5 – 6 hours	R80.00	14	1%	R 1 120.00	R87.00	R 1 218.00
6+ hours	R150.00	129	9%	R 19 350.00	R162.00	R 20 898.00
Parking from 19:00 – 05:00				**R 37 088.00**		**R 40 570.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 964 288.00**		**R 1 054 820.00**

The total revenues per year for Scenario 4 is estimated at: R13 992 139.20 for 2023 (base year) and R15 302 401.80 for 2026.

Table 6-21: Scenario 5: Weekday parking

Scenario 5 (Weekdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	766	40%	R 4 596.00	R7.00	R 5 362.00
30 – 60 min	R10.00	376	20%	R 3 760.00	R11.00	R 4 136.00
1 – 2 hours	R20.00	353	18%	R 7 060.00	R22.00	R 7 766.00
2 – 3 hours	R25.00	109	6%	R 2 725.00	R27.00	R 2 943.00
3 – 4 hours	R30.00	56	3%	R 1 680.00	R33.00	R 1 848.00
4 – 5 hours	R40.00	30	2%	R 1 200.00	R44.00	R 1 320.00
5 – 6 hours	R80.00	30	2%	R 2 400.00	R87.00	R 2 610.00
6+ hours	R150.00	203	11%	R 30 450.00	R162.00	R 32 886.00
Parking from 19:00 – 05:00				**R 53 871.00**		**R 58 871.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 1 185 162.00**		**R 1 295 162.00**

Table 6-22: Scenario 5: Saturday parking

Scenario 5 (Saturdays)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	805	46%	R 4 830.00	R7.00	R 5 635.00
30 – 60 min	R10.00	380	22%	R 3 800.00	R11.00	R 4 180.00
1 – 2 hours	R20.00	314	18%	R 6 280.00	R22.00	R 6 908.00
2 – 3 hours	R25.00	93	5%	R 2 325.00	R27.00	R 2 511.00
3 – 4 hours	R30.00	38	2%	R 1 140.00	R33.00	R 1 254.00
4 – 5 hours	R40.00	24	1%	R 960.00	R44.00	R 1 056.00
5 – 6 hours	R80.00	16	1%	R 1 280.00	R87.00	R 1 392.00
6+ hours	R150.00	78	4%	R 11 700.00	R162.00	R 12 636.00
Parking from 19:00 – 05:00				**R 32 315.00**		**R 35 572.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 138 954.50**		**R 152 959.60**

Table 6-23: Scenario 5: Off-peak parking

Scenario 5 (Off-peak)

Time				2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	581	37%	R 3 486.00	R7.00	R 4 067.00
30 – 60 min	R10.00	347	22%	R 3 470.00	R11.00	R 3 817.00
1 – 2 hours	R20.00	294	19%	R 5 880.00	R22.00	R 6 468.00
2 – 3 hours	R25.00	88	6%	R 2 200.00	R27.00	R 2 376.00
3 – 4 hours	R30.00	56	4%	R 1 680.00	R33.00	R 1 848.00
4 – 5 hours	R40.00	31	2%	R 1 240.00	R44.00	R 1 364.00
5 – 6 hours	R80.00	15	1%	R 1 200.00	R87.00	R 1 305.00
6+ hours	R150.00	141	9%	R 21 150.00	R162.00	R 22 842.00
Parking from 19:00 – 05:00				**R 40 306.00**		**R 44 087.00**
R10.00						
Lost Ticket	R160.00					
			Monthly Income	**R 1 047 956.00**		**R 1 146 262.00**

The total revenues per year for Scenario 5 is estimated at: R15 068 916.50 for 2023 (base year) and R17 471 880.40 for 2026.

Table 6-24: Scenario 6: Weekday parking

Scenario 6 (Weekdays)

Time	Demand 2021 (Incl. Vat)			2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	766	42%	R 4 596.00	R7.00	R 5 362.00
30 – 60 min	R10.00	376	21%	R 3 760.00	R11.00	R 4 136.00
1 – 2 hours	R20.00	353	19%	R 7 060.00	R22.00	R 7 766.00
2 – 3 hours	R25.00	109	6%	R 2 725.00	R27.00	R 2 943.00
3 – 4 hours	R30.00	56	3%	R 1 680.00	R33.00	R 1 848.00
4 – 5 hours	R40.00	30	2%	R 1 200.00	R44.00	R 1 320.00
5 – 6 hours	R80.00	30	2%	R 2 400.00	R87.00	R 2 610.00
6+ hours	R150.00	102	6%	R 16 800	R162.00	R 18 144.00
Parking from 19:00 – 05:00				**R 40 221.00**		**R 44 129.00**
R10.00						
Night Parking		15% of Total Volume				
30 – 60 min	R10.00	192	70%	R 1 920.00	R11.00	R 2 112.00
1 – 1.5 hours	R15.00	82	30%	R 1 230.00	R17.00	R 1 394.00
				R 3 150.00		**R 3 506.00**
Monthly Parking		5% of Total Volume				
Month Rate	R1 328.00	90	100%	R 119 520.00	R1 435.00	R 129 150.00
Total				**R 119 520.00**		**R 129 150.00**
			Monthly Income	**R 1073 682.00**		**R 1177 120.00**

Table 6-25: Scenario 6: Saturday parking

Scenario 6 (Saturdays)

Time	Demand 2021 (Incl. Vat)			2023	2026	2026
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	805	46%	R 4 830.00	R7.00	R 5 635.00
30 – 60 min	R10.00	380	22%	R 3 800.00	R11.00	R 4 180.00
1 – 2 hours	R20.00	314	18%	R 6 280.00	R22.00	R 6 908.00
2 – 3 hours	R25.00	93	5%	R 2 325.00	R27.00	R 2 511.00
3 – 4 hours	R30.00	38	2%	R 1 140.00	R33.00	R 1 254.00
4 – 5 hours	R40.00	24	1%	R 960.00	R44.00	R 1 056.00
5 – 6 hours	R80.00	16	1%	R 1 280.00	R87.00	R 1 392.00
6+ hours	R150.00	78	4%	R 11 700.00	R162.00	R 12 636.00
Parking from 19:00 – 05:00				**R 32 315.00**		**R 35 572.00**
R10.00						
Night Parking		15% of Total Volume				
2 – 3 hours	R25.00	184	70%	R 4 600.00	R27.00	R 4 968.00
3 – 4 hours	R30.00	79	30%	R 2 370.00	R33.00	R 2 607.00
				R 6 970.00		**R 7 575.00**
Monthly Parking		No Monthly parking for Sat				
Month Rate	R1 328.00	0	100%	R -	R1 219.00	R -
Total				**R -**		**R -**
			Monthly Income	**R 292 294.50**		**R 319 609.60**

Table 6-26: Scenario 6: Off-peak parking

Scenario 6 (Off-peak)

Time	Demand 2021 (Incl. Vat)			2023	2025	2025
Parking from 05:00 – 19:00		Volume	Split	Daily Income	Inflated rate	Daily Income
0 – 30 min	R6.00	581	40%	R 3 486.00	R7.00	R 4 067.00
30 – 60 min	R10.00	347	24%	R 3 470.00	R11.00	R 3 817.00
1 – 2 hours	R20.00	294	20%	R 5 880.00	R22.00	R 6 468.00
2 – 3 hours	R25.00	88	6%	R 2 200.00	R27.00	R 2 376.00
3 – 4 hours	R30.00	56	4%	R 1 680.00	R33.00	R 1 848.00
4 – 5 hours	R40.00	31	2%	R 1 240.00	R44.00	R 1 364.00
5 – 6 hours	R80.00	15	1%	R 1 200.00	R87.00	R 1 305.00
6+ hours	R150.00	48	3%	R 7 200.00	R162.00	R 7 776.00
Parking from 19:00 – 05:00				**R 26 356.00**		**R 29 021.00**
R10.00						
Night Parking		15% of Total Volume				
2 – 3 hours	R25.00	153	70%	R 3 825.00	R27.00	R 4 131.00
3 – 4 hours	R30.00	66	30%	R 1 980.00	R33.00	R 2 178.00

				R 5 805.00		**R 6 309.00**
Monthly Parking		No Monthly parking for Sat				
Month Rate	R1 328.00	90	100%	R 119 520.00	R1 435.00	R 129 150.00
Total				**R 119 520.00**		**R 129 150.00**
			Monthly Income	**R 955 706.00**		**R 1 047 730.00**

In summary, based on the scenarios, the estimated revenue in 2026 (first year that the facility will be operational) varies between R11.7m and R18.3m. Scenario 6 shows the best revenue possibilities, with the total revenues per year for this scenario being estimated at: R16 710 286 for 2023 (base year) and R18 309 998.00 for 2026.

6.1.5 Step 5: Assumptions

6.1.5.1 Inflation

The Consumer Price Index (CPI) has been used as the inflation rate at which the base Operating & Maintenance costs and revenues are escalated at in arriving at nominal figures throughout the concession period.

The inflation forecast has been set at 5%, which is within the South African Reserve Bank target range of between 3% and 6%, which means construction and other capital costs are escalated by 5% per annum.

Figure 6-6: South Africa Inflation Rate

6.1.5.2 Discount Rate

The discount rate is an interest rate applied to a project's benefits and costs that are expected to occur in the future in order to convert them into a present value. This conversion is done to ascertain what those benefits and costs are worth today. The discount rate used for the financial analysis is based on current best practice in South Africa, specifically by Infrastructure South Africa when Cost-Benefit analyses are performed on large Government sponsored infrastructure projects. The discount rate that has been used to discount the project cash flows is 10%. The same discount rate is used in the economic value assessment of indirect benefits as discussed in Section 7 of the report.

6.1.5.3 Revenue Rate Increase

The preference surveys indicated that there is a sensitivity to paying for parking. As a result, the increase to the rate was done only every two years. The increase rate chosen for the model was 8% every two years. This rate is below inflation for each year, so as to represent a conservative estimate. However, this needs to be monitored by the operator yearly.

6.1.5.4 Modelled lifecycles

For purposes of the PSC and the PPP financial analysis models the productive and non-productive lifecycles have been considered. The productive lifecycle is the period starting when revenue is generated until the selected lifespan for modelling purposes and the non-productive period includes planning and construction. For modelling purposes, two productive project timelines (i.e., once revenue is generated and the project is in operation) have been modelled, namely a 20-year and a 25-year period. For the PPP model, these two periods can be regarded as the concession periods.

6.1.6 Step 6: Base PSC Model

The base PSC model was developed for the two project lifecycle periods discussed in the preceding section. In this section the base PSC model is discussed for the 20-year and 25-year project lifecycle periods respectively based on the above assumptions and scenarios (Appendix C). The models were assessed based on the Net Present Value (NPV), the Internal Rate of Return (IRR) and the Accounting Rate of Return (ARR).

NPV and IRR are closely related concepts, in that the IRR of an investment is the discount rate that would cause that investment to have an NPV of zero. Hence, the NPV and IRR are answering two separate but related questions. For NPV, the question is, “What is the total amount of money that will be made if the investment is to proceed, after taking into account the time value of money? For IRR, the question is, “If the investment is to proceed, what would be the equivalent annual rate of return that the investment would make?

In theory, a project will only be acceptable when the NPV is positive (greater than zero). Similarly, only projects with an IRR higher than the discount rate, which forms a lower limit, will be considered for funding. IRR must be handled carefully because there are situations in which the mathematical solution of the above equation is not unique. This happens when the stream of net benefits over the assessment period changes its sign (positive or negative) more than once.

The ARR is the annual net **profit** from the investment, which includes revenue minus any annual costs or expenses of implementing the project or investment.

Table 6-27 presents the Base PSC results for the two project lifecycle terms.

Table 6-27: Base PSC model results

Lifecycle period	Scenario	NPV	Discount Rate	IRR	ARR	Remarks
20-years	Base	-R24 610 594	10%	7.55%	7.60%	less than the discount rate
25-years	Base	-R12 704 953	10%	8.95%	7.60%	less than the discount rate
20-years	1	-R24 610 594	10%	7.55%	7.60%	less than the discount rate
25-years	1	-R12 704 953	10%	8.95%	7.60%	less than the discount rate
20-years	2	-R11 991 810	10%	8.85%	8.52%	less than the discount rate
25-years	2	R254 214	10%	10.02%	8.52%	less than the discount rate
20-years	3	R10 754 003	10%	10.98%	10.18%	Slightly above the discount rate
25-years	3	R23 618 669	10%	11.87%	10.18%	Above the discount rate
20-years	4	R14 805 128	10%	11.34%	10.48%	Slightly above the discount rate
25-years	4	R27 778 040	10%	12.19%	10.48%	Above the discount rate
20-years	5	R27 442 065	10%	12.42%	11.41%	Slightly above the discount rate
25-years	5	R40 757 111	10%	13.16%	11.41%	Above the discount rate – good return
20-years	6	R27 442 065	10%	12.42%	11.41%	Above the discount rate
25-years	6	R42 331 393	10%	13.30%	11.52%	Above the discount rate – good return

The table shows that over a 20-year period, scenarios 3-6 returns IRRs of more than the discount rate. Over 25-years a similar situation is presented but at higher levels. Scenarios 1 and 2 are below the discount rate and where Scenario has a negative NPV, Scenario 2 breaks through and have a very small NPV. Scenario 3 is marginally more than the discount rate and has a positive NPV. Scenarios 5 and 6 performs the best as reflected over both 20 and 25 years.

6.2 Risk Adjusted PSC Model

In following the Feasibility Study Guidelines, optimal risk transfer is a cornerstone concept in order to achieve "Value for Money". The Risk Matrix is a tool that is used to identify and quantify the risks in the Project and to allocate the identified risks to determine optimal risk allocation; this is done for both the PPP Reference Model and the PSC Financial Model. The Risk Matrix is integrated into the financial model.

The Risk Matrix identifies the Project risks, documents the consequences of each risk, identifies mitigation factors, allocates the risk between the contracting parties and quantifies the risk. The quantification of each risk is determined, firstly, by estimating the probability of occurrence and secondly, by estimating the most likely loss upon the occurrence of the event; the value for the risk is the product of the probability and the value of the loss. The allocation of the risk is identified to determine which party will bear the risk, or the sharing of the risk. The risk allocation has been prepared upon the basis of that party, which is best suited to manage the risk at the best "Value for Money", e.g. if a particular risk is allocated to the private sector where they are not best placed to manage this risk they will price a large premium into the contract to assume such a risk, thereby impacting negatively upon the project's "Value for Money" calculation.

With respect to the quantification of the risks, the risks for both a project procured as a PPP and a project procured by Government as a turnkey project have been incorporated together into a single Risk Matrix. When quantifying the risks, the **PSC Base Model** indicates the total Project risk, following this procurement method the Government retains all the risks in the Project; whereas the **PPP Reference Model** indicates the risks retained by Government, by virtue of the risk-sharing with the private sector. For the purposes of this Feasibility Study, reference is made only to 'retained risks' in the context of both the PSC Financial Model (i.e. the Project risks) and the PPP Financial Model (i.e. the retained risk).

In addition to the quantification of risks, each risk has been ranked (on a scale of high, medium and low) for both quantitative and qualitative risks; this has been done to draw Stellenbosch Municipality's attention to the 'high' risk area of the Project.

The Risk Matrix is to be used by the transaction advisor team in the future: namely the legal and financial advisors. The legal team will use the Risk Matrix, specifically the risk allocations, as a basis of preparing a draft PPP Agreement (assuming that Treasury Approval I is achieved in the future) ensuring that the risks transferred are captured in the PPP Agreement. The Risk Matrix will further be used by the Legal Advisor in evaluating the bids, and to define the broad parameters of the negotiations, if a PPP contract is viable.

The Financial Advisor will use the Risk Matrix, in the first instance, to attach a value to the risks facing Stellenbosch Municipality were they to undertake the Project themselves and, in the second instance, to identify how the Private Party will deal with the risks that will be transferred to them (e.g. insurance, costed into return expectation, other mitigation and management measures costed into the cash flows, etc.) in the construction of the PPP Reference Model. The risk-adjusted PSC and the PPP Reference Model, including consideration of the risks identified will be used to determine Affordability (Risk Adjusted PSC versus Budget) and a benchmark for demonstrating "Value for Money", both considerations that would form part of a Treasury Approval I.

The Risk Matrix will be a "living" document and, should the Project be procured by way of a PPP, will be updated during the course of contract negotiations; it is envisaged that the document will be updated at TA IIB (indicating the Preferred Bidder's preferred risk allocation) and at TA III (indicating the agreed risk allocation with the Private Party).

A comprehensive Risk Matrix has been populated that contains an in-depth analysis of each category of foreseeable risk. Each risk is further categorized into a PPP model and a PSC model.

The following is a brief summary of the methodology utilized in identifying, analysing and quantifying the risk elements and establishing a process for allocating the risks to the private sector where applicable.

- Step 1: Identify the risks.

  The process adopted in identifying risks related to parking structures.

  Potential risks can be categorized very broadly:

  - Construction Risk: The main risks are the possibility of delay in construction completion, cost overruns and increased costs time overruns.
  - Design Risk: The risk that the design solution is considered in isolation and not coherent/integrated with operational efficiency and other considerations.
  - Operational Risk: The risk of continuous delivery of sub-standard service levels, as well as cost overruns/ underestimates.
  - Demand Risk: The risk that the required other projects and needs will not be implemented that will assist in increasing the demand for the parking Garage.

- Step 2: Identify the impacts of each risk.

  This part of the exercise aims to quantify the impact of the risk in the event that it was to occur. In the event that a potential risk occurs, it could result in either a delay or increased costs. The impact of the risk would be based on the period in which the risk occurs, and the cost affected. For instance, cost overruns occurring during the construction period would have an impact on the capital expenditure costs.

- Step 3: Estimate the likelihood of the risks occurring.

  When assessing the likelihood/probability of risk occurrence, a number of factors are taken into consideration including:

  - Past experience: in considering the risk of cost overruns with conventional procurement, past experience of recent projects is taken into account;
  - General economic conditions and user demands: This takes into consideration the preference surveys etc.
  - Experience of the service provider to undertake this type of project etc.

- Step 4: Estimate the cost of each risk.

  In calculating the cost of each risk, the following formula is used:

  Cost of Risk = Impact x Probability x Cost Affected

  The timing of the risk is then considered and the NPV of total risk based on the discounted nominal cash flows constructed.

- Step 5: Identify strategies for mitigating the risks.

  The risk mitigating strategy is considered for each risk.

- Step 6: Allocate risk.

  Taking due cognizance of the project structures under consideration, an assessment was made for each risk to determine whether it would be transferred to the relevant Private Party, retained by Stellenbosch Municipality or shared. The risk was allocated to the party that would be best able to manage it. Past experience from other projects was applied in risk allocation.

- Step 7: Construct the risk matrix.

  The outcome of Steps 1 to 6 above was a comprehensive risk matrix, which resulted in the NPV of the risks retained by Stellenbosch and the NPV of risks transferred to the Private Party.

  The valuation of these risks, being the Net Present Value (NPV) of risk, is then added to the cost of the PSC in order to establish the real cost of public sector procurement called the risk-adjusted PSC price.

  Value for money is determined by comparing the risk-adjusted PSC to the risk-adjusted PPP alternative on an NPV basis.

6.2.1 Risks

The risks are identified below with the description of the risk. The risk categories are described as Likely, Moderate and Extreme.

Table 6-28: Risk Description

Description	Affected Cost	Description	Consequences
Cost Overrun 2023	R111 521 263.60	Risk that construction is not completed in the allocated budget	Cost
Likely			
Moderate			
Extreme			

Time Overrun 2023 Likely Moderate Extreme	R111 521 263.60	Risk that construction is not completed in the allocated time	Cost due to delay
Heritage Risk Likely Moderate Extreme	R124 266 550.87	The risk that the design and construction will need to change due to Heritage Reasons	Cost of upgrades
Operating Risk Likely Moderate Extreme	R1 257 952.50	The risk that the operating inputs cost more than budgeted for	Cost increase per year
Maintenance Risk Likely Moderate Extreme	R469 003.50	The risk that the construction and or design was inadequate and additional more expensive maintenance is required	Increase cost per year
Technology Risk Likely Moderate Extreme	R1 999 141.0	The risk that the SMART tech is outdated and more expensive upgrades are required, especially when the Smart parking System has to be replaced every 8 years.	Cost increase

Design Risk 2023	R12 529 314.00	Risk that the design phase takes longer than expected at a higher price	Delay and cost increase
Likely			
Moderate			
Extreme			
Usage Risk (as per scenario)	R10 661 866.50	The risk that the demand is not realised due to other infrastructure and policing needs that must be implemented to ensure demand is achievable	Lower Revenue collected
Likely			
Moderate			
Extreme			

6.2.2 Allocate Risk

The risk allocation was done through the best fit of which party would adequately manage the risks identified.

Table 6-29: Allocation of Risk

description	Mitigation	Allocation
Cost Overrun 2023	Private party has a fixed term and a fixed contract with subcontractors to minimise the risk	Allocated to the private party, but at a far reduced risk
Likely		
Moderate		
Extreme		
Time Overrun 2023	Institution will not pay until service commencement	Risk is allocated to the private party, but is reduced by transferring the risk to the subcontractor
Likely		
Moderate		
Extreme		
Heritage Risk	To minimise this risk, a thorough due diligence exercise needs to be conducted during design phase. This is best managed by the public sector	Allocated to the public sector
Likely		
Moderate		
Extreme		

Operating Risk	Managed by the Private party, the contracts and existing operational knowledge minimise this risk	Allocated to the private sector
Likely		
Moderate		
Extreme		
Maintenance Risk	The insurances and knowledge of the private sector and quality management of the private sector can address this risk	Allocated to the private sector
Likely		
Moderate		
Extreme		
Technology Risk	The private party is an existing operator of such infrastructure and business and will remain up to date with required tech needs. Risk can be absorbed into upgrade maintenance	Allocated to the private sector
Likely		
Moderate		
Design Risk 2023	Private party may pass risk to subcontractor, but maintain primary liability. Institution will not pay until service commencement	Risk is allocated to the private sector
Likely		
Moderate		
Extreme		
Usage Risk (as per scenario)	The public sector needs to ensure that the required projects to increase demand and that policing of the illegally parked vehicles is done, to provide the required demand.	Risk remains with the public sector
Likely		
Moderate		
Extreme		

6.2.3 Risk Matrix

The risk matric was done for the PSC model if all risk were allocated to government, Table 6-30 and hereafter the risks allocated through the use of PPP contract, Table 6-32. The total value to the allocated risk in the risk matrix is R22.9m.

Table 6-30: PSC Risk Matrix with no allocation to PP

Description	Cost	Description	Consequences	Effect on PSC base cost assumption		Likelihood of risk occurring (%)	Values of risk (R000)
Cost Overrun	R111 521 263.60	Risk that construction is not completed in the allocated budget	Cost				
Likely				10%	R11 152 126.36	50%	R5 576 063.18
Moderate				20%	R22 304 252.72	20%	R4 460 850.54
Extreme				30%	R33 456 379.08	5%	R1 672 818.95
							R11 709 732.68
Time Overrun	R111 521 263.60	Risk that construction is not completed in the allocated time	Cost due to delay				
Likely				10%	R11 152 126.36	30%	R3 345 637.91
Moderate				15%	R16 728 189.54	20%	R3 345 637.91
Extreme				20%	R22 304 252.72	5%	R1 115 212.64
							R7 806 488.45
Heritage Risk	R124 266 550.87	The risk that the design and construction will need to change due to Heritage Reasons	Cost of upgrades				
Likely				1%	R1 242 665.51	30%	R372 799.65
Moderate				1%	R621 332.75	10%	R62 133.28
Extreme				0%	R310 666.38	5%	R15 533.32
							R450 466.25
Operating Risk	R1 257 952.50	The risk that the operating inputs cost more than budgeted for	Cost increase per year				
Likely				20%	R251 590.50	35%	R88 056.68
Moderate				35%	R440 283.38	15%	R66 042.51
Extreme				45%	R566 078.63	10%	R56 607.86
							R210 707.04

Maintenance Risk	R469 003.50	The risk that the construction and or design was inadequate and additional more expensive maintenance is required	Increase cost per year				
Likely				25%	R117 250.88	45%	R52 762.89
Moderate				35%	R164 151.23	25%	R41 037.81
Extreme				45%	R211 051.58	5%	R10 552.58
							R104 353.28
Technology Risk	R1 999 141.00	The risk that the SMART tech is outdated and more expensive upgrades are required	Cost increase				
Likely				20%	R399 828.20	45%	R179 922.69
Moderate				30%	R599 742.30	20%	R119 948.46
Extreme				40%	R799 656.40	5%	R39 982.82
							R339 853.97
Design Risk 2023	R12 745 287.27	Risk that the design phase takes longer than expected at a higher price	Delay and cost increase				
Likely				8%	R1 019 622.98	40%	R407 849.19
Moderate				15%	R1 911 793.09	30%	R573 537.93
Extreme				20%	R2 549 057.45	20%	R509 811.49
							R1 491 198.61
Usage Risk (as per scenario)	R15 160 906.50	The risk that the demand is not realised due to other infrastructure and policing needs that	Lower Rev Risk				
Likely				10%	R1 516 090.65	40%	R606 436.26
Moderate				15%	R2 274 135.98	15%	R341 120.40
Extreme				25%	R3 790 226.63	5%	R189 511.33
							R1 137 067.99

		must be implemented to ensure demand is achievable					

If the risks are transferred/ allocated to the private sector as per the allocation matrix, the total risk value decreases to R1,14mil, which is 5% of the total risk value.

Table 6-31: Risk Retained

Description	Affected Cost	Description	Consequences	Effect on PSC base cost assumption		Likelihood of risk occurring (%)	Values of risk (R000)
Cost Overrun 2023	R0,00	Risk that construction is not completed in the allocated budget	Cost				
Likely				10%	R0,00	50%	R0,00
Moderate				20%	R0,00	20%	R0,00
Extreme				30%	R0,00	5%	R0,00
					Risk Value		R0,00
Time Overrun 2023	R0,00	Risk that construction is not completed in the allocated time	Cost due to delay				
Likely				10%	R0,00	30%	R0,00
Moderate				15%	R0,00	20%	R0,00
Extreme				20%	R0,00	5%	R0,00
					Risk Value		R0,00
Heritage Risk	R0,00	The risk that the design and construction will need to change	Cost of upgrades				
Likely				1%	R0,00	30%	R0,00
Moderate				1%	R0,00	10%	R0,00
Extreme				0%	R0,00	5%	R0,00

		due to Heritage Reasons					
					Risk Value		R0,00
Operating Risk	R0,00	The risk that the operating inputs cost more than budgeted for	Cost increase per year				
Likely				20%	R0,00	35%	R0,00
Moderate				35%	R0,00	15%	R0,00
Extreme				45%	R0,00	10%	R0,00
					Risk Value		R0,00
Maintenance Risk	R0,00	The risk that the construction and or design was inadequate and additional more expensive maintenance is required	Increase cost per year				
Likely				25%	R0,00	45%	R0,00
Moderate				35%	R0,00	25%	R0,00
Extreme				45%	R0,00	5%	R0,00
							R0,00
Technology Risk	R0,00	The risk that the SMART tech is outdated and more expensive upgrades are required	Cost increase				
Likely				20%	R0,00	45%	R0,00
Moderate				30%	R0,00	20%	R0,00
Extreme				40%	R0,00	5%	R0,00

					Risk Value		R0,00
Design Risk 2023	R0,00	Risk that the design phase takes longer than expected at a higher price	Delay and cost increase				
Likely				8%	R0,00	40%	R0,00
Moderate				15%	R0,00	30%	R0,00
Extreme				20%	R0,00	20%	R0,00
					Risk Value		R0,00
Usage Risk (as per scenario)	R15 160 906.50	The risk that the demand is not realised due to other infrastructure and policing needs that must be implemented to ensure demand is achievable	Lower Rev Risk				
Likely				10%	R1 516 090.65	40%	R606 436.26
Moderate				15%	R2 274 135.98	15%	R341 120.40
Extreme				25%	R3 790 226.63	5%	R189 511.33
					Risk Value		R1 137 067.99

6.2.4 Risk Adjusted PSC model.

The risk adjusted PCS model was done in in comparing the NPV of the base model, the risk adjusted model and the risk retained model. The financial models are located in Appendix D and E. As per the PSC base model only scenarios 3, 4, 5 and 6 were acceptable, hence for the risk analysis, only these scenarios were compared as reflected in Table 6-32. All models were subjected to the same discounted rate and assumptions as previously discussed.

The risks created an NPV difference between the base model and the risk adjusted models of scenarios 3-6 of between R15.2m and R19.0m over 20 years. Over a 25-year period the difference is between R6.6m and R42.0m. The difference the risks created between the risk retained models and the base models ranged between R8.5m and R14.4m over a 20-year project life cycle and between R14.8m and R16.5m over a 30-year period. The impact of the risk on the NPV of for example, Scenario 6 translates to a base NPV of R29.4m to a -R10.4m for the risk adjusted model to R14.9m NPV for the risk retained model over a 20-year period. Over a 30-period, the NPV is reduced from a R42,3m (base model) to a low R0.06m for the risk adjusted model to R25.8m for the risk retained model.

Table 6-32: PSC Risk Adjusted NPV model comparison

		Scenario 3	Scenario 4	Scenario 5	Scenario 6
NPV – 20-year	PSC Based Models	R10 754 003	R14 805 128	R27 442 065	R29 410 063
	PSC Risk Adjusted	-R27 566 023	-R23 847 412	-R12 232 221	-R10 359 812
	PSC Risk Retained	-R2 289 889	R1 428 722	R13 043 913	R14 916 321
NPV – 25 -year	PSC Based Models	R23 618 669	R27 778 040	R40 757 111	R42 331 393
	PSC Risk Adjusted	-R17 007 032	-R13 225 116	-R1 405 882	R59 891
	PSC Risk Retained	R8 811 865	R12 593 781	R24 413 016	R25 878 789

The actual cost based on the risk adjusted matrix for government over the life cycle of the project for the scenarios is as per Table 6-33. The estimated effect on the costs has a difference of around R15 to R30 mil.

Table 6-33: Actual Cost

		Scenario 3	Scenario 4	Scenario 5	Scenario 6
20-year	PSC Based Models	R157 910 467,57	R157 910 467,57	R157 910 467,57	R157 910 467,57
	PSC Risk Adjusted	R208 889 830,45	R218 961 575,18	R222 395 276,78	R220 616 520,25
	PSC Risk Retained	R176 408 020,54	R183 609 526,34	R187 043 227,94	R207 428 708.93
25 - year	PSC Based Models	R243 853 871.27	R243 853 871.27	R243 853 871.27	R243 853 871.27
	PSC Risk Adjusted				
	PSC Risk Retained	R300 392 599.93	R301 833 884.94	R306 262 637.51	R306 676 971.70

6.2.5 Affordability Analysis

The capital expenditure on the Eikestad project would require a year 1 spend of R90.8 and a year 2 spend of R35.5m. Table 6-34 shows the June 2021 Amended Budget for capital expenditure in the Stellenbosch Municipal area (which excludes any provision for a parking garage) and an estimated capital expenditure for 2024, based on an inflation figure of 5% per annum. This is regarded as a somewhat optimistic estimate give that the difference between the original 2021 budget and the 2021 amended budget was only about 2.8%. Given the fiscal realities at the time of writing the report (November 2023), it is highly unlikely that the increase of 5% per annum would be realised.

Table 6-34: Actual Capital Spend

Sector	June 2021 Capital Expenditure		2024 Estimated Budget
	Original Budget	Amended Budget	Estimated Budget
Road and Stormwater	R37 800 000,00	R47 485 565,00	R54 970 477.18
Traffic Engineering	R18 800 000,00	R12 128 000,00	R14 039 676.00
Transport Engineering	R13 600 000,00	R12 626 780,00	R14 617 076.20
Traffic Services	R1 420 000,00	R1 427 293,00	R1 652 270.06
Total	R71 620 000,00	R73 667 638,00	R85 279 499.44

The table shows that the 2021 amended total budget was R73.6m, which is estimated to increase to just more than R85m by 2024 (first year of expenditure). The table clearly demonstrates that the Stellenbosch Municipality will be hard pressed to find any fund (outside of grants) for the parking facility. Just the estimated Consultant Fees amounts to almost 11.1% of the total estimated capital cost required for the Eikestad parking facility. The estimated direct construction costs (excluding Consultant fees) are estimated at almost R113.5m, which makes it patently clear that the Municipality would require a private partner to develop the facility.

In addition, the operational and maintenance costs amount to another R1.5m per year.

6.3 PPP Reference Model

As demonstrated in the pre-feasibility report, significant risk transfer to the private sector. This section reports on the financial model developed from the perspective of a private partner As with the PSC model, the PPP model also contains a risk adjusted PPP reference model which is compared to the risk adjusted PSC model and determines the best value for money. As part of the PPP reference model, assumptions were made regarding lending rate, debt/equity, BBBEE structured costs and includes a risk adjustment for the PPP reference model, based on the identified risks and mitigation measures.

6.3.1 Types of PPP

There are two major types of PPP funding contracts: User-charge and a Unitary-Payment

PPP as Funding Sources:

- User-Charge PPP (Advised for this project)
- User pays for services.

Government funding expands.

- Unitary-payment PPP (Not advised for this project)

- Funding not expanded.

For this project a user-pays funding source is advised. The relationship between the service providers, government and users is through the special purpose vehicle, as presented in Figure 6-7.

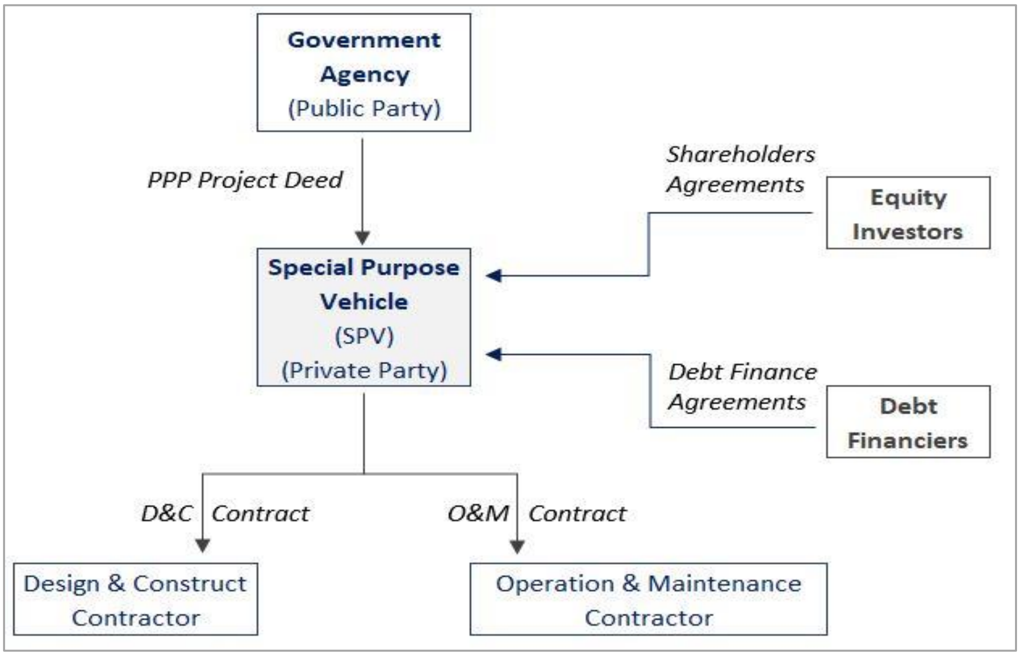


Figure 6-7: SPV relationship

The types of PPP contracts are listed below:

- Build-Operate-Transfer (BOT)
- Build-Own-Operate (BOO)
- Build-Own-Operate-Transfer (BOOT)
- Design-Build (D&B)
- Design-Build-Finance (DBF)
- Design – Build – Finance – Operate (DBFO)
- O & M (Operation & Maintenance)

Due to the nature of the risks, the availability of funds and the technical capacity for this type of project, a BOOT is most likely the most acceptable contract type.

6.3.2 Proposed PPP structure and funding

The PPP reference model was established as per module 4 of the National Treasury PPP guidelines.

In accordance with module four of the PPP guidelines, the proposed structure for the PPP project needs to show the relationship between the institution, the special purpose vehicle (SPV) (if required), shareholders, lenders, suppliers, subcontractors and other players. The proposed sources of funding (the combination of debt and equity, and (if appropriate) government contribution) are identified and shown in a proposed funding structure. Appropriate equity returns, and the costs and key terms of debt financing, including debt service cover ratios (if applicable) are shown. All assumptions are clearly stated, as these directly affect the cost of capital for the project.

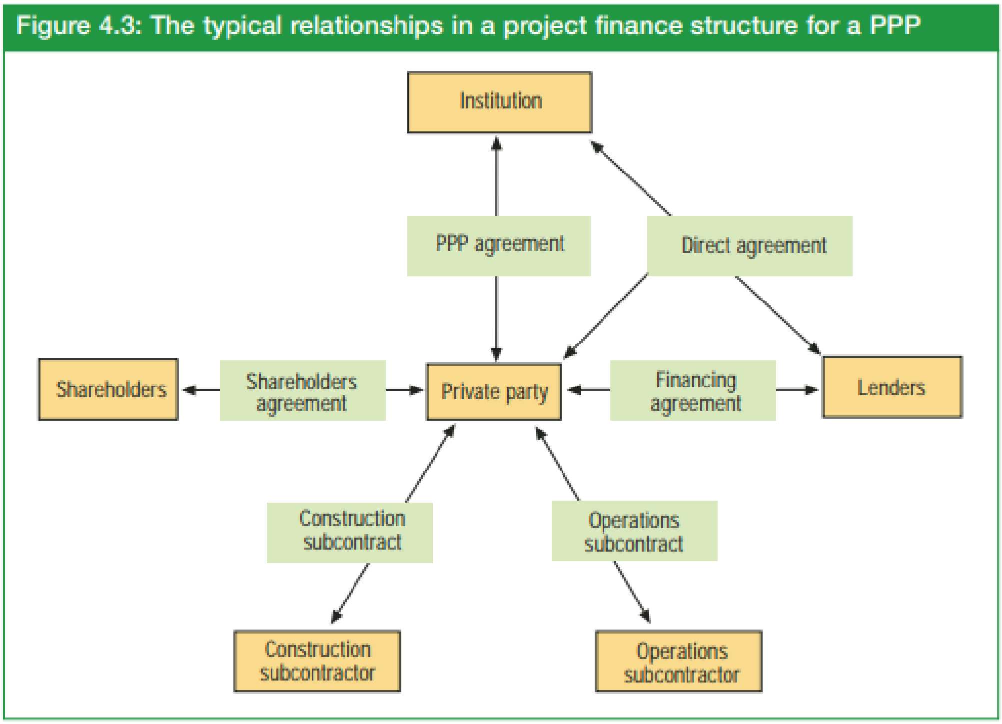


Figure 6-8: Extract, Relationship for a PPP

The assumptions made for the PPP reference model are describe below:

6.3.2.1 Project Costing

Where applicable the cots inputs were kept the same for both the PSC and the PPP financial models. The project costing for the PPP reference model is discussed below.:

Capital Cost

The capital cost has been described in chapter 6.1. However, the site supervision, construction cost and the consulting fee are grouped together as this will be a part of the total debt amount or construction cost. Consultant fee and Site supervision was estimated at 12% of the construction cost.

Building Escalation

The building escalation cost is discussed in chapter 6.1

Maintenance Cost

The maintenance cost is discussed in chapter 6.1

Discount Rate

The discounted rate was put at 10%. The internal rate of return for investor attraction was required to be above 12.75%which is the prime lending rate +1%.

Inflation

The inflation cost is discussed in chapter 6.1

Currency Treatment

It is assumed that about 5% of the capital cost will be imported primarily from European countries. The imported content is usually under agency agreement to local suppliers, but the prices are subject to variation due to fluctuation in the exchange rates. This was included in the cost overrun and technology risk analysis and is a very small contributor to additional costs.

Taxation

The provisions of the Income Tax Act and the VAT Act have been used in constructing the tax implications of the transactions in order to determine the tax cash flows for the PPP reference model. The following currently legislated tax rates have been used as the forecast tax rates:

- Corporate Income Tax rate of 27%;
- VAT rate of 15%; and
- STC/Withholding Tax rate of 10%.
- Tax on Dividend 20%

Asset Values

Due to the continuous maintenance of the assets and planning for replacement of mechanical assets during the concession period, the facility assets are expected to have good market values and useful lives. This is not reflected in the book value of the assets as maintenance costs are not capitalized to the assets but rather expensed.

6.3.2.2 Equity and Debt Assumptions

Equity Contributions

Twenty percent (15%) of the total funding required is funded through equity. The rest (85%) is funded through a redeemable shareholder loan. The shareholder loan is repaid only when there is cash available and it ranks after the reserves in terms of the cash flow cascade.

Dividend Policy

The PPP model assumes a 100% dividend payout to equity shareholders of cash available for distribution to equity shareholders.

Equity Returns

An internal rate of return of >12% is forecasted to be required by investors and the accounting rate of return over 15% is required. This return is a factor in determining the tariff increase rate.

Debt Assumptions

Eighty-five percent (80%) of the total funding required is funded through a single senior debt facility for the PPP reference model. Provision is made to consider alternative funding structures.

Funding Assumptions

Use has been made of a single senior debt facility with the option of a second debt facility. The loan repayment term of 20 years has been assumed for both the 20-year and 25-year models. JIBAR has been used as the base rate, which has been converted into a semi-annual rate from a quarterly rate.

Johannesburg Interbank Agreed Rate (JIBAR) is the money market rate that is used in South Africa. The rate comes in one-month, three-month, six-month and twelve-month discount terms. The rate is determined as an average of the rates indicated by local and international banks. JIBAR is calculated as a yield and then converted into a discount rate. The rate is calculated daily after all of the rates are received by participating banks. JIBAR is commonly used as a base rate to set lending rates.

The table below includes the following assumptions with regard to the funding.

Table 6-35: Funding Assumptions

Senior Debt	Assumptions
JIBAR 3 Months	8.36[2]%
Risk Margin	1,50%
Liquidity fee	1,40%
Bank Costs	0,50%
Rate used	**11.76%**

It must be noted that the prime lending rate is currently set at 11.75% with the repo rate at 8.25%[3]

Debt Schedule

A debt schedule for loan facility is prepared as part of the financial model.

Key Output Ratios required by Lenders

The following ratios which are based on the project cash flows and are required to be met before the lenders can declare the project bankable and invest in it:

- Debt Service Cover Ratio (DSCR)
- Loan Life Cover Ratio (LLCR);

These ratios are crucial as their breach at any time during the concession period could result in Private Party default. The minimum DSCR requirement, in particular, has been used in generating the tariff amount.

[2] 3 November 2023

[3] 3 November 2023

The target minimum DSCR of 1.2 is an estimate of what the lenders would require. The PPP financial model however generates a slightly lower minimum DSCR in the early years of operation and picks up thereafter.

Reserve Accounts Required by Lenders

Provision has been made for a Maintenance Reserve Account (MRA), Operational Reserve Account (ORA) and a Debt Service Reserve Account (DSRA) as it is forecasted that the lenders may require these accounts as part of their lending conditions:

- DSRA: an amount equal to the next 1.5 times annual payment period's debt service (interest, fees and principal payments under the Facility). The reserve is to act as a buffer in the event of the inability of the Private Party to service its debt obligations.
- MRA: These cash reserves are calculated based on the forecast maintenance expenditures 12 months preceding the scheduled maintenance expenditure date.
- ORA: These cash reserves are calculated based on the forecast operational expenditures 12 months preceding the scheduled maintenance expenditure date.

6.3.2.3 BEE Targets

The BEE targets are discussed and defined in chapter 6.1 subsection 6.1.3. This section is valid for the PPP reference model calculations.

6.3.2.4 Concession Period

6.3.2.5 Two concession periods have been provided for in the models, namely 20 and 25 years. Revenue

For the PPP reference model, the same annual tariff increase as that for the PSC was applied, namely 8% every other year, or 80% of inflation.

6.3.3 PPP Reference model recommendations

The PPP reference model (i.e. the model non adjusted for any risk) was developed for the PSC model scenarios that were acceptable (Appendix G). Again, the user charge was the same as per the PSC model. The results are as follows:

Scenario 3:

Using a Debt/ Equity of 85/15 and a lending rate of 12.75%, the NPV after VAT and Tax at a 10% discount rate was R6.4m with the IRR 8.83% over a 20-year period. Over 25 years the picture improves to a positive NPV of R18.4m and an IRR of 12.04%.

The IRR, ARR, DSCR and the LLCR were not acceptable for the 20 period. The IRR was acceptable for the 25-year period.

Table 6-36: Scenario 3 PPP Reference Model Results 20 and 25 years

	Before Risk Adjusted 20 year		Risk Adjusted 25 year	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R6 463 076.24		R16 051 625.52	
IRR	8.83%	Reject	R18 498 540.84	Accept
ARR	11%	Year one Reject	12.04%	Year one reject
Debt/ Equity	5.67	High	11%	High
LLCR	6%	Year one	5.67	Year one
DSCR 1	0.92	Year one	18%	Year one
DSCR 2	1.01	Year two	0.92	Year two
DSCR 4	1.10	Year four	1.01	Year four

The shareholders returns are indicated below in rand value. The total BBBEE spend is around 0.93% of the project.

Table 6-37: Shareholders Returns and Equity Checks 20 years.

Final Returns Equity Check			
BBBEE Returns	R21 264 327.36	0.40	Check Equity
Other Partners	R31 896 491.04	0.60	
Total	R53 160 818.41		
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	
Total Cost	R381 230 408.40	0.93%	

Table 6-38: Shareholders Returns and Equity Checks 25 years.

Final Returns Equity Check			
BBBEE Returns	R60 125 357.69	0.40	Check Equity
Other Partners	R90 188 036.54	0.60	
Total	R150 313 394.24		
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	
Total Cost	R381 230 408.40	0.93%	

Scenario three on then 25-year scenario is marginal as an investment opportunity.

<u>Scenario 4:</u>

Using a Debt/ Equity of 85/15 and a lending rate of 12.75, the NPV after VAT and Tax at a discounted rate was R8.7m as the IRR was at 9.43%. Over 25 years the NPV increased to R20.9m and the IRR to 12.47%, which is above the discount rate, but below the lending rate of 12.75. The 25-year scenario is a marginal as an investment for this scenario.

Table 6-39: Scenario 4 PPP Reference Model Results 20 and 25 years

	Before Risk Adjusted 20 year		Before Risk Adjusted 20 year	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R8 718 631.81		R20 945 251.48	
IRR	9.43%	Reject	12.47%	Accept

ARR	11%	Year one Reject	11%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	9%	Year one	21%	Year one
DSCR 1	0.94	Year one	0.94	Year one
DSCR 2	1.03	Year two	1.03	Year two
DSCR 4	1.12	Year four	1.12	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% total increase on the project cost.

Table 6-40: Shareholders Returns and Equity Checks

	20-year period		25-year period	
Unit	Value	Criteria	Value	Criteria
BBBEE Returns	R22 787 585.45	0.40	R62 253 771.06	0.40
Other Partners	R34 261 734.98	0.60	R93 461 013.40	0.60
Total	R57 049 320.43		R155 714 784.47	
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

This option is marginal as a feasible option yet could still be feasible if the Debt/ equity was a 90/10.

Scenario 5:

Using a Debt/ Equity of 85/15 and a lending rate of 12.75%, the NPV after VAT and Tax at a discounted rate was R23.1m and the IRR came to 13.01% over a 20-year period. Over 25 years the picture improves to an NPV of R33m and an IRR of 15.20%, which is above the discount rate and the lending rate used. The DSCR is not acceptable in either the 20 or the 25-year periods. However, the DSCR and Debt/ equity ratio is acceptable.

Table 6-41: Scenario 5 PPP Reference Model Results

	Before Risk Adjusted 20 year		Before Risk Adjusted 25 year	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R23 151 138.08		R36 655 516.91	
IRR	13.01%	Accept	15.20%	Accept
ARR	12%	Year one Reject	12%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	23%	Year one	36%	Year one
DSCR 1	1.03	Year one	1.03	Year one
DSCR 2	1.13	Year two	1.13	Year two
DSCR 4	1.23	Year four	1.23	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% increase on the project cost.

Table 6-42: Shareholders Returns and Equity Checks

Final Returns Equity Check				
BBBEE Returns	R32 630 890.76	0.40	R76 145 482.85	0.40
Other Partners	R48 946 336.13	0.60	R114 218 224.28	0.60
Total	R81 577 226.89		R190 363 707.13	
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

Scenario 5 is an acceptable investment option in both the 20 year and 25-year scenarios.

Scenario 6:

Using a Debt/ Equity of 85/15 and a lending rate of 12.75%, the NPV after VAT and Tax at a discounted rate was R24.8m and the IRR was 13.4% over a 20-year period. Over 25 years the picture is improved to an NPV of R36.1m and an IRR of 15.26, which is above the discount rate and the lending rate. The DSCR from year four onwards is acceptable if a DSCR of 1.2 is accepted.

Table 6-43: Scenario 6 PPP Reference Model Results

	Before Risk Adjusted 20 year		Before Risk Adjusted 25 year	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R24 812 565.49		R36 162 521.49	
IRR	13.43%	Accept	15.26%	Accept
ARR	12%	Year one Reject	12%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	25%	Year one	36%	Year one
DSCR 1	1.04	Year one	1.04	Year one
DSCR 2	1.15	Year two	1.15	Year two
DSCR 4	1.25	Year four	1.25	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% increase on the project cost.

Table 6-44: Shareholders Returns and Equity Checks

Final Returns Equity Check				
BBBEE Returns	R33 018 063.50	0.40	R69 307 354.62	0.40
Other Partners	R49 527 095.26	0.60	R103 961 031.93	0.60
Total	R82 545 158.76		R173 268 386.55	

BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

Scenario 6 is an acceptable investment option.

From the results above, three demand scenarios pass through to be assessed as the risk adjusted PPP reference model.

6.4 Risk Adjusted PPP Reference Model

6.4.1 Risk Matrix

The risks that are transferred to the PPP reference model are shown in Table 6-45. The risk likelihood and the effect are reduced compared to the PSC model as the private sector has mitigation measures that were considered from the risk allocation matrix. The operational and maintenance risk have been mitigated as the private sector has extensive knowledge and expertise in these fields. The Heritage risk and the usage demand risk remains with the public sector as they are best suited to mitigate these risks. The risk adjusted PPP reference model is detailed in annexure D and E.

Table 6-45: Risk Valuation PPP Reference Model

Description		Description	Consequences	Effect on PSC base cost assumption		Likelihood of risk occurring (%)	Values of risk (R000)
Cost Overrun	R101 153 073.56	Risk that construction is not completed in the allocated budget	Cost				
Likely				4%	R4 046 122.94	15%	R606 918.44
Moderate				8%	R8 092 245.88	10%	R809 224.59
Extreme				12%	R12 138 368.83	5%	R606 918.44
							R2 023 061.47
Time Overrun	R101 153 073.56	Risk that construction is not completed in the allocated time	Cost due to delay				
Likely				5%	R0.00	15%	R0.00
Moderate				10%	R10 115 307.36	10%	R1 011 530.74
Extreme				15%	R15 172 961.03	5%	R758 648.05
							R1 770 178.79
Heritage Risk	R0.00	The risk that the	Cost of upgrades				

Likely		design and construction will need to change due to Heritage Reasons		1%	R0.00	30%	R0.00
Moderate				1%	R0.00	10%	R0.00
Extreme				0%	R0.00	5%	R0.00
							R0.00
Operating Risk	R0.00	The risk that the operating inputs cost more than budgeted for	Cost increase per year				
Likely				20%	R0.00	35%	R0.00
Moderate				35%	R0.00	15%	R0.00
Extreme				45%	R0.00	10%	R0.00
							R0.00
Maintenance Risk	R0.00	The risk that the construction and or design was inadequate and additional more expensive maintenance is required	Increase cost per year				
Likely				25%	R0.00	45%	R0.00
Moderate				35%	R0.00	25%	R0.00
Extreme				45%	R0.00	5%	R0.00

6.4.2 PPP Risk Adjusted Results

The analysis of the risk adjusted PPP model was done for the three scenarios that returned feasible results in chapter 6.3.

<u>Scenario 4:</u>

Using a Debt/ Equity of 85/15 and a lending rate of 12.75%, the risk adjusted NPV (after VAT and Tax) at a 10% discount rate was R -5.2m with an IRR of 8.26% over 20 years, which is below the lending rate. Over 25 years the picture improves to a positive risk adjusted NPV of R6.8m and an IRR of 11.62%, which is above the discount rate, bust still below the lending rate. The ARR is just below 11%. The DSCR from year four onwards is not acceptable at 1.2.

Table 6-46: Scenario 4 PPP Risk Adjusted Model Results

	20 years		25 years	
Unit	Value	Criteria		
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	-R5 205 701.33		R6 857 915.15	
IRR	8.26%	Reject	11.62%	Accept
ARR	10.86%	Year one accept	11%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	-5%	Year one	7%	Year one
DSCR 1	0.94	Year one	0.94	Year one
DSCR 2	1.03	Year two	1.03	Year two
DSCR 4	1.12	Year four	1.12	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% increase on the project cost.

Table 6-47: Shareholders Returns and Equity Checks, Risk

Final Returns Equity Check	20-years		25-years	
BBBEE Returns	R22 787 585.45	0.40	R62 253 771.06	0.40
Other Partners	R34 261 734.98	0.60	R93 461 013.40	0.60
Total	R57 049 320.43		R155 714 784.47	
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

This option is not feasible and not an attractive investment. This option could become a feasible one if the lending rate is lower than 11%. Similarly, if the tariff increase was increased to 5% per year, the options return a more feasible outcome.

Scenario 5:

Using a Debt/ Equity of 80/20 and a lending rate of 12.75%, the risk adjusted NPV after VAT and Tax over 20 years at a discount rate of 10% was R5,5m with an IRR of 11.92%. Over 25 years the picture improves significantly to a risk adjusted NPV of R18.8m and an IRR of 14.34%, which is above the discount rate and the lending rate. The DSCR from year four onwards is acceptable.

Table 6-48: Scenario 5 PPP Risk Adjusted Model Results

Final Returns Equity Check	20-years		25-years	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R5 491 523.34		R18 832 898.99	
IRR	11.92%%	Reject	14.34%	Accept
ARR	12%	Year one accept	12%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	5%	Year one	19%	Year one
DSCR 1	1.03	Year one	1.03	Year one
DSCR 2	1.13	Year two	1.13	Year two
DSCR 4	1.23	Year four	1.23	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% increase on the project cost.

Table 6-49: Shareholders Returns and Equity Checks, Risk

Final Returns Equity Check	20-years		25-years	
BBBEE Returns	R32 630 890.76	0.40	R76 145 482.85	0.40
Other Partners	R48 946 336.13	0.60	R114 218 224.28	0.60
Total	R81 577 226.89		R190 363 707.13	
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

Scenario 5 is an acceptable investment option. However, the IRR is marginal if mirrored against the lending rate used in the model. A lower lending rate will improve the outcome of this scenario.

<u>Scenario 6:</u>

Using a Debt/ Equity of 85/15 and a lending rate of 12.75% the risk adjusted NPV over 20 years is R6.7m with an IRR of 12.34%, above the discount rate but below the lending rate. Over 25 years the picture changes significantly to an NPV of R17.89m and an IRR of 14.37%, which is above the discount rate and the lending rate. The DSCR from year four onwards is acceptable at 1.2, but not at 1.5.

Table 6-50: Scenario 6 PPP Risk Adjusted Model Results

Final Returns Equity Check	20-years		25-years	
Unit	Value	Criteria	Value	Criteria
Total Cost	R381 230 408.40		R381 230 408.40	
NPV	R6 709 463.83		R17 896 416.64	
IRR	12.34%	Accept	14.37%	Accept
ARR	12%	Year one accept	12%	Year one reject
Debt/ Equity	5.67	High	5.67	High
LLCR	7%	Year one	18%	Year one
DSCR 1	1.04	Year one	1.04	Year one
DSCR 2	1.15	Year two	1.15	Year two
DSCR 4	1.25	Year four	1.25	Year four

The shareholders returns are acceptable in accordance with shareholding. The BEE expense results in a 0.93% increase on the project cost.

Table 6-51: Shareholders Returns and Equity Checks, Risk

Final Returns Equity Check	20-years		25-years	
BBBEE Returns	R33 018 063.50	0.40	R69 307 354.62	0.40
Other Partners	R49 527 095.26	0.60	R103 961 031.93	0.60
Total	R82 545 158.76		R173 268 386.55	
BBBEE Initial Cost	R3 550 472.88	% Additional Cost	R3 550 472.88	% Additional Cost
Total Cost	R381 230 408.40	0.93%	R381 230 408.40	0.93%

Scenario 6 is an acceptable investment option, especially over a 25-year given the assumptions, particularly the discount rate and the lending rate are taken into account.

From the results above, two options remain as attractive investments, scenario 5 and 6 using the above criteria and assumptions.

6.5 Sensitivity Analysis

The sensitivity analysis of both the PSC models and the PPP reference models were conducted. The sensitivity analysis was done as per the following assumed areas:

- Demand

- Lending Rates
- Debt/ Equity
- Inflation
- Tariff annual increase

Due to the fact that the demand sensitivity is tested through the proposed seven scenarios, the remaining items above were only assessed on sensitivity on the NPV and IRR for scenario 6.

6.5.1.1 Demand Analysis:

The scenarios indicated the sensitivity regarding the demand. The demand of the seven scenarios differs as per Table 6-52.

Table 6-52: Demand Sensitivity

Scenario	Description	Volumes/ day	% difference
Base	Existing Eikestad Volumes	1169	61%
1	Illegal surveyed parking + Base	1241	65%
2	Scenario 1 + Church Street Pedestrianization	1497	78%
3	Overflow + Scenario 2	1683	88%
4	Scenario 3 + 2,57% growth 3 years	1784	93%
5	Scenario 3 + 2,57% growth till 2028	1912	99%
6	Scenario 3 + Night Demand and Monthly estimates	1923	100%

The results of the demand sensitivity indicated that over a 20-year period the PSC Risk retained model were still viable investments for scenarios 4 to 6 with IRRs ranging from between 10.13% (slightly above the discount rate) for scenario 4 to 11.36% for scenario 6. NPVs for these scenarios varies between R1.4m to R14.9m, which is equal to a R13.5m difference.

Over a 25-year period, scenarios 3 to 6 show viability from an IRR and an NPV perspective. Over this project period the IRRs of the PSC risk retained model varies between 11.72%for scenario 3 to 12.09% for scenario 6. Similarly the NPVs vary from R8.8m for scenario 3 to R25.9m for scenario 6. Over a 25-year period scenario 3 also becomes viable. The NPV variance over this period amounts to R17m.

The effect of the differences in demand is significant over the lifetime of the project.

The results of the PPP risk adjusted model was more sensitive as the attractive criteria is more stringent. The models that yielded a possible investment was based on scenarios 4, 5 and 6. This IRR and NPV differences, over 20 years were between 8.8% and 20.8% and R13m and R18m respectively. Over 25 years the differences were between 6.6% and 13.3% for IRR and R14m and R18.2m for the NPV.

The difference in demand is 11% per daily average. Although the range in NPV for the analysis is high, the daily averages is a yearly difference of 122 472 parked vehicles. As such the robustness of the scenarios tested and the sensitivity of the financial model for including the risk retained models is stable and able to endure a significant reduction in users and still ensure returns.

6.5.1.2 Lending Rates

The lending rates was assessed in only the PPP risk retained scenario 6 mode as this option is the most optimal scenario where night and monthly parking's were included. The results from Table 6-53 indicate a significant difference in the sensitivity as the rate increases per 1%. All other assumptions remain constant only the lending rate is altered. The IRR is less sensitive in comparison to the NPV. Nevertheless, the impact of the lending rate does significantly affect the feasibility of the investment.

Table 6-53: Sensitivity of the Lending Rate on PPP risk retained model scenario 6

Year	Lending rate	NPV (Rand)	IRR (%)	Difference IRR	Difference NPV
20 years	14.75	-3 809 878.28	8.8	3.54	R10 519 342.11
25 years	14.75	5 635 637.53	11.41	2.72	R10 539 762.29
20 years	13.75	1 577 040.64	10.61	1.73	R5 132 423.19
25 years	13.75	11 032 862.31	12.77	1.36	R5 142 537.51
20 years	12.75	6 709 463.83	12.34	0	R0.00
25 years	12.75	16 175 399.82	14.13	0	R0.00
20 years	11.75	11 554 640.96	13.97	1.63	R4 845 177.13
25 years	11.75	21 030 480.87	15.45	1.32	R4 855 081.05
20 years	10.75	16 261 211.31	15.55	3.21	R9 551 747.48
25 years	10.75	26 583 012.70	17.01	2.88	R10 407 612.88
20 years	9.75	20 846 402.17	17.08	4.74	R14 136 938.34
25 years	9.75	30 341 340.90	18.09	3.96	R14 165 941.08
20 years	8.75	25 300 597.41	18.56	6.22	R18 591 133.58
25 years	8.75	34 804 688.54	19.4	5.27	R18 629 288.72
20 years	7.75	29 614 300.66	19.4	7.06	R22 904 836.83
25 years	7.75	39 127 261.42	20.69	6.56	R22 951 861.60

6.5.1.3 Debt/Equity

The debt/ equity was assessed in only the PPP risk retained scenario 6 model. The results from Table 6-54 indicate the sensitivity as the debt/ equity for various levels, from 40/60 to 95/5. The impact of Debt/ Equity has a significant effect on the IRR the higher the debt and then decreases in sensitivity on the IRR as the equity increases. In contrast, the effect of the increased equity has a more profound effect on the NPV, the higher the equity becomes. However, the sensitivity of the increased equity is less significant than the demand and lending rate effects.

Table 6-54: Sensitivity of Debt/ Equity on PPP risk retained model scenario 6

Year	Debt/Equity	NPV	IRR	Difference IRR	Difference NPV
20 years	95/5	9 010 419.97	14.57	2.23	R2 300 956.14
25 years	95/5	18 457 179.11	16.53	2.4	R2 281 779.29
20 years	90/10	7 890 513.33	13.24	0.9	R1 181 049.50

25 years	90/10	17 346 860.89	15.11	0.98	R1 171 461.07
20 years	85/15	6 709 463.83	12.34	0	R0.00
25 years	85/15	16 175 399.82	14.13	0	R0.00
20 years	80/20	5 377 041.77	11.65	0.69	R1 332 422.06
25 years	80/20	14 852 566.12	13.36	0.77	R1 322 833.70
20 years	70/30	2 658 556.25	10.71	1.63	R4 050 907.58
25 years	70/30	12 153 257.51	12.27	1.86	R4 022 142.31
20 years	60/40	-59 929.20	10.09	2.25	R6 769 393.03
25 years	60/40	9 453 948.89	11.53	2.6	R6 721 450.93
20 years	50/50	-2 778 414.66	9.65	2.69	R9 487 878.49
25 years	50/50	6 754 640.28	10.99	3.14	R9 420 759.54
20 years	40/60	-5 496 900.12	9.33	3.01	R12 206 363.95
25 years	40/60	4 055 331.66	10.57	3.56	R12 120 068.16

6.5.1.4 Inflation

The inflation rate was assessed in only the PPP risk adjusted scenario 6 model. The results from Table 6-55 indicate the sensitivity as the inflation rate is increased in 0.5% intervals. The impact of inflation has a very low effect on the overall IRR and NPV values.

Table 6-55: Sensitivity of Inflation on PPP risk retained model scenario 6

Year	Inflation	NPV	IRR	Difference IRR	Difference NPV
20 years	4%	7 479 900.87	12.59	0.25	R770 437.04
25 years	4%	17 052 643.84	14.34	0.21	R877 244.02
20 years	4.50%	7 098 463.96	12.47	0.13	R389 000.13
25 years	4.50%	16 618 416.10	14.23	0.1	R443 016.28
20 years	5%	6 709 463.83	12.34	0	R0.00
25 years	5%	16 175 399.82	14.13	0	R0.00
20 years	5.50%	6 312 780.34	12.21	0.13	R396 683.49
25 years	5.50%	15 723 442.01	14.02	0.11	R451 957.81
20 years	6%	5 908 291.52	12.08	0.26	R801 172.31
25 years	6%	15 262 386.53	13.9	0.23	R913 013.29

6.5.1.5 Annual Tariff Increase

The annual tariff increase was assessed in both the PSC Risk Retained and PPP Risk Adjusted scenario 6 model. The results from Table 6-56 indicate the sensitivity as the annual tariff rate is increased and also shows the effect if lower increases than the modelled increase of 8% every second year is implemented. The impact of this increase at even low percentage increases has a very high effect on the overall IRR and NPV values. The table clearly shows the danger to the profitability of the project if lower than inflation rate increases are implemented.

Table 6-56: Sensitivity of Annual tariff increase on PPP risk adjusted model scenario 6

Year	Revenue Growth	NPV (Rand)	IRR	Difference IRR	Difference NPV
20 years	9	12 507 526.15	14.03	1.69	R5 798 062.32

25 years	9	23 190 570.39	15.57	1.44	R7 015 170.57
20 years	8	6 709 463.83	12.34	0	R0.00
25 years	8	16 175 399.82	14.13	0	R0.00
20 years	7%	1 721 590.63	10.71	1.63	R4 987 873.20
25 years	7%	10 084 823.22	12.77	1.36	R6 090 576.60
20 years	6%	-3 232 854.59	8.82	3.52	R9 942 318.42
25 years	6%	4 111 359.35	11.24	2.89	R12 064 040.47
20 years	5%	-7 338 367.44	6.96	5.38	R14 047 831.27
25 years	5%	-902 644.79	9.8	4.33	R17 078 044.61
20 years	4	-11 867 953.97	4.58	7.76	R18 577 417.80
25 years	4	-6 164 775.38	8.1	6.03	R22 340 175.20

The effect on the IRR in the PSC model is less significant, but as with the PPP model, the effect on the NPV is significant.

Table 6-57: Sensitivity of the annual tariff increases on the PSC Risk Adjusted Model, scenario 6

Year	Revenue Growth	NPV (Rand)	IRR(%)	Difference IRR (%)	Difference NPV (%)
20 years	9	23 012 900.36	12.03	0.67	R8 096 579.28
25 years	9	35 682 871.26	12.77	0.68	R9 804 082.44
20 years	8	14 916 321.08	11.36	0	R0.00
25 years	8	25 878 788.82	12.09	0	R0.00
20 years	7%	7 939 080.87	10.75	0.61	R6 977 240.21
25 years	7%	17 354 546.09	11.46	0.63	R8 524 242.73
20 years	6.00%	1 032 887.30	10.1	1.26	R13 883 433.78
25 years	6.00%	9 018 752.84	10.79	1.3	R16 860 035.98
20 years	5%	-4 653 713.65	9.53	1.83	R19 570 034.73
25 years	5%	2 057 613.06	10.19	1.9	R23 821 175.76
20 years	4	-10 823 466.73	8.88	2.48	R25 739 787.81
25 years	4	-5 139 839.35	9.51	2.58	R31 018 628.17

6.5.1.6 Summary

Based on the above analysis, the risk adjusted models are most impacted by demand, revenue increase and the lending rates. The debt/ equity and inflation have a lower effect on the sensitivity of the models. The models have been developed with an average lending rate, low tariff increase and an achievable and conservative demand. The debt/ equity is in order with existing PPP projects in South Africa and can be changed by 10 to 20% without the model becoming completely unattractive. The inflation rate was taken as a realistic value and has little effect on project. Based on the above, the models have been developed conservatively, have flexibility and are still attractive as a possible investment opportunity.

6.6 Affordability Checks

6.6.1 Institutional Budget Availability

As discussed in chapter 6.2, the availability of funds form the Stellenbosch Municipality is limited with regards to other project commitments and available equity for capital projects. The recently updated CITP shows that the Municipality is not providing any budget for the Eikestad Mall. It can therefore be deduced that a PPP option is really the only way forward.

Though, the project becomes self-sustainable in the operational phase and as such will cover its own operational and maintenance cost post construction. Nevertheless, if the project is a proposed BOOT PPP user pays type project, the municipality would need to, through negotiations, only fund the retained risk section.

6.6.2 Budget Vs Risk adjusted PPP Reference Model

In assessing the retained risk section, the municipality would need to keep available funds of approximately R1,5mil to R2mill per year NPV. At a worst-case scenario, the annual demand difference between scenario 3 and 6 is +-R2 to 3mil per annuum and is thus the maximum the risk amount would arise to. It must also be understood that although scenario 3 for the PPP risk adjusted model did not return favourable investment indicators, it did not make a financial loss. Nevertheless, the maximum demand difference financial risk to the project per year is still affordable within the available budget. Hence the project as a possible PPP BOOT project could be affordable and feasible for the municipality based on the analysis above.

6.7 Initial Value for Money

The initial value for money test is done by comparing the PSC risk retained models and the PPP risk adjusted models for scenario 6. The process of establishing the value for money test is as follows:

- Check the models.
- Establish the initial indication for the value for money test.
- Assess the BEE value for money.

6.7.1 The Models

The models were checked as follows:

- Do the models reflect the requirements of the output specifications? The models have assessed the NPV, IRR, DSCR and LLCR and the ARR.
- Has all capital, maintenance, operational etc cost been included in both models? All models have included maintenance, operational (direct and indirect) and capital cost (design fee, site supervision and construction costs)

- Have all BEE costs been including? The BEE shareholder, Socio-Economic and capital costs have been included in the respective models.
- Have the risks been summarised and the financial consequences been included? The risk matrix, impacts, likelihood, financial impacts, transfer and retained assumptions have been included and assigned to the relevant models.
- Has a sensitivity analysis been done? A sensitivity analysis has been conducted and assessed for the applicable scenarios with regards to demand variations, lending rates, inflation rates, revenue adjustments and different debt/equity ratios.
- Are all assumptions used reasonable and appropriate? The assumptions made have been tested in the financial sensitivity model and are considered reasonable and appropriate.

6.7.2 Initial Value for Money Test

The initial value for money test was conducted for three criteria, namely a Financial and Technical capacity, Cost and BEE targets and finally based on the Net present values. The models have the exact same revenue incomes, discount rate and inflation, as per scenario 6 of the 20-year forecast. The 20-year analysis was selected as this is the minimum concession period. The Financial and Technical section indicate that the private sector would be able to secure funds, has industry experience is managing this type of project and has the technical capacity to operate and maintain such a facility. The public sector could fund the project, however this would detach funding from other capital projects that may be needed. In addition, the public sector does not have the capacity to manage and operate such a facility. The cost analysis indicated that the NPV of the private sector and the public sector is similar excluding VAT and Tax, however, the private sector has a factor of 5 in its returns to BEE partners. In addition, due to Tax and VAT, the private sector returns an additional NPV of R66m to the public sector over 20 years and R122m over 25 years.

The NPV risk analysis indicated that the private sector could manage the risks far more efficiently and has the ability to reduce the total risk cost to the public sector by almost 60% in transferred risks as per the NPV value of the project. This is significant risk transfer.

In assessing the risk adjusted NPV total returns, the NPV of the private sector before Tax is greater than the risk adjusted public sector NPV. This is as a result of better risk management expected for the private sector. In addition, the facility will be transferred at no and or nominal consideration (as negotiated with private party) back to the municipality with a viable useful asset with an agreed to remaining life required.

Based on the analysis of Table 6-58, it is apparent that the private sector gives an initial value for money on the:

- Technical Abilities;
- Risk Transfer abilities;
- Financial Returns and affordability; and

- BEE target spend and upskill.

Table 6-58: Initial Value for Money check

Value for Money Comparison			
		Public Sector Comparator	PPP Reference
Financial and Technical Capacity	Financial	Difficult to secure funds. Current CITP makes no provision for own capital or DCs related to the Eikestad parking facility in budget	Can secure funds through private funding
	Technical	Lack of knowledge, low capacity	Has industry experience and capacity
	Commercial	Lack of capacity, vacancies in the Municipality add to this issue.	Based on commercial viability
	Socio-economic		1% of profits as target
	Institutional impact	Large on financial and technical	Core business
Costs	Inflation	5%	5%
	Tax	0	27% corporate tax and 20% dividend tax.
	VAT	0	15%
	Initial Budget Required	R118 349 096.07	R17 752 364.41
	Funding Options	Grant and or Equitable Share	Debt/ equity of 85/15 can be 80/20
	Government Contributions	100%	0%
	Net Present Cost Excluding BEE cost	R146 655 299.97	R153 320 342.98
	Net Present Cost After VAT and Tax	R146 655 299.97	R166 200 546.70
	BEE target spend excluding dividend share (NPV)	R33 592 087.48	R41 054 794.35
	BEE target equity returns after Tax (NPV)	R0,00	R5 710 558.93
	Risk Adjustment Cost (NPV)	R39 320 501.04	R4 236 690.32

	Risk Retained Cost (NPV)	R14 493 741.82	R4 236 690.32
NPV	Risk Adjustment net present value before Tax and VAT	-9 796 662.63	R18 800 638.74
	Risk adjustment net present value After Tax	-9 796 662.63	R7 012 585.21

7 Economic Value Assessment

In the previous chapter, a detailed financial analysis has been compiled based on the revenue that the parking garage will generate over two programming periods, namely 20 and 25 years as well as the capital costs of the parking facility and the operating and maintenance costs thereof.

The objective of this section of the study is to shed light on the **broader economic advantages** that the new parking facility will have on the community of Stellenbosch and its neighbourhoods. The study is to a large extent based on the Financial Analysis conducted in the preceding chapter. The Economic Analysis comprises two main components, namely, a Costs Benefit Analysis (CBA) and a Macroeconomic Impact Analysis (MEIAM).

It is important to note that CBA and MEIAM are two different assessments. The CBA, in contrast to the Financial Analysis, considers the valuation of both money and non-money benefits including social, environmental, and quality of life impacts, where the cashflow analysis focuses only on the monetary benefits. The CBA uses shadow prices to portray the scarcity of the resource and effects adjustments where the market prices are subsidised for social reasons. The CBA is done in constant prices and a real discount rate of 10% is used.

The Economic Impact Analysis focuses specifically on measurable changes in the flow of money (income) earned by labour and businesses, including both spending and productivity effects. It calculates the broader impacts in terms of Gross Domestic Product (GDP), Employment, Household Income, and the impact on the Fiscus.

7.1 Methodology

7.1.1 Cost Benefit Analysis (CBA)

A CBA is considered to be the most acceptable tool for ascertaining the economic viability of public and public/private sector infrastructure development projects. The CBA method provides a logical framework for evaluating developmental projects; thus, serving as an aid in the project approval decision-making process. The core principle of CBA can be described as the comparison of costs and benefits. The only factor that complicates this technique is the discounting of future costs and benefits to present values. CBA differs from cash-flow analysis in that cash-flow looks at the availability of cash to repay a specific loan or service an investment, whereas CBA looks at the lifespan of the project.

The following standard CBA criteria were used in the evaluation the Eikestad parking facility:

- Net Present Value (NPV).
- Internal Rate of Return (IRR); and
- Benefit Cost Ratio (BCR).

The detailed definition of these standard evaluation criteria is as follows:

Net Present Value

According to this method, the difference between the benefits and costs (the net benefit) in a specified future year is discounted to the present using a discount rate. The discounted sum of all these net benefits over the project's economic life is defined as the NPV.

The criterion for the acceptance of a project is that the NPV must be positive (i.e., greater than zero). In other words, funds will be voted for a project only if the analysis produces a positive net present value. Where a choice must be made between mutually exclusive projects, the project with the highest net present value will be chosen since it maximises the net benefit to the community.

Internal Rate of Return

The IRR is the discount rate at which the present values of cost and benefits are equal.

Only projects with an IRR higher than the discount rate, which forms a lower limit, will be considered for funding. IRR must be handled carefully because there are situations in which the mathematical solution of the above equation is not unique. This happens when the stream of net benefits over the assessment period changes its sign (positive or negative) more than once.

Benefit Cost Ratio

The discounted BCR is the ratio of the present value of the benefits relative to the present value of the costs.

A project is potentially worthwhile if the BCR is greater than 1. This means that the PV of benefits exceeds the PV of costs. Under this decision rule, if alternatives are mutually exclusive, the alternative with the highest BCR would be chosen.

7.1.2 Macroeconomic Impact Assessment

Partial general equilibrium analysis is used to quantify the macroeconomic impact of the Eikestad parking facility in Stellenbosch. The Social Accounting Matrix (SAM) for the Western Cape Province provides the basis for this analysis.

The SAM is a comprehensive, economy-wide database that contains information about the flow of resources that takes place between the different economic agents that exist within an economy (i.e., business enterprises, households, government, etc.) during a given period – usually one calendar year. A SAM is thus a matrix that incorporates the interrelationships that exist between the various economic agents in the economy, including the distribution of income and expenditure amongst household groups.

7.1.2.1 Basis for calculating the benefits of the Stellenbosch parking garage.

In general, the basis for calculating the benefits of a Transport Project entails the following.

- Vehicle operational costs.
- Time costs; and
- Accident costs.

The users of the Eikestad parking facility will benefit in terms of the reduction of vehicle operational costs and time costs. When there is a shortage of parking, drivers must often park some way from their actual destination, and this extra walk time can be viewed as a cost.

The benefit also emanates from the reduction of swerving and searching for parking bays. Due to the availability of the new parking garage the users can drive straight to the new parking garage.

As far as the savings of accidents and the costs thereof is concerned, the new parking garage will have only a minuscule impact and can therefore regarded as negligible.

7.2 Assumptions

7.2.1 Benefits

The benefits of the Eikestad parking facility comprise of reduction of walking distances from the eventual parking location to the destination and the time and operational cost reduction due to less swerving and searching for an available parking bay.

The assumptions postulated and the calculation of the saving of longer distance walk for Base Year 2026 are provided in Table 7-1 and Table 7-2 below. Table 7-3 and Table 7-4 provide the calculations for the benefits of less swerving and searching for parking bays. The assumptions are presented in relation to both weekdays and Saturdays the calculations and assumptions are self – explanatory in the respective tables.

Table 7-1: Value of time of users of the Eikestad parking facility, 2026 base year, weekdays

	Row		Formula
Number of parking users per day [Base Year 2026]	1	**1367**	
Walking speed of Parking Users (Kilometre per Hour)	2	4	
Radius of Stellensbosch's CBD has been used as the average walking distance [Kilometres]	3	0.4	
Walking distance per day equals to the twice the radius [Kilometres]	4	0.80	
Hours walked per person per day [Hours]	5	0.2	
Total Walking Hours Spend per Day by Parking Users [Hours]	6	**273**	**[ROW 6 = ROW1* ROW5]**
Time Value Split among Parking Users [Source based on surveys]			
Working Hour (Percentage)	7	**35%**	
Recreational Hour (Percentage)	8	**65%**	
Value of Working Time : (Rand per hour) [*Source CBA Manual*]	9	**R171.4**	
Value of Recreational Time : (Rand per hour) [*Source CBA Manual*]	10	**R17.7**	
Total Rand Value of Working Time Gained	11	**R16 372**	**ROW 11 = (ROW 1 * ROW7 * ROW9)**
Total Rand Value of Recreational Time Gained	12	**R3 143**	**ROW 12 = (ROW 1 * ROW 8 * ROW 10)**
Per Day : Total Value Gained [Rand]	13	**R19 515**	**ROW 13 = (ROW 11 + ROW 12)**
Days per Year	14	**267**	
Total Value Gained [Rand Million]	15	**R5.21**	**ROW 14 = (ROW 13 * 267 Days)/1000 000**

Table 7-2: Value of time of users of the Eikestad parking facility, 2026 base year, weekdays Saturdays

-	Row		Formula
Number of parking users per day [Base Year 2026]	**1**	1311	
Walking speed of Parking Users (Kilometre per Hour)	**2**	4	
Radius of Stellenbosch's CBD has been used as the average walking distance [Kilometres]	**3**	0.4	
Walking distance per day equals to the twice the radius [Kilometres]	**4**	0.80	
Hours walked per person per day [Hours]	**5**	0.2	
Total Walking Hours Spend per Day by Parking Users [Hours]	**6**	**262**	**[ROW 6 = ROW1* ROW5]**
Time Value Split among Parking Users [Source based on surveys]			
Working Hour (Percentage)	**7**	**35%**	
Recreational Hour (Percentage)	**8**	**65%**	
Value of Working Time : (Rand per hour) [*Source CBA Manual*]	**9**	**R171.4**	
Value of Recreational Time : (Rand per hour) [*Source CBA Manual*]	**10**	**R17.7**	
Total Rand Value of Working Time Gained	**11**	**R15 707**	**ROW 11 = (ROW 1 * ROW7 * ROW9)**
Total Rand Value of Recreational Time Gained	**12**	**R3 015**	**ROW 12 = (ROW 1 * ROW 8 * ROW 10)**
Per Day : Total Value Gained [Rand]	**13**	**R18 722**	**ROW 13 = (ROW 11 + ROW 12)**
Days per Year	**14**	**49**	
Total Value Gained [Rand Million]	**15**	**R0.92**	**ROW 14 = (ROW 13 * 49 Days)/1000 000**

Table 7-3: Value of time and operational costs saving from less swerving and searching, 2026 base year, weekdays

A: Calculation of Total value of Time Spend For Swerving	ROW		Formula
-	-		
Number of parking users per day [Base Year 2026]	1	1822	
Percentage that will swerve if there is no parking garage [Percentage]	2	70%	
Number of parking users per day that will swerve before parking outside CBD [Base Year 2026]	3	1275	ROW 3 = (ROW 1 * ROW 2)
Number Streets involved	4	6.00	
Average length of street involved [Kilometres]	5	0.80	
Number of Swerving Attempts per car	6	1.00	
Distance of time swerved per car for one attempt [Kilometres]	7	4.80	ROW 7 = (ROW 4 * ROW 5 * ROW 6)
Distance Swerve per day [Kilometres]	8	6122	ROW 8 = (ROW 3 * ROW 7)
Swerved Speed [Kilometre per Hour]	9	20.00	
Time Spent per Kilometre when Swerving [Minutes]	10	3.00	ROW 9= (60 / ROW 9)
Time spent per Swerving [Minutes]	11	14.40	ROW 11 = (ROW 8 * ROW 10)
Time spent per person Swerving	12	0.24	ROW 12 =(ROW 11 / 60)
Time Value Split among Parking Users			
Working Hour (Percentage)	13	35%	
Recreational Hour (Percentage)	14	65%	
Value of Working Time : (Rand per hour) [*Source CBA Manual*]	15	R171.4	
Value of Recreational Time : (Rand per hour) [*Source CBA Manual*]	16	R17.7	
Total Value of Working Time Spend Due to Swerve	17	R18 358	ROW 17 = (ROW 3 * ROW 12 * ROW 13 *ROW 15)
Total Value of Recreational Time Spend Due to Swerve	18	R3 518	ROW 18 = (ROW 3 * ROW 12 * ROW 14 *ROW 16)
Per Day : Value of Time Lost [Rand Values]	19	R21 876	ROW 19 = (ROW 17 + ROW 18)
Weekdays per Annum	20	267	
Per Year : Value of Time Lost [Rand Millions]	21	R5.84	ROW 21 = (ROW 19 * ROW 20)/1000000
B: Calculation of Vehicle Operation Costs Due to Swerving & Searching			
Distance Swerve per day [Kilometres]	22	6122	ROW 22 = ROW 8
Distance Swerve per Year [Kilometres]	23	1799844	ROW 23 =(ROW 22 * 24,5 Days * 12 Number of Months)
Vehicle Operational Costs per Kilometre (Source : Vehicle Operating Costs from the Automotive Association A), [R/Kilometre]	24	R4.64	
Total Vehicle Operational Costs Per Annum Due To Swerving [R Million]	25	R8.35	ROW 25 = (ROW 23 * ROW 24)
C. Total Time Lost and Vehicle Operational Costs per annum Due To Swerving ,[R Million]	26	R14.19	ROW 26 = ROW 21 + ROW 25)

Note : A Manual For Cost Benefit Analysis with specific reference to Water Resource Development , (Updated , Fourth Version , Report No TT 894 / 22, Page 83 , Table 7.11, Figures Applicable for Western Cape)

Table 7-4: Value of time and operational costs saving from less swerving and searching, 2026 base year, Saturdays

A: Calculation of Total value of Time Spend For Swerving	ROW		Formula
-	-		
Number of parking users per day [Base Year 2026]	1	1748	
Percentage that will swerve if there is no parking garage [Percentage]	2	70%	
Number of parking users per day that will swerve before parking outside CBD [Base Year 2026]	3	1224	ROW 3 = (ROW 1 * ROW 2)
Number Streets involved	4	6.00	
Average length of street involved [Kilometres]	5	0.80	
Number of Swerving Attempts per car	6	1.00	
Distance of time swerved per car for one attempt [Kilometres]	7	4.80	ROW 7 = (ROW 4 * ROW 5 * ROW 6)
Distance Swerve per day [Kilometres]	8	5873	ROW 8 = (ROW 3 * ROW 7)
Swerved Speed [Kilometre per Hour]	9	20.00	
Time Spent per Kilometre when Swerving [Minutes]	10	3.00	ROW 9= (60 / ROW 9)
Time spent per Swerving [Minutes]	11	14.40	ROW 11 = (ROW 8 * ROW 10)
Time spent per person Swerving	12	0.24	ROW 12 =(ROW 11 / 60)
Time Value Split among Parking Users			
Working Hour (Percentage)	13	35%	
Recreational Hour (Percentage)	14	65%	
Value of Working Time : (Rand per hour) [*Source CBA Manual*]	15	R171.4	
Value of Recreational Time : (Rand per hour) [*Source CBA Manual*]	16	R17.7	
Total Value of Working Time Spend Due to Swerve	17	R17 613	ROW 17 = (ROW 3 * ROW 12 * ROW 13 *ROW 15)
Total Value of Recreational Time Spend Due to Swerve	18	R3 375	ROW 18 = (ROW 3 * ROW 12 * ROW 14 *ROW 16)
Per Day : Value of Time Lost [Rand Values]	19	R20 988	ROW 19 = (ROW 17 + ROW 18)
Weekdays per Annum	20	49	
Per Year : Value of Time Lost [Rand Millions]	21	R1.03	ROW 21 = (ROW 19 * ROW 20)/1000000
B: Calculation of Vehicle Operation Costs Due to Swerving & Searching			
Distance Swerve per day [Kilometres]	22	5873	ROW 22 = ROW 8
Distance Swerve per Year [Kilometres]	23	1726744	ROW 23 =(ROW 22 * 24,5 Days * 12 Number of Months)
Vehicle Operational Costs per Kilometre (Source : Vehicle Operating Costs from the Automotive Association A), [R/Kilometre]	24	R4.64	
Total Vehicle Operational Costs Per Annum Due To Swerving [R Million]	25	R8.01	ROW 25 = (ROW 23 * ROW 24)
C. Total Time Lost and Vehicle Operational Costs per annum Due To Swerving ,[R Million]	26	R9.04	ROW 26 = ROW 21 + ROW 25)

Note : A Manual For Cost Benefit Analysis with specific reference to Water Resource Development , (Updated , Fourth Version , Report No TT 894 / 22, Page 83 , Table 7.11, Figures Applicable for Western Cape)

7.2.2 Capital, maintenance and operational costs

For purposes of performing a Cost Benefit Analysis, it is also important to consider the capital, maintenance, and operational costs of the Parking Garage. Information flowing from the Financial Assessment (Chapter 6), forms the basis for performing the Economic CBA for this project. It is important to note that shadow prices were applied to convert the capital, maintenance, and operational costs of the financial analysis to come up with the economic analysis. The Updated Fourth Edition CBA Manual provided the shadow prices used in the Economic CBA.

It is worth highlighting that a residual value for the capital / investment items was taken into account in the final year of the project programming period. Capital consists of various capital assests with different life cycles. The following table is provided to assist the researcher in considering the replacement of capital goods during the lifetime of the project, as well as to estimate the residual value.

Table 4.1: Replacement of Capital Goods

Type of Asset	Sector	Lifetime Years
Residential buildings **Non-residential buildings** **Construction works.**	Agriculture Mining General government* Other	50 50 80 30 80
Transport equipment **Machinery and other equipment**	Manufacturing Mining and electricity, gas, and water Other	50 8 8

Source : Note : A Manual For Cost Benefit Analysis with specific reference to Water Resource Development , (Updated , Fourth Version , Report No TT 894 / 22, Page 83 , Table 7.11, Figures Applicable for Western Cape)

7.3 Results of the CBA and Macroeconomic Impact Assessment

7.3.1 Results of the CBA

The CBA is defined as the net savings in terms of time and vehicle operating costs that the future existence of the Stellenbosch Parking Garage for the users thereof will bring about.

Table 5 below represents consolidated results of the Cost Benefit Analysis performed for the Stellenbosch Parking Garage project regarding the Final Scenario of the Financial Assessment in Chapter 6, Scenario 6. The results depict the marginal benefits (difference between the With and Without the Parking Garage for the users of the parking facility.

Table 7-5: Consolidated CBA results, R millions, 2023 Constant Prices, Scenario 6

Indicator				Year				
				0	5	10	15	25
Rand Millions	Percentage Composition	PV	Total	2023	2027	2032	2040	2050
-		10%	-					
A: Benefits								
Less Distance Walk : Value of Time Savings	**20.9%**	R 88.9	R 301.7		R 6.9	R 8.5	R 13.3	R 16.6
Less Swerving : Value of Time Savings	**23.4%**	R 99.6	R 338.2		R 7.7	R 9.5	R 14.9	R 18.6
Less Swerving : Vehicle Operating Costs	**55.7%**	R 237.3	R 805.7		R 18.3	R 22.7	R 35.5	R 44.4
Total Benefits pa	**100.0%**	R 425.7	R 1 445.7		R 32.8	R 40.7	R 63.6	R 79.6
B. Capital Costs		R 111.5	R 108.7	R 63.9	R 0.0	17.97	17.97	-51.80
C. Maintenance & Operating Costs		R 12.8	R 42.7	R 0.0	R 1.7	1.71	1.71	1.71
Net Present Value (NPV)		R 227.5						

From Table 7-5 it can be deduced that the Present Value (PV) of the total savings that the new parking garage will bring about over a period of 25 years at a discount rate of 10% amounts to R425.7m, which is comprised of:

- Shorter Distance Walk from parking bays before existence of parking garage:
  - Value of Time Savings, R88.9 million, (20.9%)
- Less Swerving in searching for parking:
  - Value of Time Savings, R99.6 million, (23.4%); and
  - Vehicle Operating Costs, R237.3 million, (55.7%)

If the capital, operational and maintenance costs are taken into account, the results of the CBA show the following:

- A Surplus / Net Present Value (NPV) of R227.5 million in 2023 constant prices.
- An Internal Rate of Return (IRR) of 23.7%; and
- A Benefit Cost Ratio (BCR) of 3.42.

The economic CBA also satisfies all CBA evaluation criteria. It yields an NPV which is positive, an IRR which is significantly higher than the real social economic discount rate of 10% , where this **discount rate of 10%** refers to the average cost-of-capital for the project, taking into account the inherent risk factors associated with such capital projects, and a Benefit/Cost Ratio which is greater than 1 which indicates that the benefits exceed costs over the 25-year programming period.

7.3.2 Results of macroeconomic impact

The macroeconomic impact reflects in the first instance the construction effect, maintenance, and operational effect in terms of standard macroeconomic indicators such economic growth and employment. Secondly it also measures the magnitude and nature of the contribution that the savings on time and operational costs contribute to the future economic growth of Stellenbosch.

The actual amount of savings available for investment in Stellenbosch is derived via the following algorithm:

Step 1: The basis of the calculation is the NPV of the benefits of the existence of the new Stellenbosch Parking Garage which amounts to **R425.7 million** (see Table 5).

Step 2: The time and cost Savings is not ultimate savings *per se* since a portion of such savings is going to be used for the consumption of goods and services by the households, this was therefore excluded from saving. The consumption of goods and services by the households' portion was calculated as the ratio between Gross Savings and Gross Operating Surplus with data obtained from the South African Reserve Bank Bulletin. According to this calculation, spending on goods and services by households translates to 61% and savings translate to 39%.

Step 3: Not all the investment based on the savings will be invested in the Stellenbosch. A view was taken that 50% will be invested in Stellenbosch and 50% will be invested in other parts of RSA. The reason why a relatively large portion of the savings will be invested in Stellenbosch is because that owners of the capital that gain by the Parking Garage is in Stellenbosch and they will probably utilise the additional profits to expand their own portfolio of businesses.

The **construction, operation and reinvestment / savings impact** of the time and operational cost savings emanating from the new Parking Garage in Stellenbosch are measured in terms of standard economic and socio-economic performance indicators such as:

- GDP (value added to the national economy).
- Employment creation (creation of new jobs for skilled, semi-skilled, and unskilled workers).
- Capital utilization (procurement of machinery, transport equipment, buildings, and other social and economic infrastructure).
- Income generated for low-income households (incremental income available to low-income households) as a specific measure of poverty alleviation.
- Fiscal Impact (contributions to Government Revenue).
- Balance of Payments; and
- Effectiveness Criteria (the GDP/Capital ratio, and the Labour/Capital ratio), where these indicators of projects are measured and compared to national and sectoral effectiveness indicators to demonstrate how efficiently a particular project employs the factors of production to arrive at a certain output.

Table 7-6: The table below reflects the contribution of the Stellenbosch Parking Garage to the economy of Stellenbosch in relation to the construction, operation, and reinvestment / savings impacts.

Table 7-6: Macroeconomic Impacts on the economy of Stellenbosch [Average per Annum over the programming period {R million, 2023 constant prices]]

	Direct Impact	Indirect Impact	Induced Impact	Construction and Operational Total Impact	Savings/Reinvestment Impact	Total Impact
	1	**2**	**3**	4 (1+2+3+)	5	6 (4+5)
Impact on Gross Domestic Product (GDP) [R million]	53	1	5	59	36	153
Impact on capital formation [R million]	111	4	22	137	113	387
Impact on employment [number of job opportunities]	31	3	17	50	135	235
- Skilled impact on employment [number of job opportunities]	9	1	5	15	34	64

- Semi-skilled impact on employment [number of job opportunities]	17	1	8	26	63	115
- Unskilled impact on employment [number of job opportunities]	5	1	3	9	38	56
Impact on Households [R million]				17	18	34
- Low Income Households [R million]				1	3	5
- Medium Income Households [R million]				3	6	9
- High Income Households [R million]				13	8	21
Fiscal Impact [R million]				10	11	21

The essence of the above results can be summarised as follows:

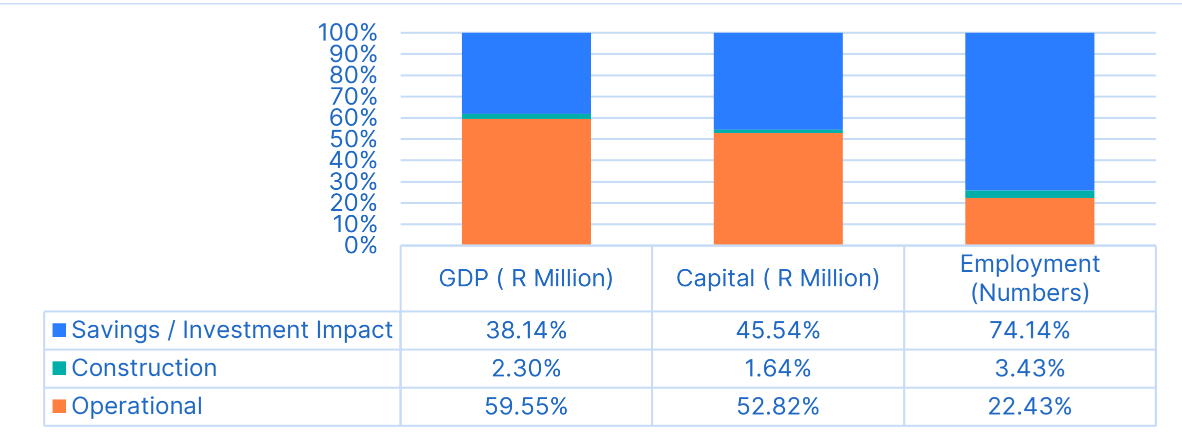
- The average annual impact of the Eikestad parking facility on the GDP of the Stellenbosch will amount to R 153 million per annum in 2023 constant prices. The GDP comprises of remuneration of employees and returns on capital invested (profits amongst others).
- The facility will sustain 235 jobs on average over the programming period, which will impact positively on the Stellenbosch economy and the community.
- The total impact on household income amounts to R34 million, of which 14.7% is destined for lower-income households. As such, a percentage of the total income generated by the parking garage will benefit the poor communities in the Stellenbosch.
- The annual fiscal impact will amount to approximately R21.26 million per annum through direct and indirect taxes generated by the operation of the Stellenbosch Parking garage.

7.3.3 Construction, Operational and Reinvestment Impact Results

The construction, operational and reinvestment phases of the Project will impact the Stellenbosch economy, where the construction phase is a once-off event that will last a few years, whilst the operational and reinvestment phases have longer-term impacts, stretching over the entire life cycle of the Projects.

In Figure 7-1, the results of the construction, operational and reinvestment phase macroeconomic impacts are presented in terms of the standard economic indicators.

Figure 7-1: Results of the main components (phases) of the project (% of aggregate)

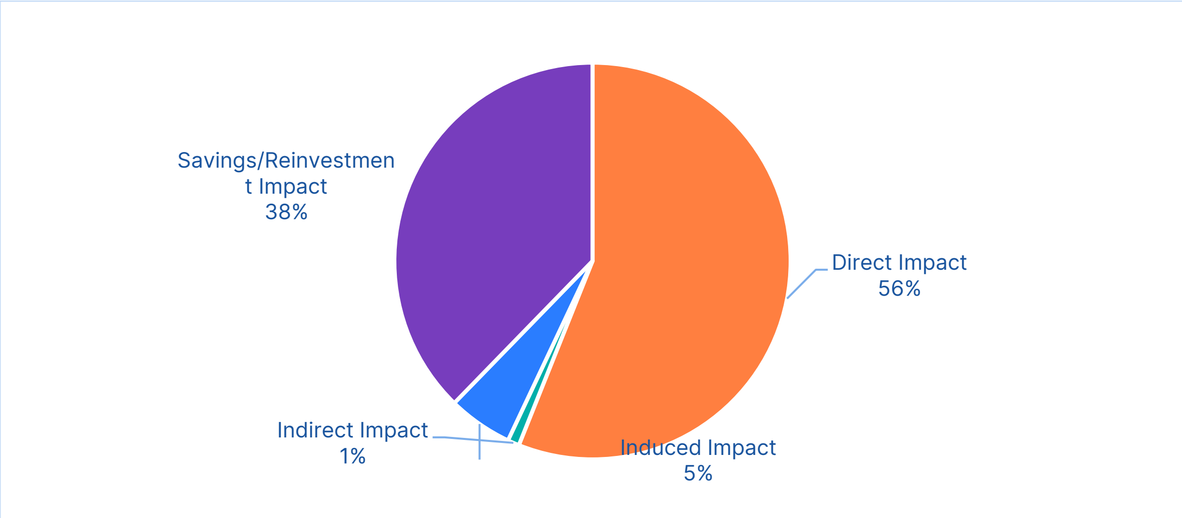


It is evident that significant impacts in terms of GDP, Capital Formation and Employment creation are generated during the operational phase of the Eikestad parking facility. Important to note is that the impacts generated by the savings/re-investment phase are sizeable relative to the construction phase impacts.

7.3.3.1 GDP Impact

Figure 7-2 allocates the total GDP impact to the different types of impacts, namely the savings / reinvestment, direct, indirect, and induced impacts. On average, the direct impact amounts to 56% of the total GDP impact value, the savings /reinvestment impact 38%, the indirect impact to 1% and the induced impact to 5% of the total GDP impact value.

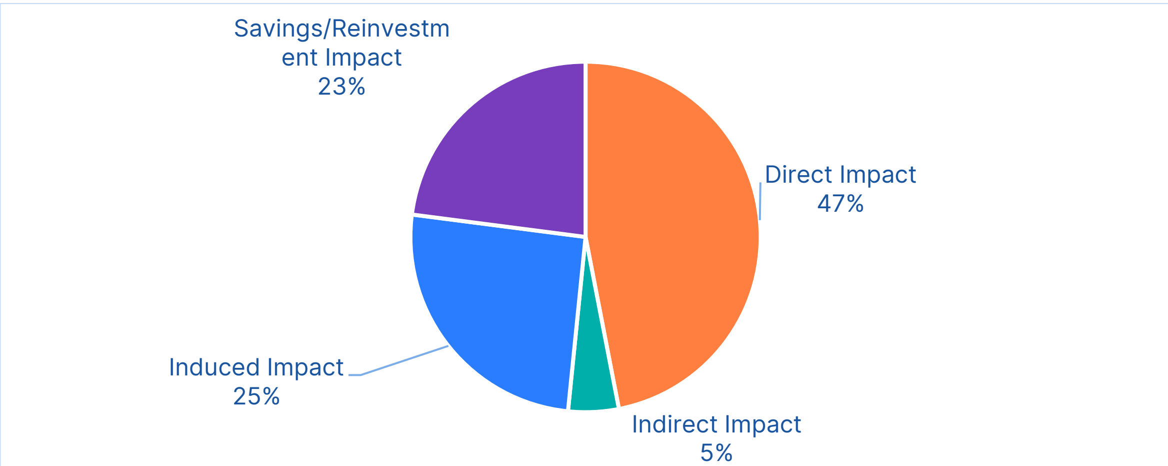
Figure 7-2: Percentage share of GDP impact



7.3.3.2 Employment

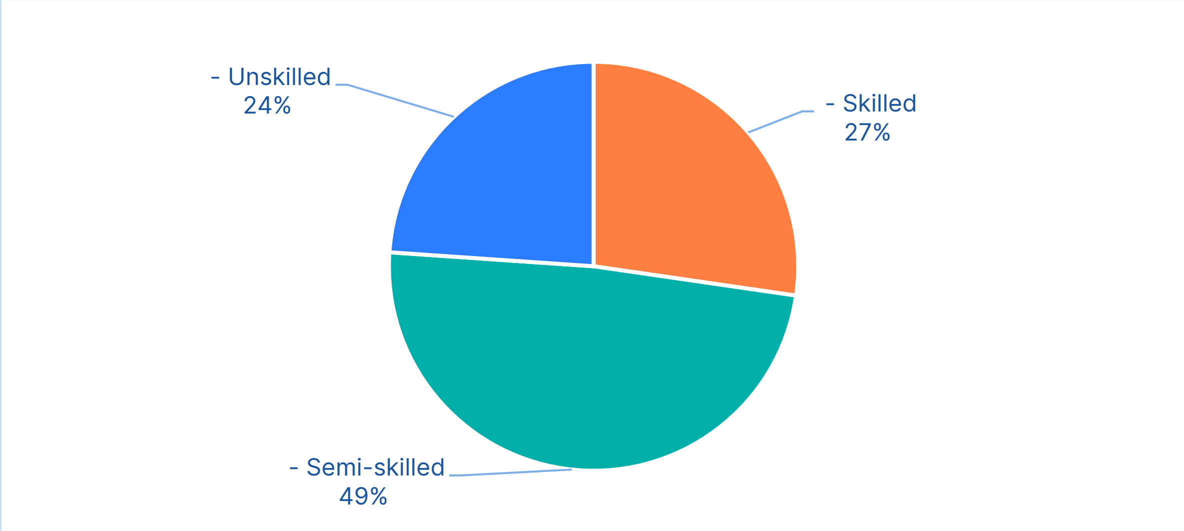
Figure 7-3 allocates the total Employment impact to the different types of impacts, namely the savings / reinvestment, direct, indirect, and induced impacts. On average, the direct impact amounts to 47% of the total employment impact value, the savings /reinvestment impact 23%, the indirect impact to 5% and the induced impact to 25% of the total employment.

Figure 7-3: Percentage share of Employment impact



As far as skill levels are concerned, Figure 7-3 below indicates that most jobs created will be semi - skilled employment at 49%. Together, Unskilled and Semiskilled Employment make up the balance of 51%.

Figure 7-4: Labour impact according to Level of Skills

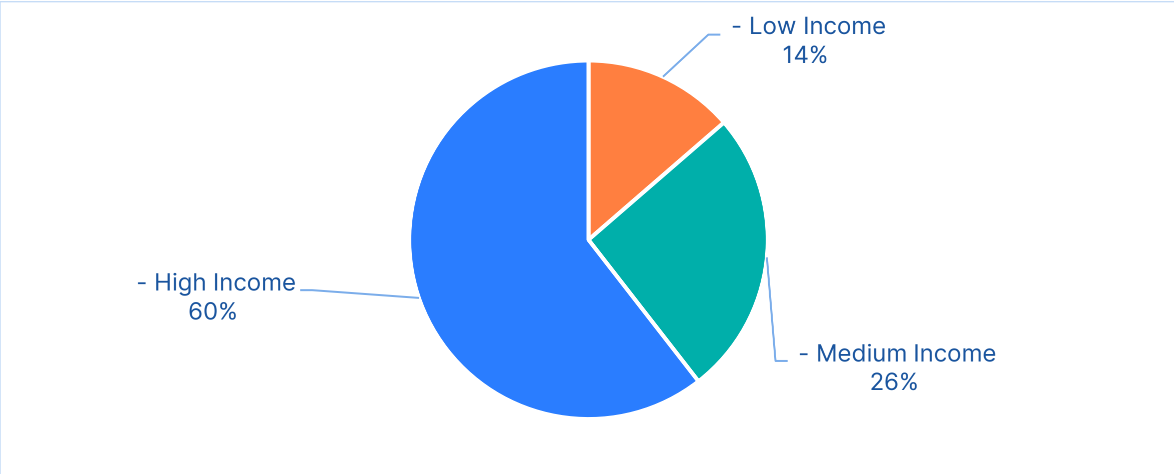


7.3.3.3 Poverty Alleviation/Impact on Household Income

Households, being the basic economic unit within the economy of any region, play a crucial role in the welfare of a region. The figure below indicates 14 % of household income will accrue to low-income households of Stellenbosch region - which is approximately 14% of the total household impact.

This increase in household income will result in an increase in consumer spending, which will stimulate economic growth throughout the region.

Figure 7-5: Household income



7.3.4 Sectoral impact

The Eikestad parking facility will have a linkage effect on other sectors of the economy Stellenbosch. These sectoral impacts are provided in the table below in terms of GDP and employment.

Table 7-7: Sectoral impact

	GDP (R Millions)	GDP %	Employment (Numbers)	Employment %
1.*Agriculture	1,77	1,87%	12,03	6,50%
2.Mining	2,99	3,16%	8,07	4,36%
3.Manufacturing	9,51	10,07%	20,59	11,13%
4.Electricity & water	0,05	0,05%	0,03	0,02%

5.Construction	3,94	4,17%	17,92	9,69%
6.Trade & accommodation	5,42	5,74%	32,26	17,44%
7.Transport & communication	55,15	58,40%	35,81	19,36%
8.Financial & business services	11,89	12,59%	22,24	12,02%
9.Community services	3,73	3,95%	36,03	19,48%
Total	94,44	100,00%	184,99	100,00%

The table above indicates that the Transport and Communication services, followed by Financial and Business Services, will be the most important sectors impacted on GDP. This is followed by manufacturing and trade. This impact is primarily because of additional wages that will be paid out in the parking facility, within the area of Stellenbosch. Regarding the employment impact, the Community Services, Transport and Trade and Accommodation impacts will lead the way with respect to new job creation.

7.3.5 Economic effectiveness criteria

Certain economic effectiveness criteria are listed in Table 7-8 below.

Table 7-8: Economic effectiveness criteria.

	GDP/Capital Ratio	Labour/Capital Ratio	Low/Total Income Households Ratio
Theme Results	**0.40**	**0.61**	**0.14**
<u>Comparative Sectoral Results</u>			
*Agriculture, hunting, forestry, and fishing	0,26	1,38	0,25
Mining and quarrying	0,28	1,04	0,20
Manufacturing	0,39	1,04	0,19
Electricity, gas, and water supply	0,01	0,03	0,17
Construction	0,50	2,43	0,23
Wholesale and retail trade	0,56	2,85	0,20
Transport, storage, and communication	0,23	0,65	0,17
Financial, insurance, real estate, and business services	0,21	0,49	0,16
Community, social and personal services	0,21	1,25	0,17
Total	0,24	0,86	0,18

The effectiveness indicators for capital investment efficiency highlight the capital-intensive nature of the Eikestad parking facility. For each R1 of capital invested in the project, R0.40 additional GDP is generated compared to R0.24 generated from an equivalent capital investment on an average

Stellenbosch project. This implies that the capital employed in the Project is less efficient in generating output as compared to capital invested in the average Stellenbosch project.

Similarly, the labour-to-capital ratio reveals that, for each R1 million of capital investment in the Parking Project, 0.61 new jobs will be created. An equivalent capital investment in the average Stellenbosch project would create 0.86 jobs, which is once again indicative of the capital intensiveness of the Project.

Regarding poverty alleviation (low income relative to Total Household Income ratio) the project is almost on par with an average project in the economy of Stellenbosch. The Low/Total Income Households Ratio of the project is 0.14 compared to 0.18 generated by an average project in the Stellenbosch economy.

7.4 Summary remarks

The objective of this section of the Stellenbosch Parking Garage study was to shed light on the broader economic advantages that the new parking facility will have on the community of Stellenbosch and its neighbourhoods. The Economic Analysis comprise mainly of two portions namely, a Costs benefit Analysis (CBA) and a Macroeconomic Impact Analysis (MEIAM).

The CBA in contrast with the Financial Analysis considers the valuation of both money and non-money benefits including social, environmental, and quality of life impacts, where the cashflow analysis focuses only on the monetary benefits.

The Economic Impact Analysis focuses specifically on measurable changes in the flow of money (income) earned by labour and businesses, including both spending and productivity effects. It calculates the broader impacts in terms of Gross Domestic Product (GDP), Employment, Household Income, and the impact on the Fiscus.

Cost Benefit Analysis

The CBA is defined as the net savings in terms of time and vehicle operating costs that the future existence of the Stellenbosch Parking Garage for the users thereof will bring about. The main results of the CBA are as follows:

- The PV of the total savings amount to R425.7 million and it comprise of:
- Shorter Distance Walk from parking bays before existence of parking garage:
- Value of Time Savings, R88.9 million, (20.9%)
    - Less Swerving in searching for parking:
    - Value of Time Savings, R99.6 million, (23.4%); and
    - Vehicle Operating Costs, R237.3 million, (55.7%)

Taking also into account, the capital, operational and maintenance costs, the Project performs as follows:

- A Surplus / Net Present Value (NPV) of R227.5 million in 2023 constant prices.
- An Internal Rate of Return (IRR) of 23.7%; and
- A Benefit Cost Ratio (BCR) of 3.42.

The economic CBA also satisfies all CBA evaluation criteria. It yields an NPV which is positive, an IRR which is significantly higher than the real social economic discount rate of 10% , where this **discount rate of 10%** refers to the average cost-of-capital for the project, taking into account the inherent risk factors associated with such capital projects, and a Benefit/Cost Ratio which is greater than 1 which indicates that the benefits exceed costs over the 25-year programming period.

Macro - Economic Impact Analysis

The macroeconomic impact reflects in the first instance the construction effect, maintenance, and operational effect in terms of standard macroeconomic indicators such economic growth and employment. Secondly it also measures the magnitude and nature of the contribution that the savings on time and operational costs contribute to the future economic growth of Stellenbosch.

In essence the results of the Macroeconomic Impact Results can be summarised as follows:

- The average annual impact of the Stellenbosch Parking Garage on the GDP of the Stellenbosch will amount to R 153 million per annum in 2023 constant prices. The GDP comprises of remuneration of employees and returns on capital invested (profits amongst others).
- The parking garage will sustain 235 jobs on average over the programming period, which will impact positively on the Stellenbosch economy.
- The total impact on household income amounts to R34 million, of which 14.7% is destined for lower-income households. As such, a percentage of the total income generated by the parking garage will benefit the poor communities in the Stellenbosch.
- The annual fiscal impact will amount to approximately R21.26 million per annum through direct and indirect taxes generated by the operation of the Stellenbosch Parking garage.

Effectiveness Criteria in terms of the Capital Invested

The effectiveness indicators for capital investment efficiency highlight the capital-intensive nature of the Parking Garage. For each R1 of capital invested in the project, R0.40 additional GDP is generated compared to R0.24 generated from an equivalent capital investment on an average Stellenbosch project. This implies that the capital employed in the Project is less efficient in generating output as compared to capital invested in the average Stellenbosch project.

Similarly, the labour-to-capital ratio reveals that, for each R1 million of capital investment in the Parking Project, 0.61 new jobs will be created. An equivalent capital investment in the average Stellenbosch project would create 0.86 jobs, which is once again indicative of the capital intensity of the Project.

Regarding poverty alleviation (low income relative to Total Household Income ratio) the project slightly makes a cut. The Low/Total Income Households Ratio of the project is 0.14 compared to 0.18 generated by an average project in the Stellenbosch economy.

From the CBA analysis it is apparent that the development of the Eikestad parking facility is economically viable. However, from the Macroeconomic Analysis although it exhibits that it contributes to the GDP and creates jobs, it shows that it is a very capital-intensive project.

8 Conclusion and Recommendations

The demand for parking services in the CBD amounted to 300 bays. Based on the needs analysis and based on the solutions analysis, the Eikestad Mall parking area was identified as the most feasible options for parking facilities.

Due to the conditions of the CBD and the nature and parking utilisation demand, the CBD Eikestad parking needs identified a need for a multi-story parking facility. As a result, the feasibility of this facility was assessed for the public sector, as well as a possible PPP project.

The value for money assessment of the Eikestad Parking garage resulted in the project having a feasibility assessment as favourable for a possible PPP BOOT contract. It is apparent that the private sector gives an initial favourable value for money on the following considerations:

- Technical Abilities;
- Risk Transfer abilities;
- Financial Returns and affordability;
- BEE target spend and upskill.

In addition, due to the cost and expertise required to fund and manage the facility, it creates a significant risk for the municipality to design-construct-operate and maintain the facility. The facility was assessed for both a 20- and 25-year forecast. The 20-year forecast deemed the minimum period, while the 25-year forecast deemed the longest. The analysis indicated that the 20-year forecast has scenarios 4, 5 and 6 that are acceptable, while the 25-year forecast allows for scenario 3, 4, 5 and 6 to be acceptable. As a result, the more favourable concession period was deemed to be the 25-year period. As a result, it is recommended that the Eikestad Parking Garage be considered as a viable option as a PPP contract. Based on the analysis, it is recommended that treasury approval 1 is approved.

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Appendix A Survey Data Analysis

Please scan the QR code below to access the files.

Alternatively, please follow the link below to access the files.

https://surbanajurong.sharepoint.com/:f:/s/africa/C1978/EqXoYJ1QlbZChKy37ks8CvcBWOFajU-RfhQgwfbdQUC8Sw?e=WJV5yl

Appendix B Environmental Scoping Report

THE ENVIRONMENTAL PARTNERSHIP
ENVIRONMENTAL CONSULTANTS

P O Box 945, Cape Town 8000
56 Shortmarket Street, Cape Town
T: 021 422 0999
F: 021 422 0998
www.enviropart.co.za
info@enviropart.co.za

STELLENBOSCH LOCAL MUNICIPALITY SCOPING REPORT FOR THE PROPOSED 'EIKESTAD PARKING STRUCTURE' ON ERVEN: 1962-RE, 1969-1976, 1954, 6402 and 6636, STELLENBOSCH, WESTERN CAPE PROVINCE

Prepared for:

STELLENBOSCH MUNICIPALITY

On behalf of:

SMEC South Africa

NOVEMBER 2023

EXECUTIVE SUMMARY

In response to Stellenbosch facing significant congestion issues, SMEC South Africa was commissioned by the Stellenbosch Municipality to investigate the traffic congestion experienced in the Stellenbosch area, with the aim of prompting the need for more sustainable solutions. The study carried out by SMEC aims to understand the existing parking situation, *inter alia,* in Stellenbosch and develop a pre-feasibility report for proposed parking facilities. Essentially, the identification of the need and demand for additional parking was required and to determine the pre-feasibility of proposed facilities, taking into consideration the possibility of a public private partnership (PPP). The aim was to paint an exact picture of the existing parking situation within the Stellenbosch Municipality and to focus on providing parking facilities for Techno Park and the CBD.

The Environmental Partnership was commissioned to undertake an Environmental Scoping exercise for the proposed Eikestad parking structure development on behalf of SMEC, as part of the parking study for the Stellenbosch Municipality. The scoping exercise assesses the environmental and sustainability aspects of a proposed facility on this particular site, due to it being considered as the best location from a technical perspective. The objective of this scoping study is to provide critical insights for informed decision-making relating to environmental and heritage sustainability aspects for a parking facility on the Eikestad site.

The development site is situated in Stellenbosch, bounded by Andringa, Victoria, van Ryneveld, and Plein Streets. The Municipality aims to maximise parking with structured facilities including direct access from Victoria & Ryneveld Streets and pedestrian access from Eikestad Mall whilst integrating the existing heritage context of the wider area. The forecourt and lower-level street facade will connect with surrounding historical buildings.

The site currently serves as an open parking lot, attracting various users, including shoppers, cultural visitors, and students. The historical significance is linked to the old Drooge Rivier stream previously located on the site, influencing townscape/streetscape and potential archaeological impacts. The history and cultural value of the site is largely integrated with the historic development of Stellenbosch.
This report assesses various environmental components, including biodiversity, water resources, air quality, land use, cultural heritage, noise and vibration, social aspects, visual aesthetics, waste and hazardous materials, climate change, and energy efficiency. Mitigation measures should be applied as necessary to minimise adverse impacts. This report furthermore outlines the relevant environmental legislation and demonstrates the development's alignment with it, indicating that no additional environmental or water use authorisations are required.

The Eikestad development has undergone a thorough evaluation to ensure alignment with environmental and heritage preservation principles. The project is expected to yield positive environmental outcomes and offers adaptability for future re-purposing, aligning with sustainability objectives.

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ABBREVIATIONS

CO_2	Carbon Dioxide
EIA	Environmental Impact Assessment
HIA	Heritage Impact Assessment
HWC	Heritage Western Cape
NEMA	National Environmental Management Act
NEMAAQ	National Environmental Management Air Quality Act
NEMBA	National Environmental Management Biodiversity Act
NEMWA	National Environmental Management Waste Act
NHRA	National Heritage Resources Act
NID	Notice of Intent to Develop
NMT	Non-Motorized Transport
NWA	National Water Act
PPP	Public-Private Partnerships

1. INTRODUCTION

1.1. Background and purpose of the Report

The Environmental Partnership conducted an Environmental Scoping exercise for the proposed Eikestad parking structure development on behalf of SMEC, as part of a parking study for the Stellenbosch Municipality. A parking study was required in response to Stellenbosch facing significant congestion issues, prompting the need for sustainable solutions like public transport and non-motorized transport to reduce congestion and increase mode shifts.

The parking study conducted by SMEC focuses specifically on understanding the existing parking situation in Stellenbosch and identifying parking needs and demand in order to develop a pre-feasibility report for proposed parking facilities, considering public-private partnerships and the impacts of other planned solutions on parking demand.

The Scoping exercise has been undertaken as part of a due diligence process to evaluate the biophysical and socio-economic aspects of the proposed Eikestad parking structure development. It represents the starting point for understanding the potential environmental implications and sustainability aspects associated with the proposed initiative. This process equips the proponent and project team with essential insights required to make informed decisions about the project's future trajectory, ensuring a harmonious coexistence between the proposed Eikestad parking development and environmental and heritage protection.

1.2. Locality

The development site is located on Erven 1962-RE, 1969-1976, 1954, 6402 and 6636 Stellenbosch between Andringa, Victoria, van Ryneveld and Plein Streets, Stellenbosch (**Figure 1**). It lies north of the Stellenbosch Town Hall, and east of the Eikestad Mall.

1.3. The Proposed Development

The Municipality aims to maximise its parking facility on the site by implementing structured parking in line with the following architectural aims (**Figure 2**):

- Create direct access to the facility from both Victoria & Ryneveld Streets. No vehicular entrance point is proposed from Andringa Street to allow for the possibility of changing Andringa Street into a pedestrian only street.
- Create direct pedestrian access to the facility from the Eikestad Mall, Ryneveld Street & Victoria Street.

- Create a parking structure that sits above a half-basement with a recessed structure that elevates to two additional storeys.
- The building must fit into the rich heritage context. The aim of this proposal is to create a building that will be secondary in its importance to the context. To achieve this the building mass has been pushed to the back and centre of the site.
- Create a forecourt. This will serve as a landscape pedestrian friendly area that will connect the different parking areas. The forecourt will include the main pedestrian access to the parking facility.
- Create a layout that connects with the rich heritage value of the immediate surrounding context. The single storey shops along Andringa Street are of a high historical value. The aim is to create a lower-level street façade that responds to these neighbouring buildings.
- Create a service zone to the southern side of the site. The aim of this is to create service access to the municipal buildings on the southern side.

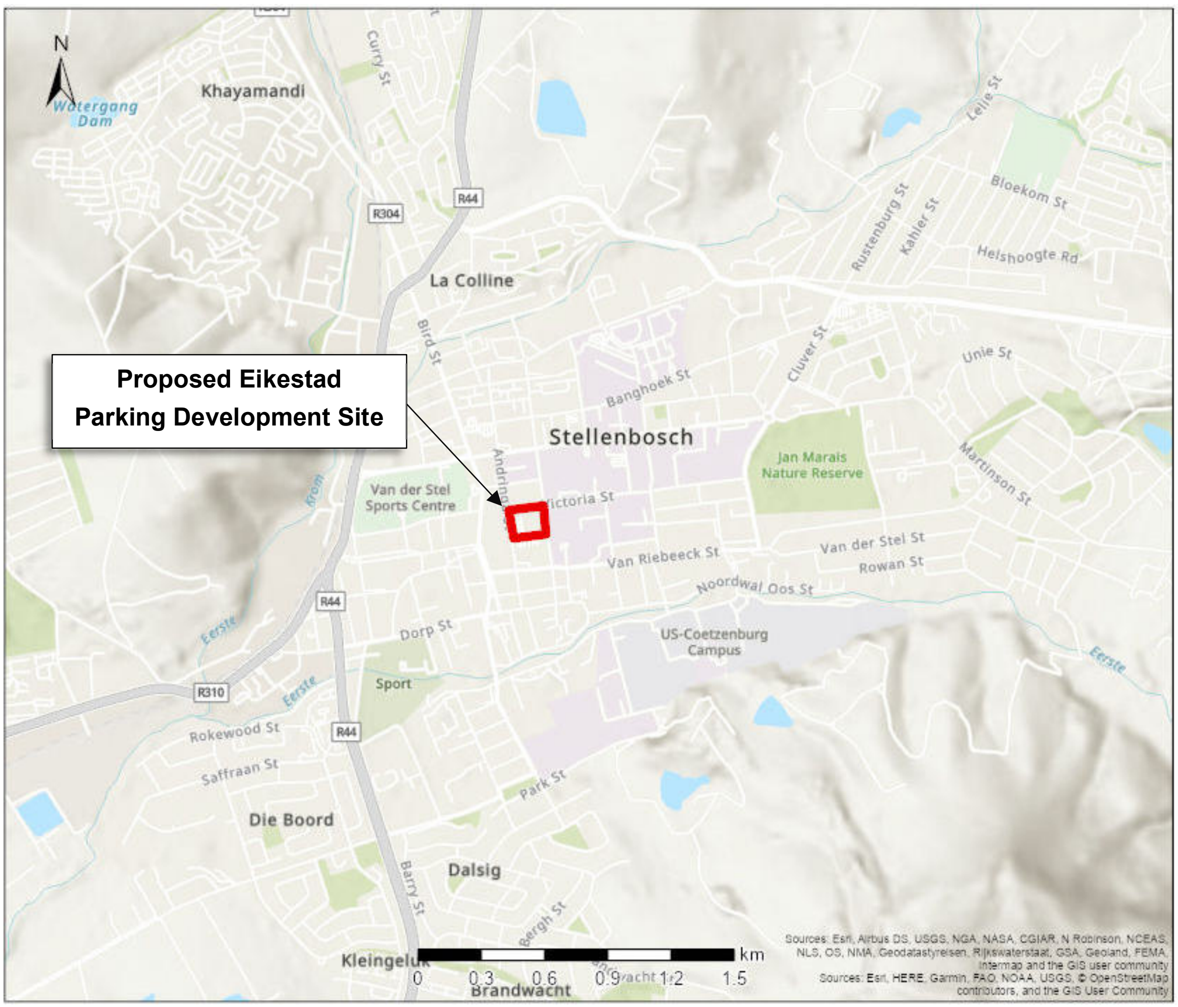


Figure 1: Eikestad Parking Development - Locality Map

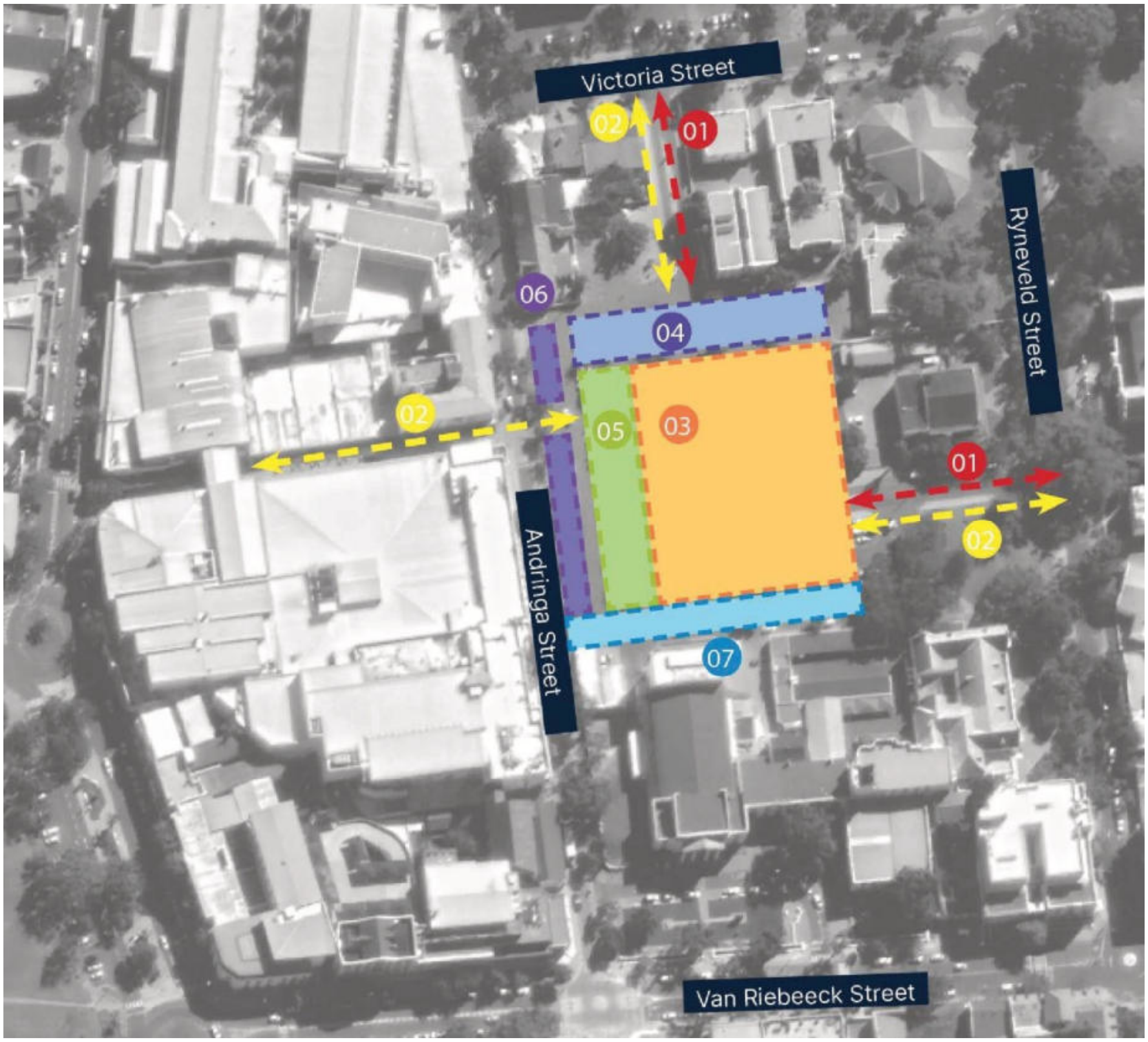


Figure 2: Proposed high-level development proposal (SMEC Architects, 2023)

2. STUDY AREA STATUS QUO

The site proposed for the development is located between the Municipality's offices on Plein Street (south), and the Stellenbosch University campus (north of the site). The Braak, an historic green space, is located one block to the west, with the main shopping mall and densest shopping area facing Bird Street located between the site and the historic open space of the Braak. Along Van Reyneveld Street, a fine streetscape with a collection of historic buildings with cultural and religious associations in the old town abuts the site. An open green space with mature trees creates the interface between the site and the street edge. Therefore, the site occupies an interesting location between government, university, commercial and cultural nodes within the town of Stellenbosch. It is currently used as a parking lot, one of the few open parking lots in this area. It is a well-used space, catering to shoppers, people visiting the nearby cultural and municipal facilities (municipality, library, Sasol Art Museum) as well as to students. In the evenings the Adam Smal Theatre at the University and other restaurant and bar venues nearby mean that the demand for parking extends beyond daytime uses only.

At present the site is tarred across its full extent. Some Turkish Oak trees have been planted on the raised kerbs between lengths of parking bays, and two boomed entries (to Van Ryneveld and Victoria Streets) exist. There is a temporary flower stand and some storage structures (more permanent) located along the Andringa Street edge of the site (west of the site).

The site is located within a built-up urban area. As such, there is no indigenous flora and fauna, including habitats, endangered species, and ecosystems on or adjacent to the site. The closest Protected Areas to the site are the Pappegaaiberg Nature Reserve, located 900 meters to the northwest, and the Jan Marais Nature Reserve, situated 1 km to the east. The nearest terrestrial Critical Biodiversity Areas are located 1 km to the southeast and 1 km to the north of the site (**Figure 3**). Similarly, there are no watercourses or wetlands on or near the site. The nearest rivers are the Eerste River, which is situated 520 meters to the south, and the Krom River, located 800 meters to the north of the site. The closest natural wetland is positioned 1.3 km to the southeast of the site (**Figure 4**).

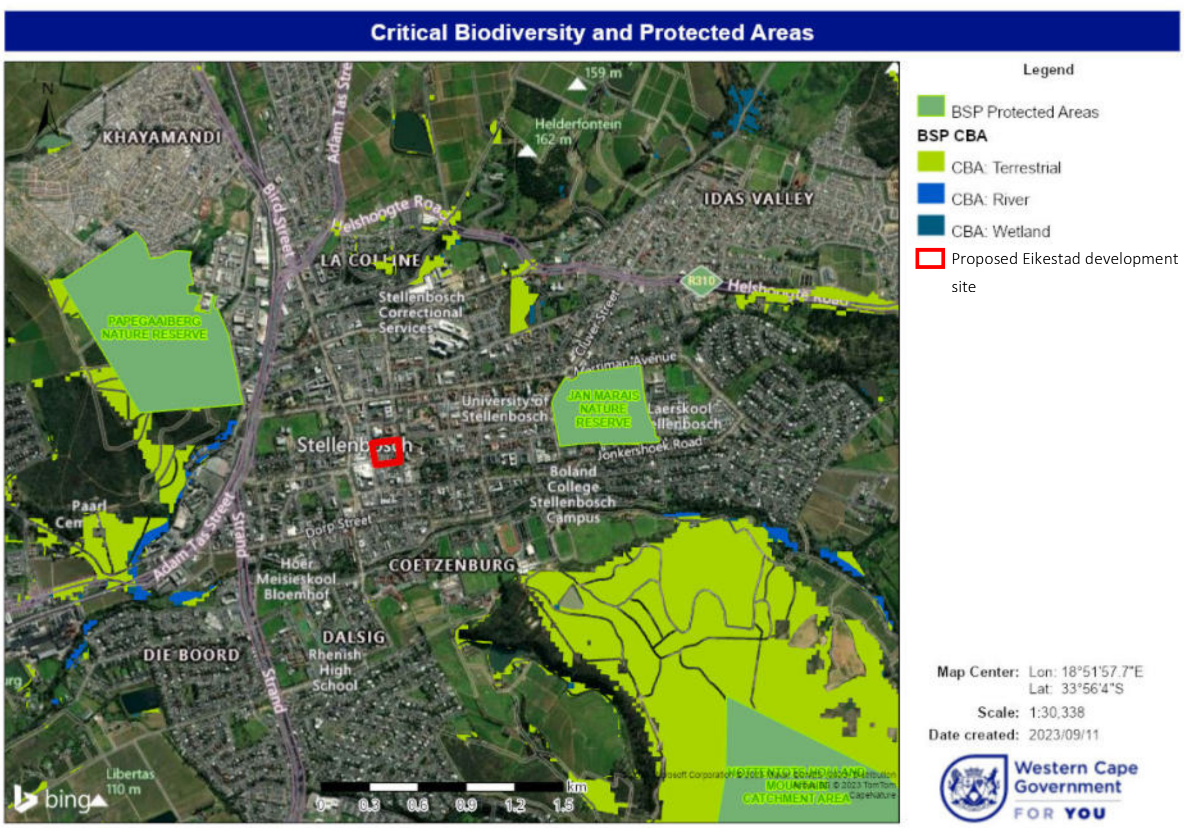


Figure 3: Critical Biodiversity and Protected Areas (CFM, 2023)

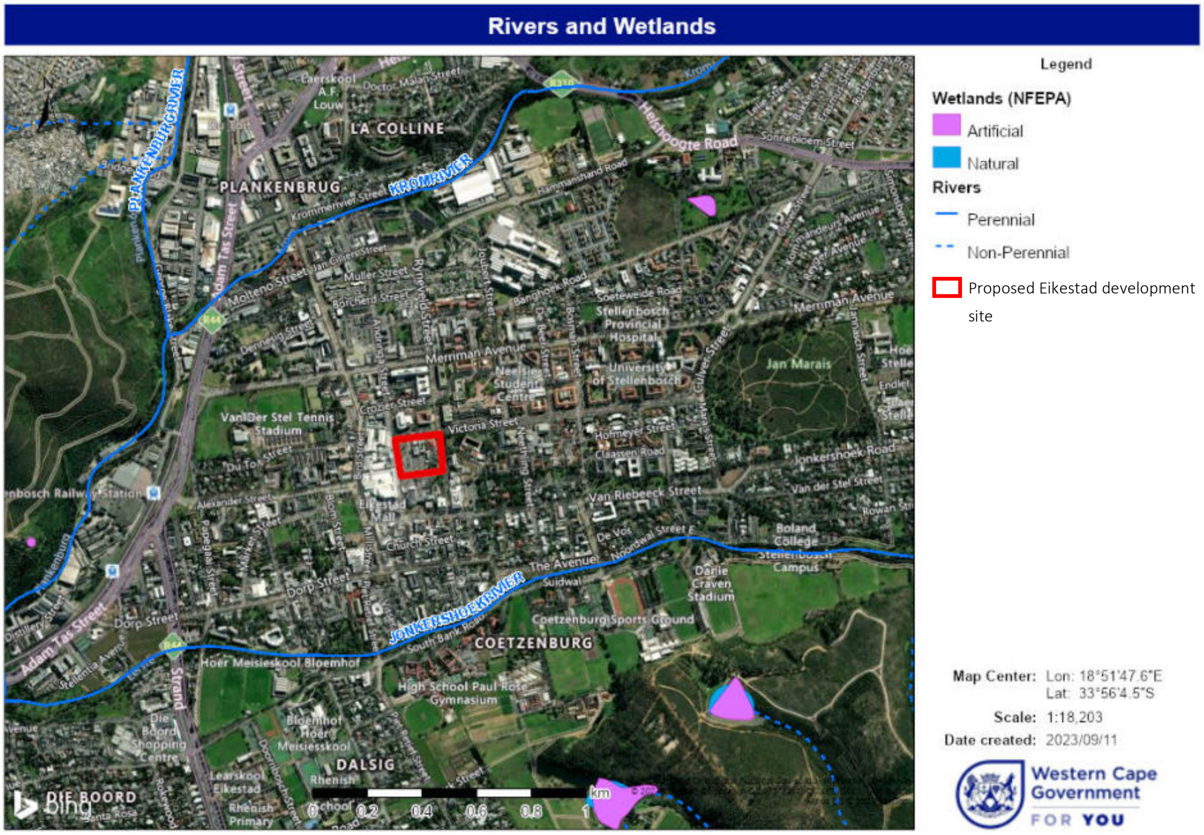


Figure 4: Rivers and Wetlands (CFM, 2023)

History of the site

According to a Middledorp/Historical Core Heritage Survey that was carried out in 2012, this parking area has no heritage significance. However, many of the buildings surrounding the site have been graded in terms of their historic significance (**Figure 5**).

The potential key heritage-related impacts will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the old Drooge Rivier stream and so archaeological impacts are possible (**Figure 6**). Note that this stream is no longer present on the site.

According to a heritage study carried out by Pistorius and Harris in 2004, the civic structure of Stellenbosch has evolved from its historic growth and topography. The subject area formed part of one of the earliest farms granted in Stellenbosch – Callabasse Kraal (granted 1683), whose werf was located behind the Skuinshuis and which was angled to align with the Drooge Rivier, running diagonally across the site. Even after the town was established in 1685, a farm grant in c1750 in the area had a T-shaped homestead which also followed the course of the Drooge Rivier, rather than the town grid.

It was between Dorp Street and the Eerste River that the early, linear ‘water erf’ grants were located, and this pattern of settlement is still faintly discernible in the present 21st century fabric of the town. The mountain ranges encircling the town forced the confluence of the Krom and Eerste Rivers, and these underpinned the ‘natural elements’ informing the character of Stellenbosch.

The key civic buildings in the town are located where the river and Dorp Street come together: the old Drostdy and the church. These buildings in turn set up their own public spaces and physical/visual axes, the most important being Church Street and Drostdy Street, which bisect at right angles and set up the grid of the core town.

The Braak forms the primary historic green space in the town and sets up two further primary routes: Bird Street to the north, and Plein/Van Riebeeck Street to the east. It was only in 1811 that Andringa Street was laid out, and Ryneveld Street was straightened, with only the Skuinshuis and old Lutheran Parsonage now reflecting the old, diagonal geometry of the early farms in this area.

Urban development in the late 19th century was influenced by the discovery of diamonds and gold in South Africa which reinvigorated the Cape economy. There had been urban densification on Plein Street as the gaps between the buildings were filled in, and many were re-built as two storey structures following the great fire of 1875: the look of Plein Street changed as thatched buildings were replaced.

In 1939 the subject site consisted of smaller buildings on all sides. The “Kruiskerk” and Erfurt House facing Van Ryneveld Street were in place, as were the small buildings on the corner of Victoria and Andringa Streets and the open, green space along Van Ryneveld Street.

By 1944, the Town Hall had been constructed and the nature of the block began to change – particularly along Andringa Street. Since the 1960s, the site has been defined by the mid-block parking lot area, which remains to this day.

Refer to **Annexure A: NID Report.**

Figure 5:Current grading map for the site approved by HWC 2012 (Abrahamse, 2023). Gradings 2 and, 3a and 3b abutting the site, are significant in terms of heritage value.

Figure 6:Map from the Harris and Pretorius study dated 2004 showing historic location of Droogte Rivier (Abrahamse, 2023)

Socio-Economic Profile of Stellenbosch

In 2020, Stellenbosch had a population of 192 879 people, with a projected growth to 209 849 by 2024 at an annual rate of 2.1%. The 65+ age group showed the highest growth rate, while household size remained stable at 3.7, possibly due to factors like lower fertility rates and an aging population.

The population density in Stellenbosch was 232 people per square kilometre in 2020. The real GDP per capita in 2018 was R62 000, higher than the Cape Winelands District and Western Cape figures, indicating economic well-being.

Income inequality increased from 2012 to 2018, with Stellenbosch having the highest Gini coefficient in 2018 compared to neighbouring municipalities. This inequality is expected to worsen due to potential impacts from the Covid-19 pandemic.

Human Development Index (HDI) in Stellenbosch improved from 0.72 in 2012 to 0.76 in 2018, reflecting better education, health, and income. This improvement correlated with GDP per capita. Regarding housing and household services, 73.4% had formal housing, the lowest in the District. Access to basic services was high, but economic stress may increase the demand for free basic services.

The local economy was valued at R16.2 billion in 2018, with growth attributed mainly to the tertiary sector. Sectors like wholesale and retail, finance, insurance, and manufacturing played key roles, while agriculture faced challenges.

Formal employment dominated in 2019, with a growing demand for skilled labour. Stellenbosch had a 11.3% unemployment rate, the second highest in the district, but lower than the Western Cape's 19.4%.

Public infrastructure spending in 2020/21 focused on social development, education, health, and human settlements. Economic infrastructure investments aimed to stimulate economic activity, primarily through transport and public works. Trading services, including wastewater and water management, electricity, and waste management, received significant allocations to improve living conditions and support businesses.

The potential socio-economic impacts associated with the proposed Eikestad development include job creation during both the construction and operational phases of the development.

(*Source: Western Cape Government: Socio-Economic Profile/Stellenbosch 2020*).

3. ENVIRONMENTAL ASPECTS CONSIDERED

This Scoping Report considers several environmental components that could potentially be impacted on by the proposed Eikestad development. The goal is to ensure that the project is developed with a full understanding of its potential effects on the biophysical and social environment and to implement mitigation measures to minimise adverse impacts.

3.1. Biodiversity and Ecological Systems

The site is located within a built-up urban area. As such, no impacts are anticipated on local indigenous flora and fauna, including habitats, endangered species, and ecosystems on and around the site.

3.2. Water Resources

No watercourses or wetlands are located on or near the site. No impacts on surface water bodies and water quality, including effects on watercourses, wetlands, rivers, have been identified.

3.3. Air Quality

No emissions or air pollution will be caused by the proposed development. As such, no impacts on ambient air quality, including greenhouse gas emissions are anticipated. The proposed parking structure will not negatively impact on ambient air quality and could potentially indirectly reduce the emission of harmful CO_2 gases by reducing the driving time spent by motorists whilst searching for parking.

3.4. Land Use and Vegetation

No significant impacts on land use, vegetation cover, and changes to land patterns and use have been identified seeing that the land use will remain the same. The existing trees in the current parking area will however be lost. A tree survey must be carried out by a qualified service provider. The tree survey is to form part of the future required HIA.

3.5. Cultural Heritage and Archaeological Sites

The identification of cultural heritage sites and identification of potential impacts on historical and archaeological resources has been carried out by a Heritage and Cultural Specialist. The key heritage-related impacts envisaged will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the historic Drooge Rivier stream and so archaeological impacts are possible.

3.6. Noise and Vibration

An evaluation of potential noise and vibration impacts caused by the project and their potential effects on the surrounding environment and communities found that noise and vibration could potentially have a negative impact during the construction phase but less so during the operational phase of the development.

3.7. Social Aspects

Consideration of social factors, including the project's impact on local communities, public health, and well-being found that a public participation process is recommended as part of the Stellenbosch Municipality's Duty of Care and to ensure that the proposed development is aligned with the current cultural and historically sensitive surrounding area.

3.8. Visual and Aesthetic Impacts

An assessment of how the project may alter the visual landscape and aesthetics of the area found that strict architectural design parameters, as approved by the Heritage Western Cape, must be adhered to.

3.9. Waste and Hazardous Materials

An examination of waste generation, disposal practices, and the potential presence of hazardous materials found that the potential impact associated with waste will be negligible.

3.10. Climate Change

An analysis of how the project may impact on climate change found that sustainable green building design practices must be adhered to reduce the potential negative impact on climate change.

3.11. Energy Use and Efficiency

An assessment of energy consumption and opportunities for energy efficiency and renewable energy integration found that the proposed design must accommodate mechanisms for efficient energy consumption.

4. LEGAL AND REGULATORY FRAMEWORK

Considering environmental legislation is paramount in any decision-making process that may have ecological consequences, the following environmental legislation has been considered during the scoping process in order to ensure that the proposed Eikestad development is in line with relevant legislative guidelines and requirements.

4.1. The Environmental Impact Assessment (EIA) Regulations, 2014 (as amended) as set out in the National Environmental Management Act (NEMA) (Act No. 107 of 1998), as amended.

It is crucial to note that the proposed development will not trigger any activities listed in the Environmental Impact Assessment Regulations of 2014 in accordance with the National Environmental Management Act (Act No. 107 of 1998), as amended. Therefore, it will not necessitate an environmental authorisation for its implementation. Importantly, the development will not have any adverse impacts on terrestrial or aquatic ecosystems.

4.2. National Environmental Management: Biodiversity Act (NEMBA) (Act No. 10 of 2004), as amended.

The site is situated within an established urban area, and consequently, the envisioned development is not anticipated to exert any adverse effects on endangered species or ecosystems, in accordance with the provisions outlined in the National Environmental Management Biodiversity Act (Act No. 10 of 2004), as amended.

4.3. National Heritage Resources Act (NHRA) (Act No 25 of 1999), as amended.

The selected site for this development is situated within a culturally and historically significant landscape and comprises 18 separate erven (as well as requiring access across two different erven), and in combination the area of the site is 18 651,2 m^2. The development of this open site into one that has a structure thereon will constitute a “change in character”, thereby triggering Section 38 (1) (c) (i) of the National Heritage Resources Act.

The key heritage-related possible impacts will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the old Drooge Rivier stream and so archaeological impacts are possible.

Accordingly, the proposed project aims to seamlessly integrate with the surrounding cultural and heritage landscape by adhering to stringent architectural design guidelines and parameters, as duly approved by Heritage Western Cape (HWC).

A Notice of Intent to Develop (NID) has been prepared by the Heritage specialist which concludes that there is reason to believe the proposed development will impact on heritage, and therefore a Heritage Impact Assessment (HIA) will be required. At this stage, a Phase 1 HIA is recommended.

In addition, the following studies would be prudent to include in an overall HIA:

- A townscape and streetscape study.
- A visual assessment at the scale of the block and surrounds.
- An archaeological desktop study.
- A tree survey
- Targeted public participation

The NID; HIA and additional studies must be submitted to HWC for endorsement and subsequent approval.

4.4. National Water Act (NWA) (Act No. 36 of 1998), as amended.

The development will not invoke any water usage as defined by the National Water Act (Act No. 36 of 1998), and thus, it will not require a water use license or a General Authorization as per this legislation. The development will not have any adverse impacts on aquatic ecosystems.

4.5. National Environmental Management: Air Quality Act (NEMAAQ) (Act No. 39 of 2004), as amended.

The proposed development is not expected to release any emissions that could compromise air quality or induce air pollution, aligning with the standards delineated within the National Environmental Management Air Quality Act (Act No. 39 of 2004), as amended.

4.6. National Environmental Management: Waste Act (NEMWA) (Act No. 59 of 2008), as amended.

The proposed development will not necessitate the acquisition of any waste management permits or licenses under the purview of the National Environmental Management Waste Act (Act No. 59 of 2008), as amended.

4.7. Positive Environmental Impacts

The proposed parking facilities are expected to yield several positive environmental outcomes. Firstly, the facility will contribute to a reduction in the volume of vehicles circling in search of available parking spaces, thereby curtailing the emission of harmful CO^2 gases. This will also lead to a decrease in on-street parking demand, freeing up space for streetscape enhancements. The centralised location of the facilities is strategically designed to encourage the utilisation of Non-Motorized Transport (NMT), thereby further alleviating traffic congestion.

5. POSSIBLE SUSTAINABLE FUTURE USE OF THE EIKESTAD PARKING STRUCTURE

In the event that it becomes necessary in the distant future, the proposed parking structure could potentially undergo re-purposing. Re-purposing is an innovative and sustainable strategy for maximising the utility of existing urban infrastructure. This transformation not only optimises land use but also contributes to a more dynamic and vibrant urban environment. Historically, parking garages have been dedicated to the singular purpose of vehicle storage. However, as urban centres evolve and respond to evolving transportation trends, re-purposing these structures has emerged as a practical and sustainable means of optimising urban space. The conversion of a parking garage into a multi-functional space has the potential to enhance the overall urban experience, advance sustainability objectives, and stimulate economic growth. Moreover, re-purposing a parking garage can significantly contribute to sustainability goals by reducing the necessity for new construction and fostering urban density.

6. CONCLUSION ON ENVIRONMENTAL CONSIDERATIONS

In conclusion, the Eikestad environmental considerations for the proposed development in Stellenbosch have been thoroughly examined to ensure that the project aligns with both ecological and heritage preservation. The Environmental Partnership conducted an extensive environmental scoping assessment to understand the potential ecological implications and sustainability aspects of the Eikestad development. This process is essential to make informed decisions and promote a harmonious coexistence between the development and environmental and heritage protection.

The project site is strategically located in the heart of Stellenbosch, surrounded by various key nodes, including government, university, commercial, and cultural areas. It currently serves as a vital parking facility for shoppers, visitors to cultural and municipal facilities, and students from the Stellenbosch University. The proposed development aims to maximise parking capacity and implement structured parking while adhering to architectural goals that respect the rich heritage context of the area.

The Scoping Report considers various environmental components, including biodiversity, water resources, air quality, land use, cultural heritage, noise and vibration, social aspects, visual aesthetics, waste and hazardous materials, climate change, and energy efficiency. Mitigation measures will be applied where necessary to minimise adverse impacts on these components.

The legal and regulatory framework has been considered, with specific attention to all relevant environmental legislation. The development of this open site into one that has a structure thereon will constitute a “change in character”, thereby triggering Section 38 (1) (c) (i) of the National Heritage Resources Act. No other Environmental or Water Use authorisation is applicable to the proposed Eikestad development.

The project is expected to yield positive environmental outcomes by decreasing the on-street parking demand, and the concomitant reduction is driver frustration relating to traffic congestion and failure to find parking. The considerable time wasted in attempting to find an open on-street parking bay will also be alleviated. Furthermore, the proposed parking structure could be designed with the potential for future repurposing, aligning with sustainability objectives and contributing to a more dynamic and vibrant urban environment. This adaptability allows for urban infrastructure to evolve and respond to changing transportation trends, fostering sustainability, economic growth, and reduced construction needs.

The proposed Eikestad development has the potential to generate significant socio-economic impacts. This includes job creation during both the construction and operational phases of the development, which can contribute to the region's economic growth and employment opportunities.

In summary, the Eikestad development project has been evaluated to ensure that it not only meets its functional goals but also aligns with environmental and heritage preservation principles, ensuring that it is a responsible and sustainable addition to the Stellenbosch community.

7. RECOMMENDATIONS

The following studies must be submitted to Heritage Western Cape for endorsement and subsequent approval.

1. The Notice of Intent to Develop (NID). This will confirm the requirement for the various stages (below) of the HIA.
2. A Heritage Impact Assessment (HIA). The HIA will be submitted in two stages:
    - The Stage 1 HIA will be submitted to HWC for endorsement and will include design parameters that will have to be included in the design of the Eikestad parking structure.
    - The Stage 2 HIA will include the aforementioned design and must be submitted to HWC for approval. This can be undertaken by the successful developer/concessionaire, and not at this stage. The outcome of the Stage 1 HIA will be included as part of the set of conditions for the successful entity to incorporate and they would need to complete the Stage 2 HIA and acquire formal approval from HWC, before any construction can commence.

3. In addition to the NID and HIA, the following studies are to be completed and included in the HIA submission.
    - A townscape and streetscape study.
    - A visual assessment at the scale of the block and surrounds.
    - An archaeological desktop study.
    - A tree survey.

4. The HIA must be subjected to a 30 day public participation period. The intention is to include this requirement as part of the broader public consultation process that will be undertaken.
5. A public consultation process will be necessary to inform the public of the proposed development, the reasons for it, and how it is proposed to be carefully integrated into the existing historical fabric of the Stellenbosch CBD. Public comments received will need to be addressed so that substantive feedback is fed into the project where require.

8. REFERENCES

Abrahamse, C. (2023). Section 38 Notification of Intent to Develop. October 2023.

Pistorius, P. and Harris, S. “Stellenbosch Stadshuis Urban Block Heritage Study”. Unpublished study for the Municipality of Stellenbosch: Stellenbosch, 2004.

Western Cape Government. (2020). Socio-Economic Profile/Stellenbosch.

ANNEXURE A –
NOTICE OF INTENT TO DEVELOP REPORT

SECTION 38 NOTIFICATION OF INTENT TO DEVELOP

ERVEN 1962-RE, 1969-1976, 1954, 6402 and 6636 STELLENBOSCH

BETWEEN ANDRINGA, VICTORIA, VAN RYNEVELD AND PLEIN STREETS, STELLENBOSCH

October 2023

Prepared for

Stellenbosch Municipality

by

claire abrahamse
architecture l urban design l heritage

SMArchS Urbanism (MIT), BArch (UCT), BAS (UCT), SACAP, CIfA, APHP, UDISA

2nd Floor, Wale Street Chambers, 38 Wale Street, Cape Town, 8001
E: claire@claireabrahamse.co.za T: 021 426 2668 M: 083 718 1919

SECTION 38 NOTIFICATION OF INTENT TO DEVELOP

ERVEN 1962-RE, 1969-1976, 1954, 6402 and 6636 STELLENBOSCH

BETWEEN ANDRINGA, VICTORIA, VAN RYNEVELD AND PLEIN STREETS, STELLENBOSCH

October 2023

PROPERTY DETAILS:

Physical Address of Property:	Centre of the block bounded by Andringa, Victoria, Van Ryneveld and Plein Streets, Central Stellenbosch.
Erven:	1962-RE, 1969-1976, 1954, 6402 and 6636 Stellenbosch.
Co-ordinates (centre point):	33.935894°S 18.861783°E
District/Municipality:	Stellenbosch.
Current Land Use:	At grade parking.
Current Zoning:	Road and Parking Zoning, Mixed Use.
Predominant Surrounding Land Use:	Retail/commercial, civic uses, offices.
NHRA "Trigger":	No. of erven – see table below.

No	Erf	Area
1	1962-RE	11270,5 m^2
2	1976	1085,9 m^2
3	1975	1083,2 m^2
4	1974	1085,7 m^2
5	1973	1080,4 m^2
6	1972	855,3 m^2
7	1971	385 m^2
8	1970	437,1 m^2
9	1969	348,5 m^2
10	1958	395,7 m^2
11	6402	115 m^2
12	6636	508,9 m^2
TOTAL AREA:		18651,2m^2

PURPOSE OF THIS REPORT:

This report is intended to accompany and provide further information for the Section 38 Notification of Intent to Develop form that must be provided to Heritage Western Cape when a development that will change the character of a site comprising 3 or more erven is being contemplated.

PROPERTY DESCRIPTION AND LOCATION:

The erven in question form the central area of a block in the middle of Stellenbosch, being located between the Municipality's offices on Plein Street, and the Stellenbosch University campus.

The Braak is located one block to the west, with the main shopping mall and densest shopping area facing Bird Street located between the site and the historic open space of the Braak. Along Van Reyneveld Street, a fine streetscape with a collection of historic buildings with cultural and religious associations in the old town abuts the site. Another positive, open green space with mature trees creates the interface between the site and the street edge.

Therefore, the site occupies an interesting location between government, university, commercial and cultural nodes within the town of Stellenbosch. It is one of the few open parking lots in this area, and is busy throughout the day, catering to shoppers, people visiting the nearly cultural and municipal facilities (municipality, library, Sasol Art Museum) as well as to students. In the evenings the nearby Adam Smal Theatre at the University and other restaurant and bar venues nearby mean that the demand for parking extends beyond daytime uses only.

At present the site is tarred across its full extent. Some Turkish Oak trees have been planted on the raised kerbs between lengths of parking bays, and two boomed entries (to Van Ryneveld and Victoria Streets) exist. There is a temporary flower stand and some storage structures (more permanent) located along the Andringa Street edge of the site.

The site is owned by the Stellenbosch Municipality.

See Figure 1 – locality plan – as well as Figure 2A to 2G for photographs of the site and surrounds.

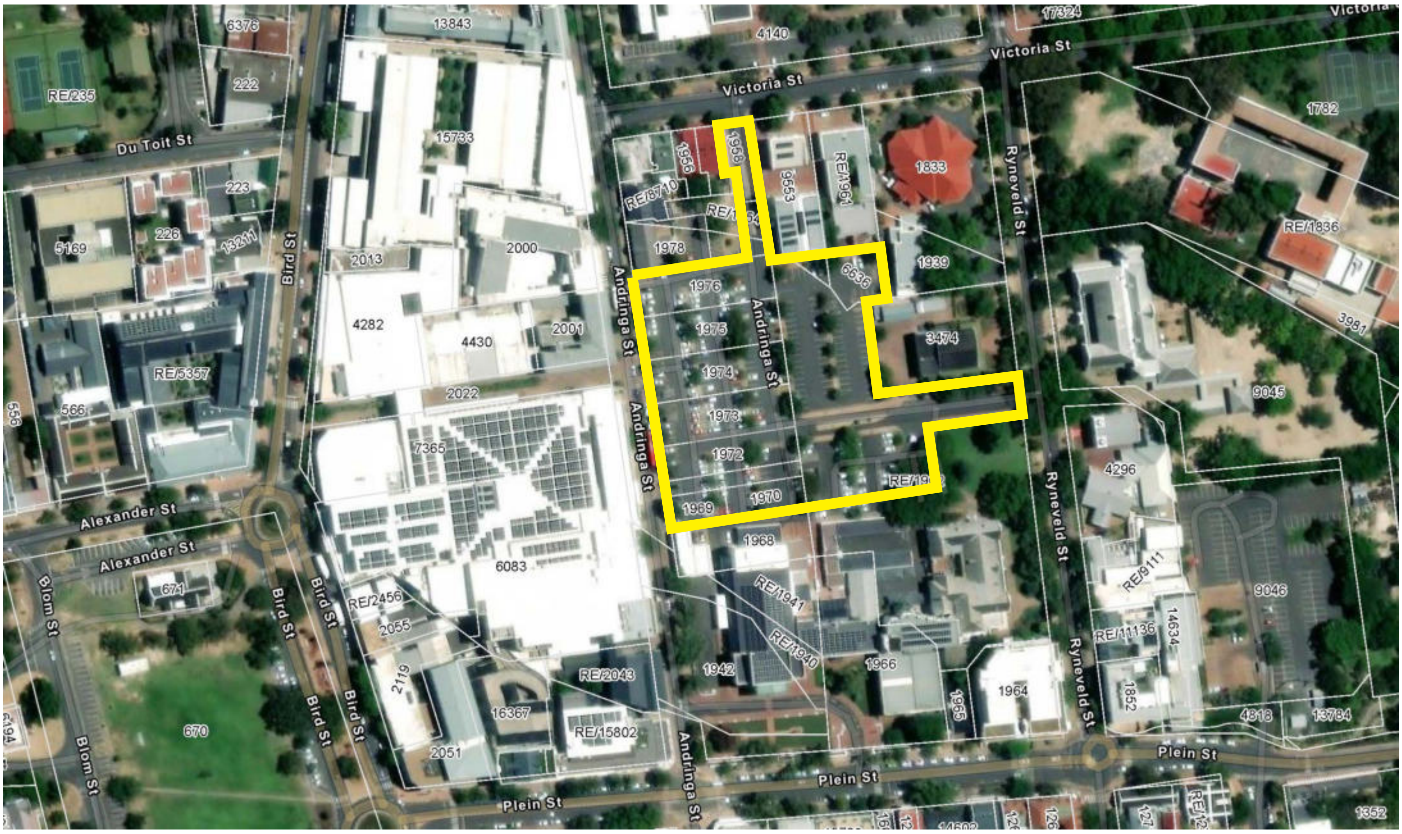


Figure 1B: Site plan with the site outlined in yellow.
(Source: Cape Farm Mapper).

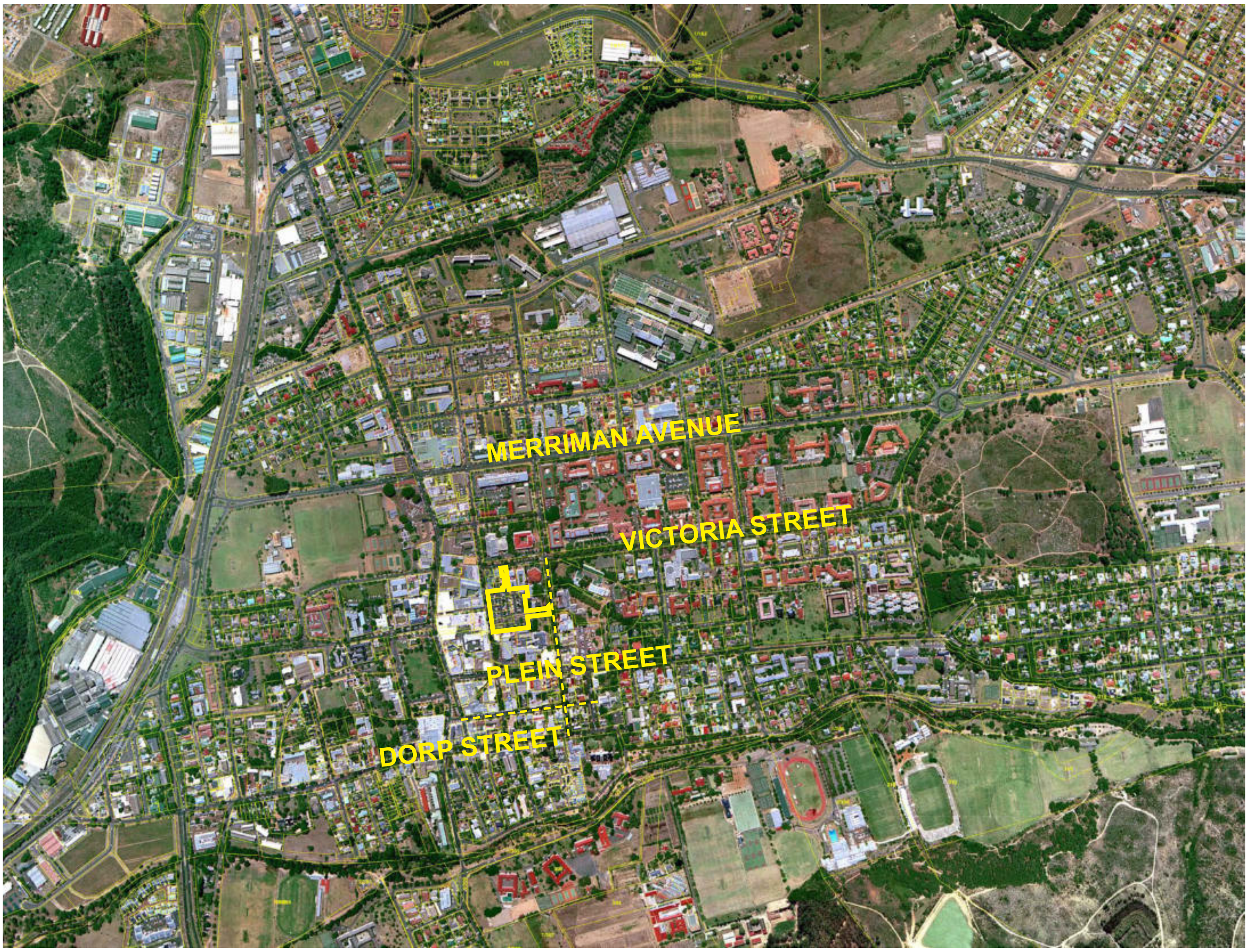


Figure 1A: Locality plan (c2011) with the site outlined in yellow.
(Source: Surveyor General).

Figure 2 (Source: Abrahamse, Stellebosch Municipality Heritage Survey).

HISTORY OF THE PROPERTY:

Stellenbosch's civic structure has evolved from its historic growth and topography.

Pistorius and Harris note that the subject area formed part of one of the earliest farms granted in Stellenbosch – Callabasse Kraal (granted 1683), whose werf was located behind the Skuinshuis and which was angled to align with the Drooge Rivier, running diagonally across the site (2004: 7). Even after the town was established in 1685, a farm grant in c1750 in the area had a T-shaped homestead which also followed the course of the Drooge Rivier, rather than the town grid.

> Fransen's reconstructed map of 1770 [Fig. 3] shows the two diagonal watercourses and Plein Street at the bottom with the T-shaped homestead, later the Wesleyan Parsonage (and the present site of the Town Hall). Ryneveld Street is on the right, cranking as it crosses the Drooge Rivier and passes the Skuinshuis. Plein Street was a definite edge between the urbanity of the village core and farmland [to the north] (2004: 7).

It was between Dorp Street and the Eerste River that the early, linear 'water erf' grants were located, and this pattern of settlement is still faintly discernible in the present 21st century fabric of the town (Figure 2). The mountain ranges encircling the town forced the confluence of the Krom and Eerste Rivers, and these underpinned the 'natural elements' informing the character of Stellenbosch.

The key civic buildings in the town are located where the river and Dorp Street come together: the old drostdy and the church. These buildings in turn set up their own public spaces and physical/visual axes, the most important being Church Street and Drostdy Street, which bisect at right angles and set up the grid of the core town.

The Braak forms the primary historic green space in the town and sets up two further primary routes: Bird Street to the north, and Plein/Van Riebeeck Street to the east.

It was only in 1811 that Andringa Street was laid out, and Ryneveld Street was straightened, with only the Skuinshuis and old Lutheran Parsonage now reflecting

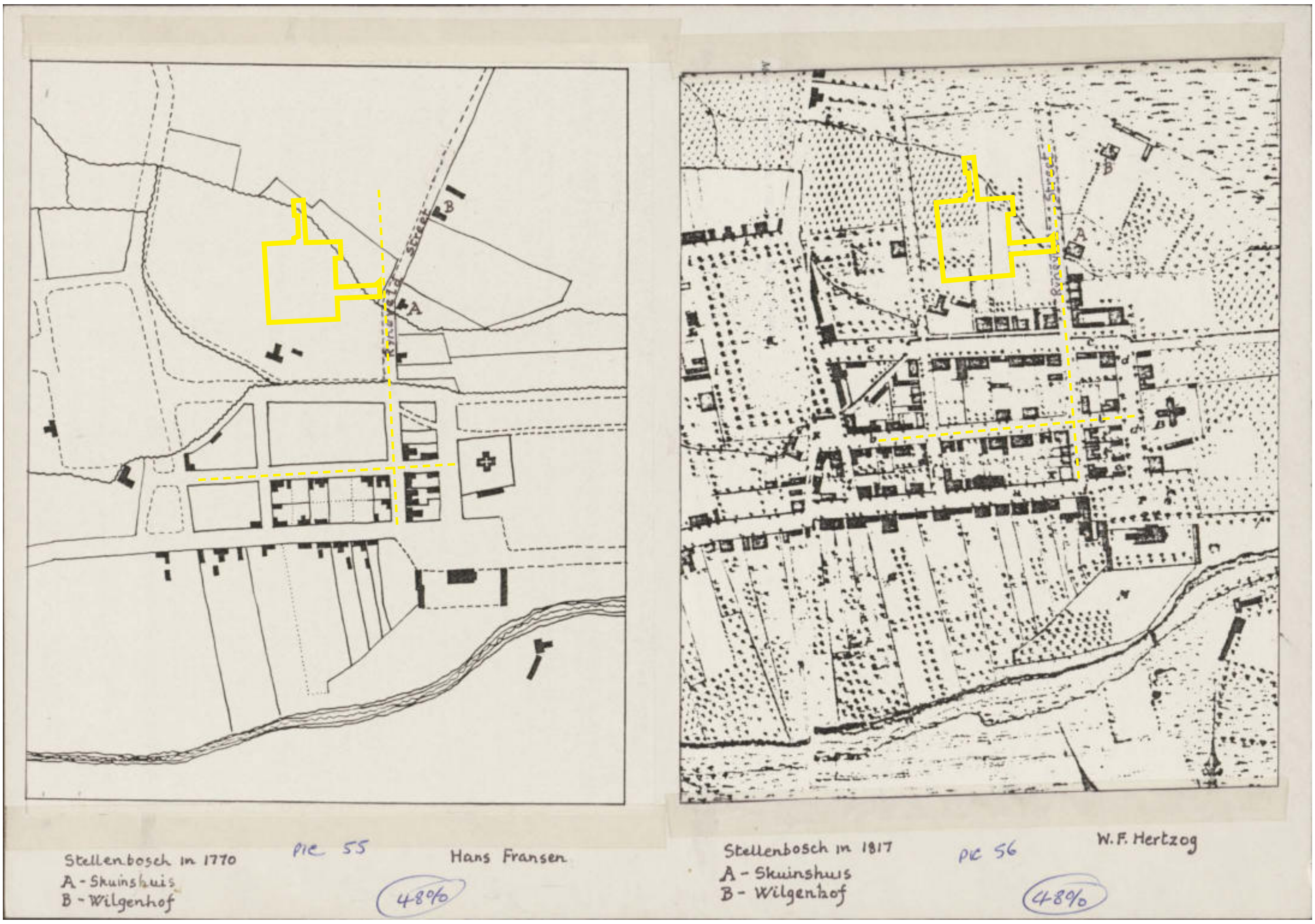


Figure 3: Fransen's reconstruction of the town in c1770, with the Hertzog plan of 1817 alongside. (Source: SUN Digital Archive).

the old, diagonal geometry of the early farms in this area. Harris and Pistorius describe the rural nature of buildings in this area:

> In 1812 a single storey gabled house was built on the corner of Plein and Ryneveld Street (Oude Bloemhof) and by 1817 Plein Street became lined with thatched buildings like it. They had long rear gardens reaching back to the Drooge Rivier which still ran diagonally across the northern part of the block. The urban ribbon extended up Ryneveld Street but Andringa was very rural, with a farm werf mid-way up it.

Urban development in the late 19th century is seen in Fransen's reconstructed map of 1905 (Figure 4). The discovery of diamonds and gold in South Africa reinvigorated the Cape economy. There had been urban densification on Plein Street as the gaps between the buildings were filled in, and many were re-built as two storey structures following the great fire of 1875: the look of Plein Street changed as thatched buildings were replaced (Harris and Pistorius, 2004: 8).

Figure 3: Fransen's reconstruction of the block in c1905 (Source: Pistorius and Harris, 2004).

> Erfurt House (1876) on Ryneveld Street sat as an object in the landscape, surrounded by balconies and a formal garden. And following the founding of Victoria College in 1866 the area along Victoria Street acquired several double storey residences that soon doubled as boarding houses, especially after the Ou Hoofgebou was opened across the street in 1886. Crozier House and Bergville both date from this time and there were others nearby that have been demolished. Later, terraced villas were built on the corner of Andringa and they reached down that street to meet the urban ribbon advancing northward. Additions and alterations were constantly being made. At the south end of Andringa, for example, the Liquor store was converted from its late Georgian character to the extravagant Edwardian building seen today.

In 1939 the subject site consisted of smaller buildings on all sides (Figure 4). The "Kruiskerk" and Erfurt House facing Van Ryneveld Street were in place, as were the small buildings on the corner of Victoria and Andringa Streets and the open, green space along Van Ryneveld Street.

By 1944, the Town Hall had been constructed and the nature of the block began to change – particularly along Andringa Street (Figure 5). The so-called "Battle of Andringa Street" occurred at this time, where local, Coloured residents and White university students were involved in violent confrontations following a skirmish that broke out at the corner shop while people were waiting to obtain a copy of the late edition of the Cape Argus on the 27th July 1940 (Grundlingh, 2012).

This incident shows that there were Coloured families living in Andringa Street at the time, but by 1966 the houses facing Andringa Street had been demolished and the parking lot established, although there was a larger area of green retained within the block (Figure 6). It was on the 25th September 1964 that 'Die Vlakte' was proclaimed a White Group Area. Besides the considerable number of Coloured people who were removed from the area as a result, six schools, four churches, a mosque, a cinema and ten business enterprises were also affected in various ways. The removal of people from the town centre to Ida's Valley and the present-day Cloetesville took place, bit by bit, until about 1970 (SMHS, 2008). There has, however, been no direct connection made between the removal of these houses and the Group Areas Act.

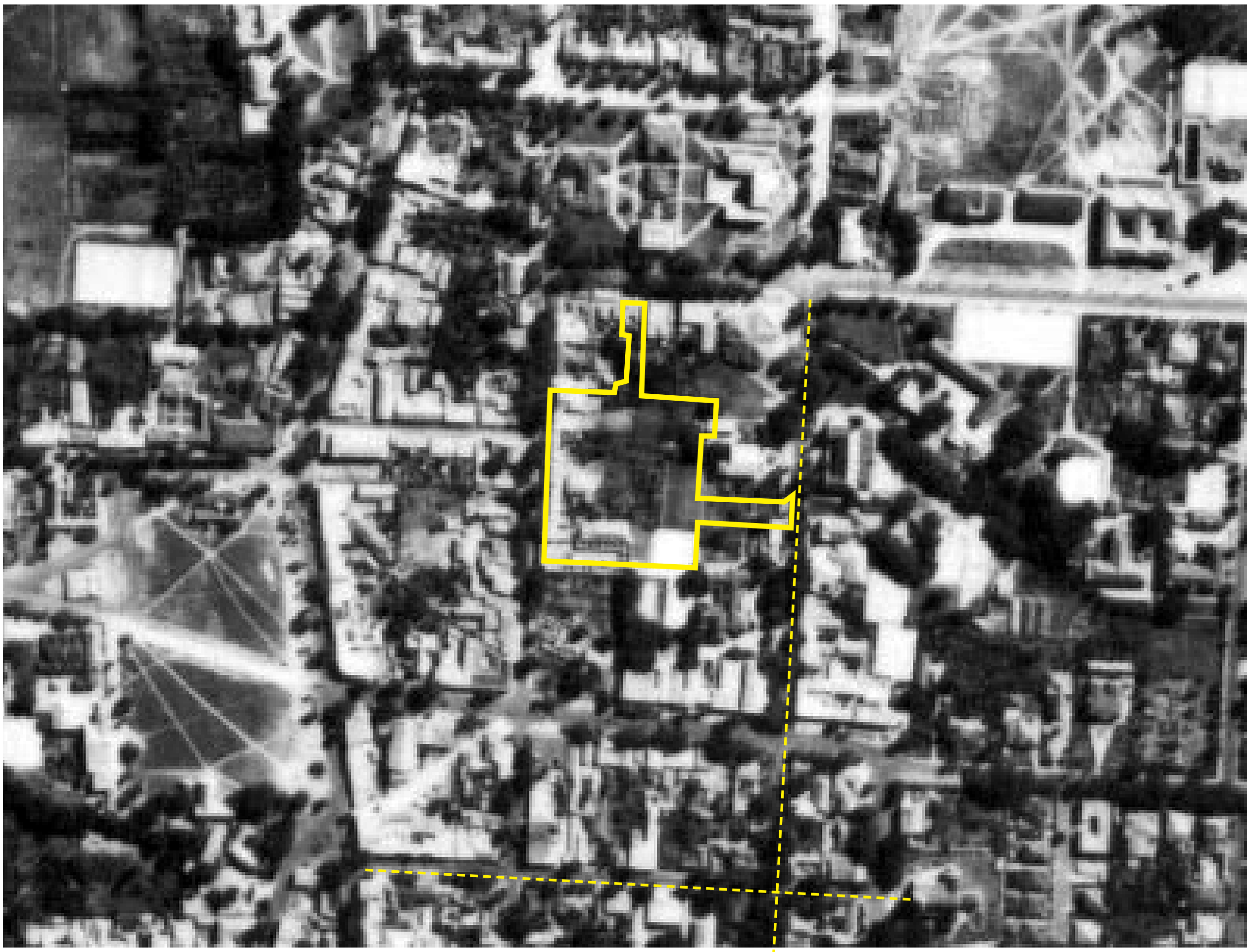


Figure 4: 1939 aerial photography for the site and surrounds (Source: NGI Mowbray).

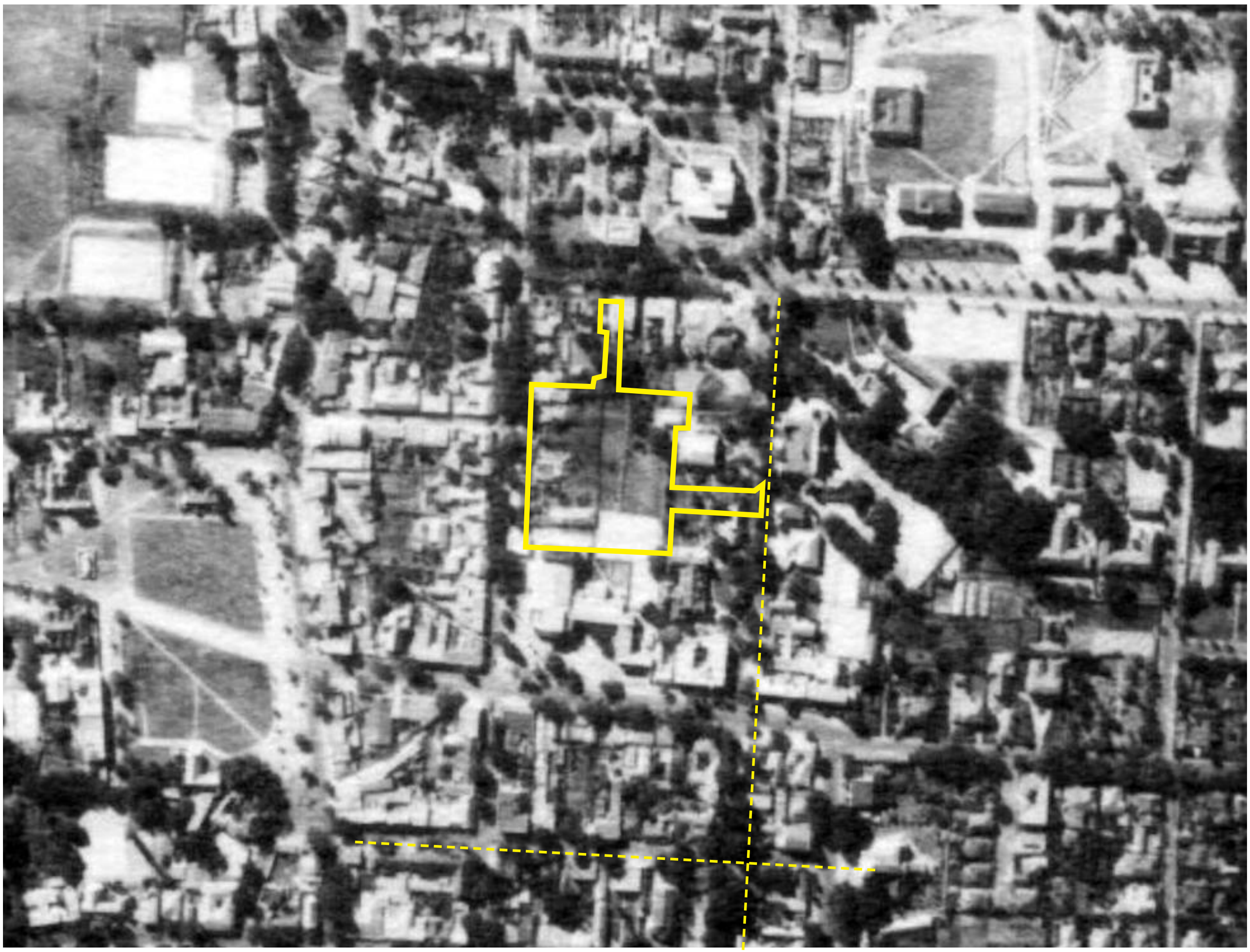


Figure 5: 1944 aerial photography for the site and surrounds (Source: NGI Mowbray).

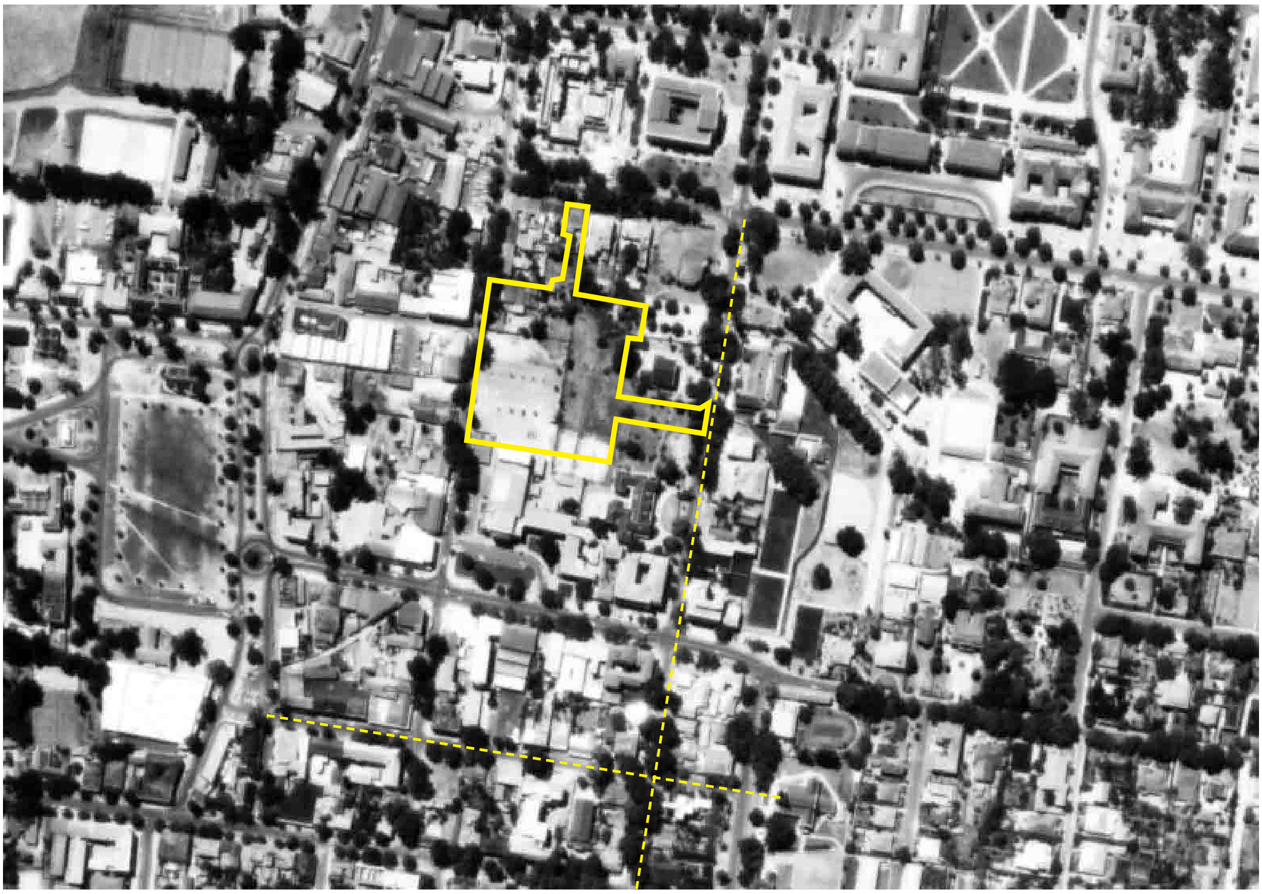
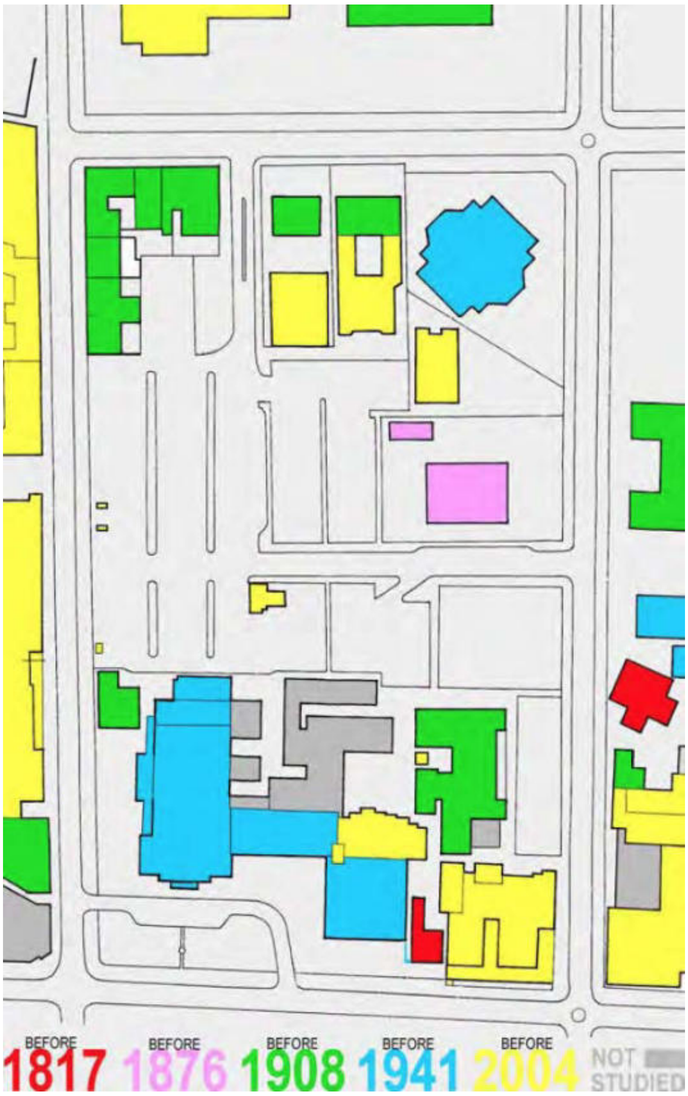


Figure 6: 1966 aerial photography for the site and surrounds (Source: NGI Mowbray).



Since the 1960s, the site has been defined by the mid-block parking lot area, which remains to this day. Pistorius and Harris note:

> In 1976 the Municipality took advantage of the unbuilt centre of the Stadhuis block to establish a large parking area to serve the civic and commercial centre of the town. Much of the urban ribbon along Andringa Street and a house on Victoria Street were demolished to provide more parking and access to it (2004: 8).

Their fabric dating map for the block has been replicated here, as Figure 7.

Figure 7 (left): Pistorius and Harris' 2004 dating of fabric map for the block.


Figure 8A: View down the pedestrian link towards Bird Street from Andringa Street.


Figure 8B: View down Andringa Street towards Plein Street.


Figure 8C: View from the north-eastern corner of the parking lot, looking north-west.

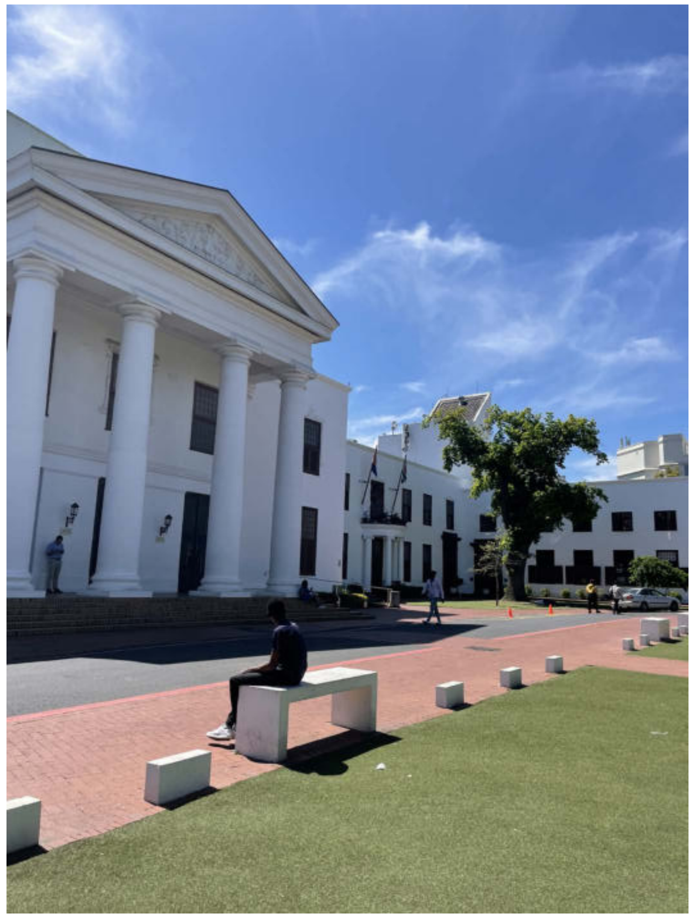


Figure 8D: View across the civic node facing Plein Street.

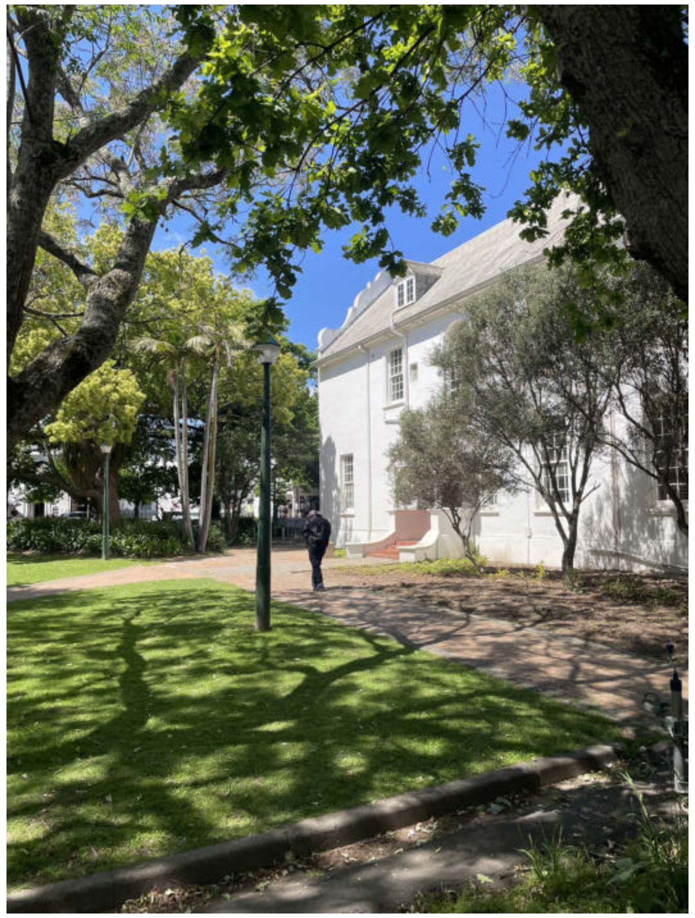


Figure 8E: View across the open green space along Ryneveld Street, looking towards Neethling House.


Figure 8F: View looking south-east behind Erfurt House, towards the Municipal buildings.

Figure 8G: View looking north-west to the backs of the heritage buildings at the corner of Andringa and Victoria Streets.

Figure 8H: View of the access from Victoria Street.

Figure 8I: General view of the parking area.

Figure 8J: Protected heritage building adjacent to the site along Andringa Street.

Figure 8K: View along Andringa Street, showing the character of the street.

Figure 8L: View of the treed municipal parking area to the south-east of the site, near the Ryneveld Road entrance and green space.

GRADING AND SIGNIFICANCE:

The site has been considered in numerous conservation-related studies. The findings of each are summarized below.

The Stellenbosch Conservation Strategy: Development Guidelines by KrugerRoos (1997)

The block was identified as part of a Key Precinct requiring a detailed Urban Design Framework "to facilitate proactive development, enhance the context of the conservation area and provide opportunities for both public and private investment" (1997: 26).

The precinct is described in that report as "the transition zone between the University and the Historical Core. It contains significant historical building stock, such as the Ryneveld Street buildings, the Wilgenhof forecourt, the Sasol Art Gallery and the row of shops linked by an arcade to the parking area adjacent to the Botanical Gardens, as well as relatively recent development such as the Town Hall complex and parking area, and the pedestrianisation of Beyers Street.

The inherent opportunities identified in the Precinct include:

- The provision of a pedestrian link from the University to the Core.
- The conversion of the parking area into a positive public space and cultural centre.
- The possible conversion of the parking area at the rear of the Town Hall as a public space, which could still accommodate parking.

See Figure 9.

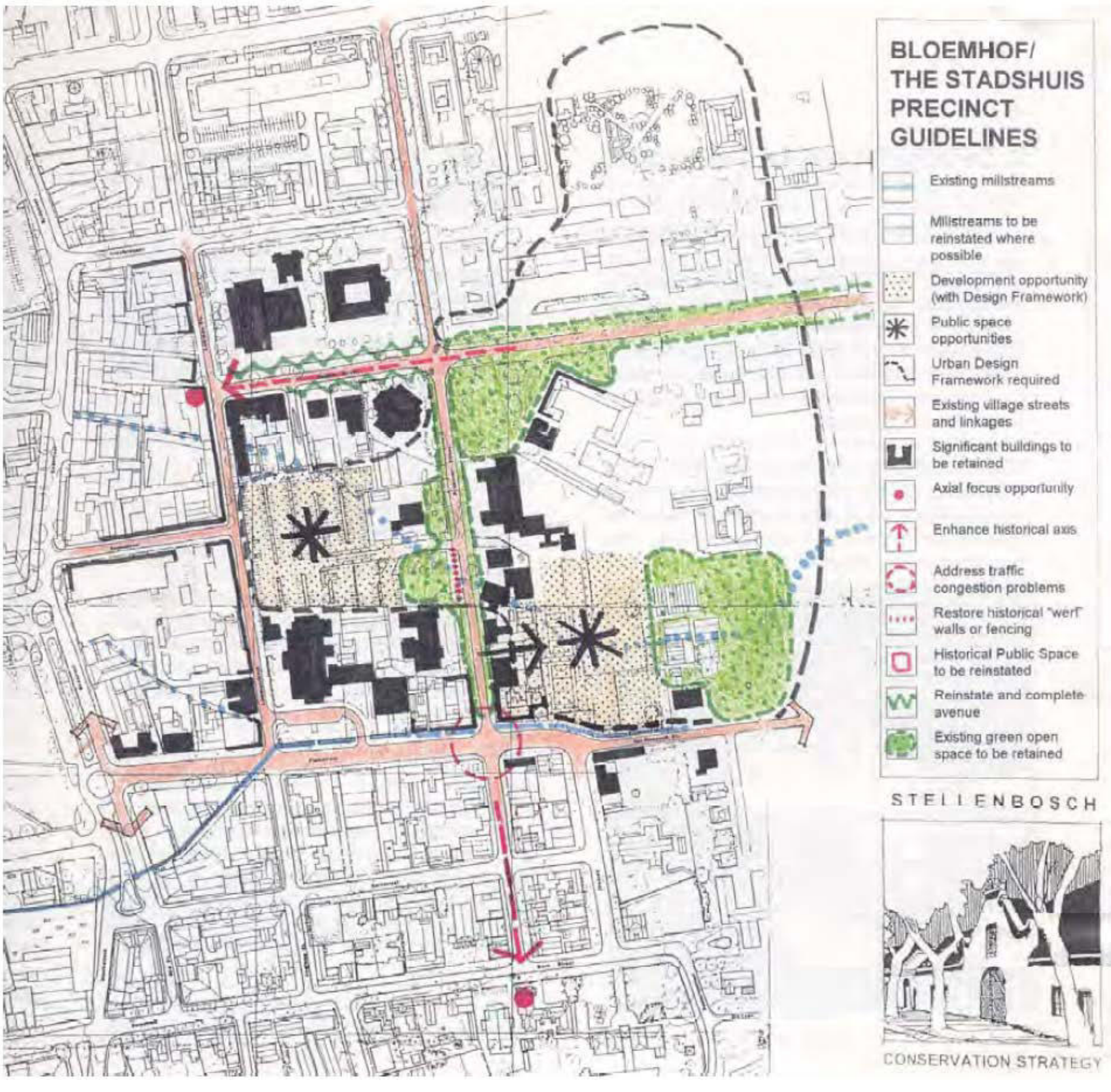


Figure 9: Guidelines for the Stadshuis Block by KrugerRoos, 1997.

Conservation Survey of all Buildings in the Historical Core by KrugerRoos (1998).

The study assessed heritage values primarily in terms of visual and architectural criteria, using also historical information from Fransen and Cook's Old Buildings of the Cape (1980).

See Figure 10.

Urban Design Study for the Stadshuis Block by KrugerRoos (2004).

The project aimed to take various previous policy statements regarding linkages between public spaces, and identified development opportunities and public space projects. Conceptual urban design proposals for the block were presented in Phase 1 of the project (Figure 11 - overleaf).

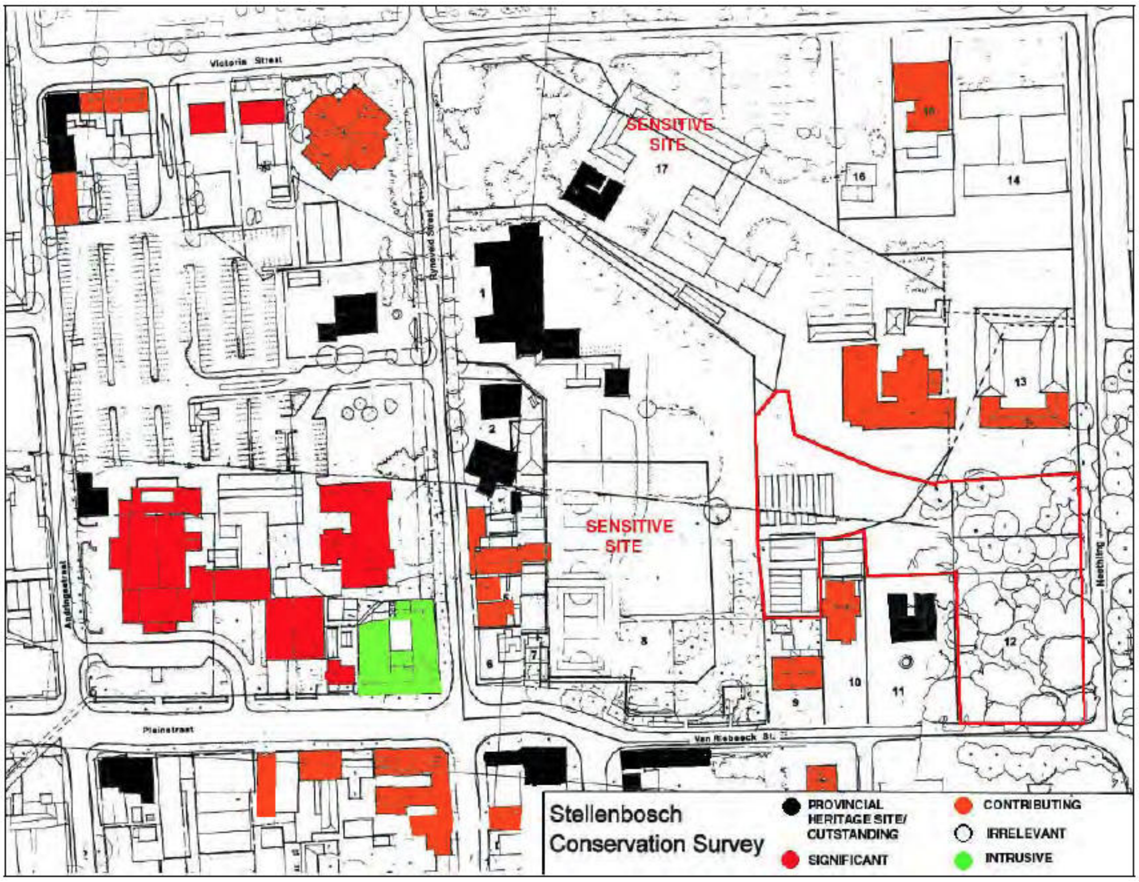


Figure 10: Heritage values according to Stellenbosch Conservation Survey, KrugerRoos, 1998. (Source: Harris and Pretorius, 2004).

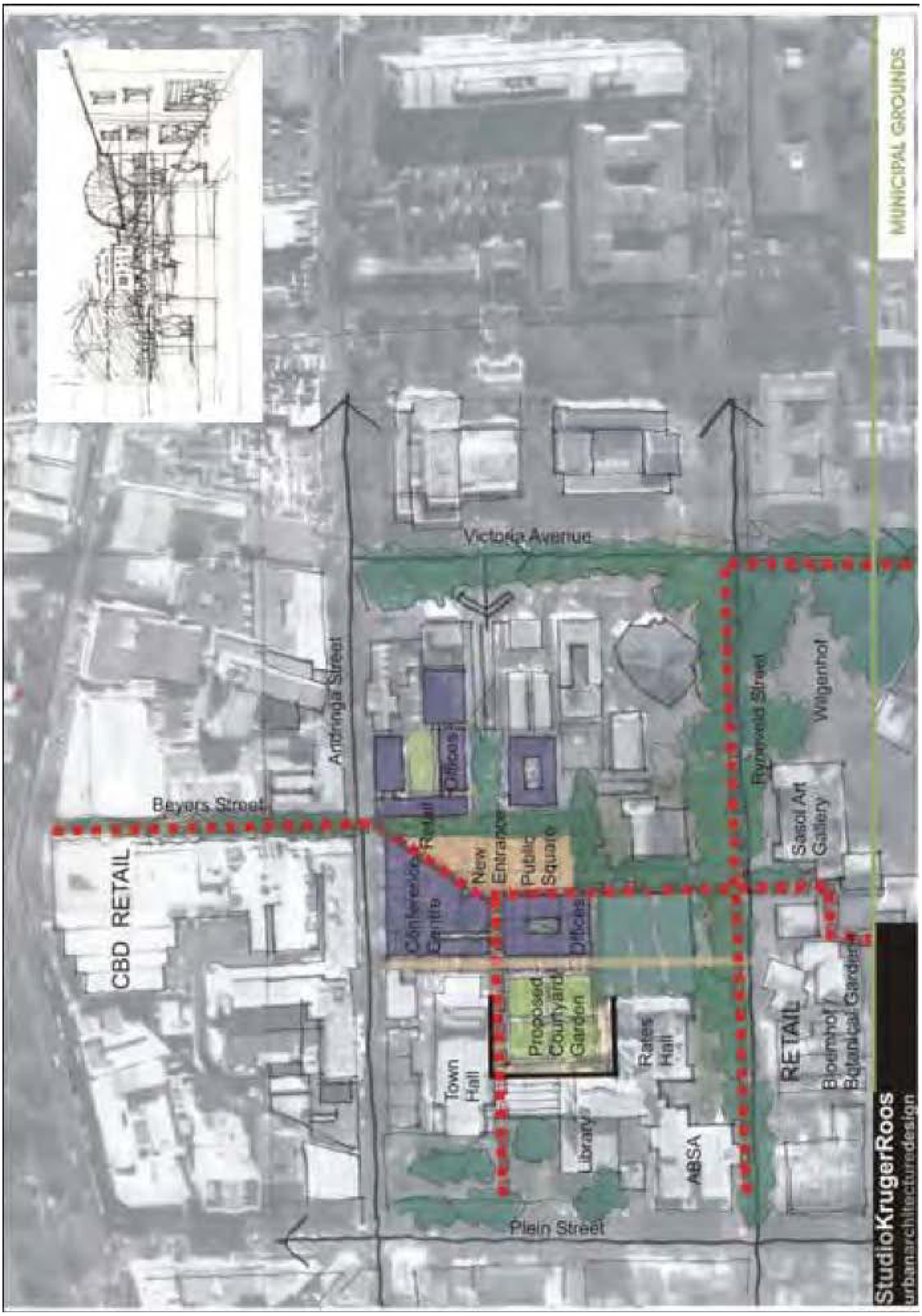


Figure 11: KrugerRoos sketch of concept for Stadshuis block, 2004.
(Source: Harris and Pretorius, 2004).

Stadshuis Urban Block Heritage Study by Pistoris and Harris (2004).

Pistorius and Harris undertook a parallel heritage study of the block in 2004, and came up with key heritage-based design indicators. These are:

Role, Structure and Form

- The multiple roles of this urban block are part of its character and should be accommodated and resolved in any development proposal:
    - The role of the southern part of the block as the civic centre of Stellenbosch is very important. Municipal functions have overflowed into other buildings on and off the block and become fragmented. Development should consolidate, strengthen and enhance the public role and stature of the "Civic Precinct", particularly by bringing the citizens there.
    - The western edge of the site was historically part of a ribbon of development along Andringa Street; re-development of this edge as part of the retail precinct would help to revitalise the area opposite it as well.
    - The relationship of the north east part of the block to the University precinct is not well resolved and could be improved by urban design.
    - The importance of convenient parking for the civic centre and commercial uses around the block is acknowledged. However, the impact of the parking area in terms of traffic generation and congestion in the historical core and its negative spatial and urban impact is problematic. While parking will have to be accommodated on the site, it should be as visually unobtrusive as possible: underground, where feasible, and screened by buildings and shaded by trees on the surface.
    - Some residential usage should be encouraged as part of the mixed-use character of the block, particularly on the northern part.
- The relationship (and potential relationships) between development of this block and the possible development of the Bloemhof site should be taken into consideration and their respective roles clarified. Possible developments which have been discussed in relation to these sites include a conference centre and a tourist hotel. Either or both would be suitable if appropriately designed.
- Development on the block should be structured like a contemporary extension of the village: broken up into clusters of buildings scaled in response to their immediate context and placed around people-scaled spaces and "streets". There is potential for the block to be divided into two parts by at least one east-west street (accommodating cars and people and with the scale, texture and treescape of the village).
- The scale and grain of any development on the block should respond directly to the scale and grain of the urban fabric of the historical core around it. This should be tested from the earliest stages of design through the use of figure-ground plans of the proposals drawn in the context of the fabric of the town around the block.
- Recognise and formalise existing pedestrian routes across the block, and where possible manage them as public paths which are part of the town. Security for any development should be at points of access to buildings.
- Increase and improve pedestrian permeability of the block, especially from Plein Street. Ensure that vehicular access is compatible with pedestrian access, and give the latter priority.
- There are opportunities to make a public "place" (square, plaza, court) or a series of connected places along routes through the development.

Parking and vehicular access

- Any increase of vehicular traffic in the historical core is regarded as a negative heritage impact. Similarly, reduction of on-street parking in the narrow streets of the historical village would be a positive heritage impact.

- The parking areas at the Stadshuis block and Bloemhof are conveniently located for users of the facilities in the centre of town, and the need for parking to be a part of development is acknowledged. However, cars should be discouraged from accessing parking via the historical core. The approach to the Stadshuis parking via Andringa Street has a very negative impact on the character and pedestrian use of that street (as do goods deliveries), and has traffic impacts beyond the immediate site, particularly on the west part of Plein Street and the Braak. We have suggested that potential parkers should be encouraged to bypass the heart of the historical core by using Merriman and Ryneveld Streets.
- In the Bloemhof study we suggested a study of the possibility of making Ryneveld Street between Plein and Merriman a two-way road, with appropriate urban design modifications. We envisaged it as a calm, dignified "university" boulevard, with grand buildings set back from the street, broad pavements in the shade of trees, and parked cars clustered in "courts" or hidden behind the buildings. The existing traffic calming measures between Victoria and Merriman Streets (raised, brick-paved pedestrian crossings) could be extended southwards, facilitating the existing east-west pedestrian movement between the Stadshuis block and Bloemhof and the University.
- Provision for surface planting of trees will need to be made in the design of the underground parking area.

See Figure 12 for a diagram of these indicators.

Middledorp/Historical Core Heritage Survey (2012).

The survey noted that the Eikestad Mall Parking had no heritage significance. However, many of the buildings surrounding the site have been graded (Figure 13).

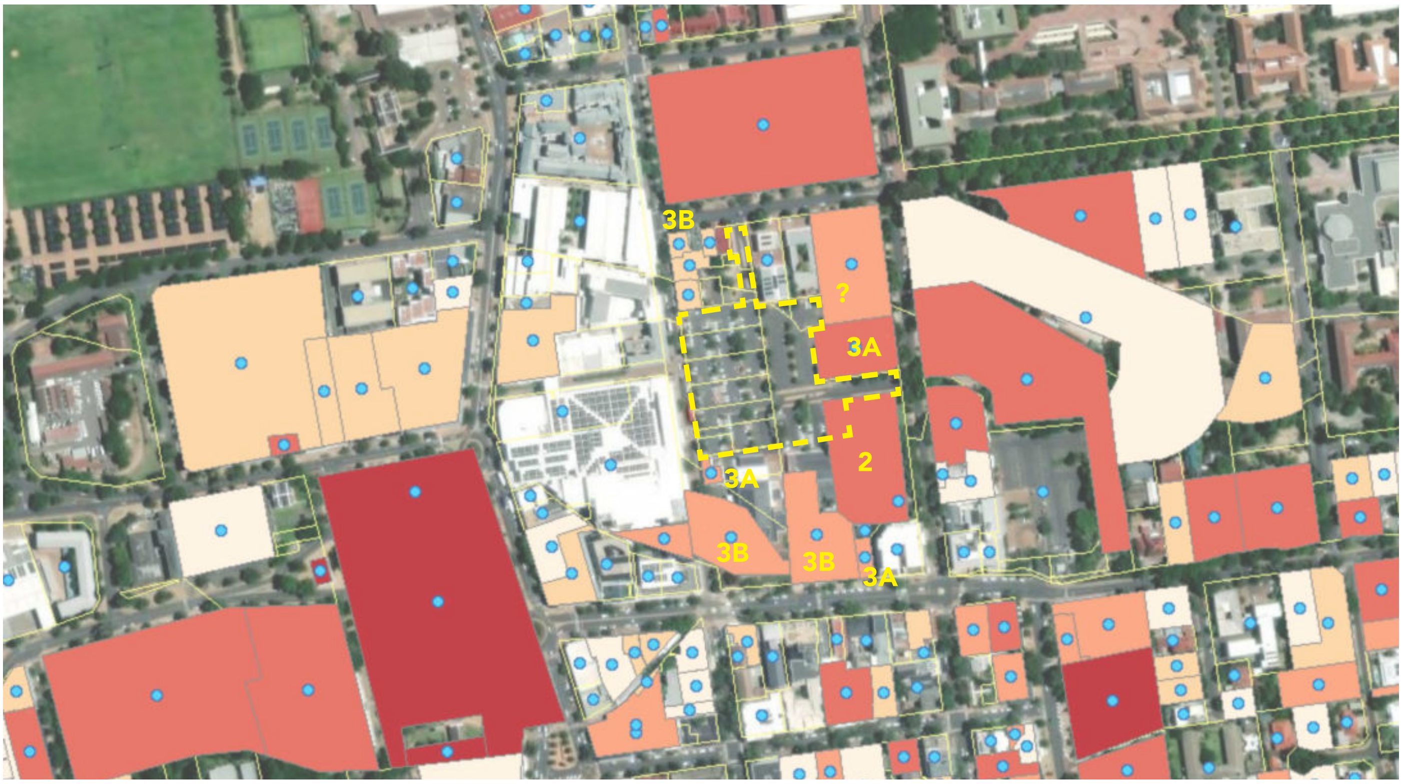


Figure 13: The current grading map for the site, with the grading of the various structures around the site indicated. These gradings were approved by HWC in 2012.

Figure 12: Harris and Pretorius' spatialised heritage-based design indicators for the block, 2004.

THE PROPOSED DEVELOPMENT:

The Municipality would like to maximise their parking facility on the site. As such, they would like structured parking to be realised on the site, together with the following architectural aims:

1. Create direct access to the facility from both Victoria & Ryneveld Streets. No vehicular entrance point is proposed from Andringa Street to allow for the possibility of changing Andringa Street into a pedestrian only street.
2. Create direct pedestrian access to the facility from the Eikestad Mall, Ryneveld Street & Victoria Street.
3. Create a parking structure that sits on top of a half-basement with a recessed structure that elevates to 2 additional storeys.
4. The building has to fit into a rich heritage context. The aim of this proposal is to create a building that will be secondary in its importance to the context. In order to achieve this the building mass has been pushed to the back and centre of the site.
5. Create a forecourt. This will serve as a landscape pedestrian friendly area that will connect the different parking areas. The forecourt will include the main pedestrian access to the parking structure.
6. Create a layout that connects with the rich heritage value of the immediate surrounding context. The single storey shops along Andringa Street are of a high historical value. The aim is to create a lower level street façade that responds to these neighbouring buildings.
7. Create a service zone to the southern side of the site. The aim of this is to create service access to the municipal buildings on the southern side.

See Figure 15.

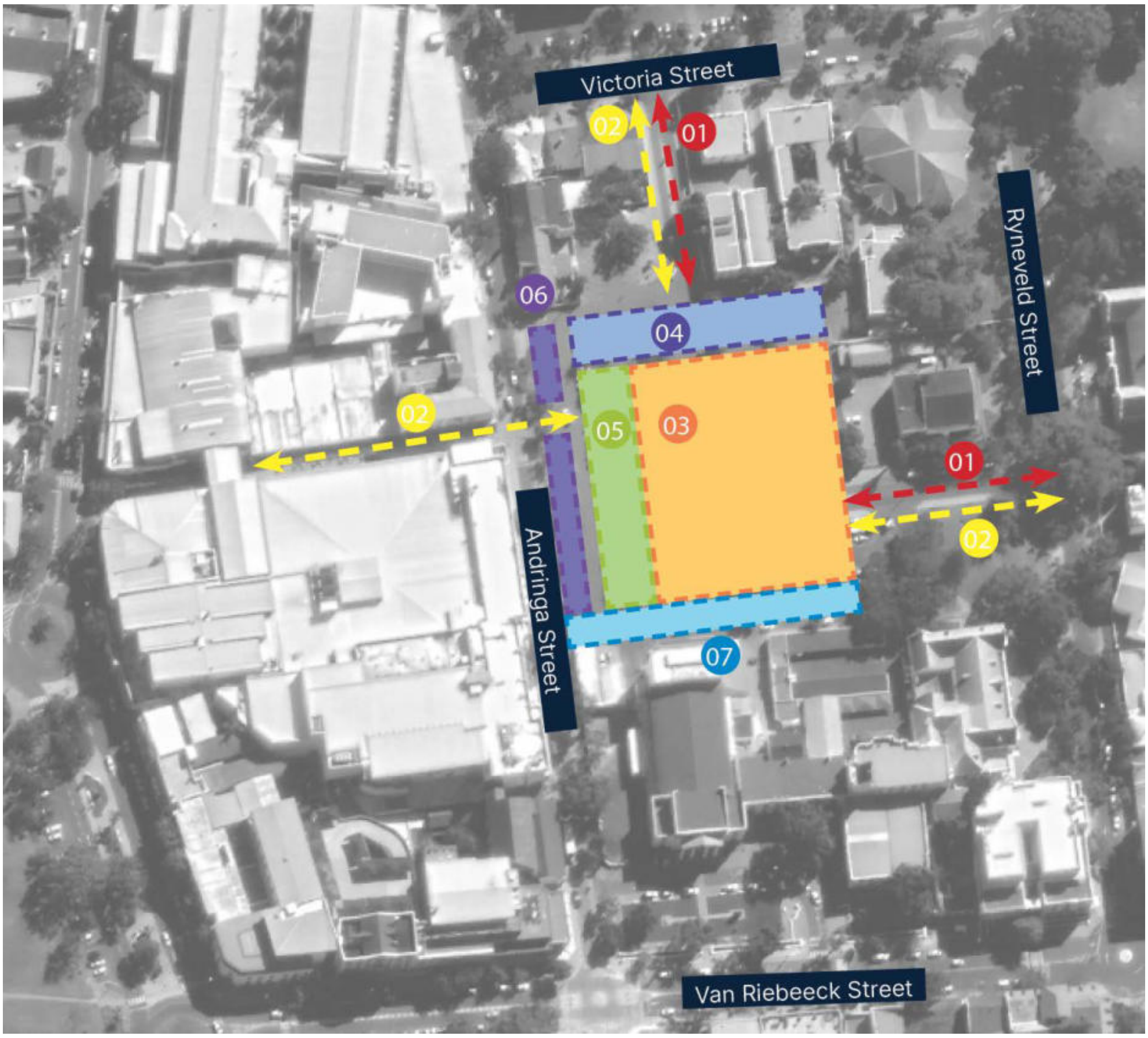


Figure 14: The current, high-level development proposal for the site, by SMEC Architects, 2023.

NHRA “TRIGGERS” AND LIKELY IMPACTS:

Because the site comprises 18 separate erven (as well as requiring access across two different erven), and in combination the area of the site is 18651,2m^2, the development of this open site into one that has a structure thereon will constitute a “change in character”, thereby triggering Section 38 (1) (c) (i) of the National Heritage Resources Act.

The key heritage-related possible impacts will be townscape/streetscape, as well as visual impacts from an urban design and townscape perspective. The site was the location of the old Drooge Rivier stream and so archaeological impacts are possible.

RECOMMENDATION:

This NID therefore assesses that there is reason to believe the proposed development will impact heritage, and therefore an HIA should be required. In addition, the following studies would be prudent to include in an overall HIA:

- A townscape and streetscape study;
- A visual assessment at the scale of the block and surrounds;
- An archaeological desktop study.

Claire Abrahamse

October 2023

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Fransen, H. “The Old Buildings of the Cape”. Jonathan Ball: Cape Town, 2004.

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Appendix C Geotechnical Report and Traffic Analysis

Geotechnical Report

SMEC
South Africa
Member of the Surbana Jurong Group

SMEC INTERNAL REF. C1978/2023/10/2908

Geotechnical Desktop Study Report

Eikestad Parking PPP, Stellenbosch, Western Cape

SMEC Reference No. C1978
Prepared for Stellenbosch Municipality
27 October 2023

Document Control

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Report Number	C1978/2023/10/2908
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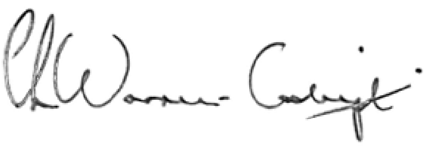
SMEC Company Details

Approved by	Charles Warren-Codrington Pr Eng			
Address	SMEC South Africa (Pty) Ltd.			
	65 Riebeek Street			
	Cape Town	South Africa		8001
Telephone	+27(0) 21 417 2900		**Website**	www.smec.com
Email	charles.warren-codrington@smec.com			
Signature				

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Important Notice

This report is confidential and is provided solely for the purposes of providing Stellenbosch Municipality with geotechnical desktop study information for the proposed Eikestad Parking lot located adjacent to Eikestad Mall in Stellenbosch, Western Cape. This report is provided pursuant to a Consultancy Agreement between SMEC South Africa (Pty) Ltd ("SMEC") and Stellenbosch Municipality, under which SMEC undertook to perform a specific and limited task for Stellenbosch Municipality. This report is strictly limited to the matters stated in it and subject to the various assumptions, qualifications, and limitations in it and does not apply by implication to other matters. SMEC makes no representation that the scope, assumptions, qualifications, and exclusions set out in this report will be suitable or sufficient for other purposes nor that the content of the report covers all matters which you may regard as material for your purposes.

This report must be read as a whole. Any subsequent report must be read in conjunction with this report.

The report supersedes all previous draft or interim reports, whether written or presented orally, before the date of this report. This report has not and will not be updated for events or transactions occurring after the date of the report or any other matters which might have a material effect on its contents, or which come to light after the date of the report. SMEC is not obliged to inform you of any such event, transaction, or matter nor to update the report for anything that occurs, or of which SMEC becomes aware, after the date of this report.

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1 Introduction

1.1 Background and Project Description

Stellenbosch Municipality (hereon the "Client") is proposing the development of a multi-level parking facility adjacent to Eikestad Shopping Mall in central business district (CBD) of Stellenbosch, Western Cape Province of South Africa. The facility is earmarked as a public private partnership (PPP) and aimed to facilitate increased parking capacity in the vicinity.

A pre-feasibility study conducted in 2018 identified this development as a favourable solution to the increased demand for parking in the CBD as well as a way to allow for removal of on-street parking for developing pedestrian and non-motorised transport facilities in surrounding roads. A geotechnical investigation is required as part of the design process, and this draft report comprises a desktop study for the geotechnical aspects of this project.

This desktop report would serve as part of the background information of the geotechnical investigation report. The geotechnical investigation report will be updated with investigation data, laboratory test results, analysis and recommendations.

1.2 Terms of Reference

SMEC South Africa (Pty) Ltd. ("SMEC"), through the Roads and Highways Function, was appointed by the Client on 27 March 2023 to provide professional services to develop the Eikestad Parking PPP. As part of the professional duty as civil engineers, the geotechnical aspects of the project need to be considered for the proposed development to design and construct the facility properly. As such, this desktop study serves as a preliminary consideration of the geotechnical conditions with the recommendation of further intrusive geotechnical investigation to substantiate the conditions.

1.3 Objectives

This geotechnical desktop study aims to determine the anticipated geotechnical characteristics of the in-situ soils and rock, as well as boundary conditions and potential fatal flaws as far as the desktop investigation level will permit. This study provides a baseline understanding for planning of further investigations and baseline design consideration. The tasks required to fulfil this objective are as follows:

- Assess the current on-site conditions;
- Review the potential geotechnical conditions from available sources;
- Reveal the variability of the in-situ soil and rock profiles;
- Reveal any risks or challenges to geotechnical investigation;
- Reveal potential fatal flaws to the specific site location for the intended purposes; and,
- Comment on the geotechnical feasibility of the proposed development.

1.4 Methodology

The following investigation approach was adopted to realise the objective of the geotechnical investigation:

- A desktop review to provide details on the regional geology, geomorphology, geohydrology, and related subsoils to be expected and sensitise the project to the potential inherent geotechnical risks to development.

- A visual site survey for site characterisation.

The following information sources were studied during the desktop work:

- Aerial imagery (Google Earth®);
- Available geological records including 3318 Cape Town, 1: 250 000 Geological Series;
- Available hydrogeological records including 3317 Cape Town, 1:500 000 Hydrogeological Map Series;
- SMEC's geotechnical database of projects conducted near the project area and within similar geotechnical and geological zonation/ sequences;
- Digital Elevation Model (DEM)-sourced elevation data; and
- National Groundwater Archive (DWS).

1.5 Codes of Practices and Standards

SMEC used the following standard practice codes and guideline documents in performing this study:

- Site Investigation Code of Practice, 1st Edition, South African Institute of Civil Engineering – Geotechnical Division, January 2010; and,
- Basis of structural design and actions for buildings and industrial buildings. Part 5: Basis for geotechnical design and actions. SANS 10160-5 (2010).

1.6 Limitations of Assessment

The services performed by SMEC were conducted in a manner consistent with the level of care, skill and detail exercised by members of the geotechnical profession practising under similar conditions for the requirements of a geotechnical study (SAICE, 2010). This geotechnical desktop study report is based on data obtained from a limited number of sources, including geological records, topographic maps, aerial imagery, and geotechnical and geological literature available for the greater Cape Town region. The nature of geotechnical engineering is such that variations in soil and rock conditions may occur even where sites seem to be consistent. Variations in what is reported here will become evident during the detailed geotechnical investigations.

2 Desktop Study

2.1 Site Location

The site is located in the central business district of Stellenbosch, adjacent to Eikestad Shopping Mall, in the Western Cape Province. The site is surrounded by Andrige Street and Eikestad Mall to the east, Victoria Street to the north, Ryneveld Street to the west and private buildings to the south. The approximate co-ordinates of the centre of site are 33.935392°S, 18.861386°E, and is accessible via Ryneveld Street or Victoria Street. The site location and layout plan are illustrated in

Figure 2-2 and

Figure 2-3.

2.2 Climate

Stellenbosch is characterised by Mediterranean climate conditions, comprising hot dry summers and cold wet winters. Climatic data (World Weather Online, 2023) indicates that the mean annual temperature in this region is 16.9°C. The average maximum daily temperature varies from 28°C in January and February to 17°C in June-August. Corresponding minimum temperatures for these months are 16°C and 7-8°C, respectively. The mean annual precipitation is approximately 847 mm, falling mainly during winter. Precipitation is the lowest in February, with an average of 15 mm. The greatest amount of precipitation occurs in June, with an average of 183 mm. The average monthly temperature and rainfall distribution are illustrated in Figure 2-1.

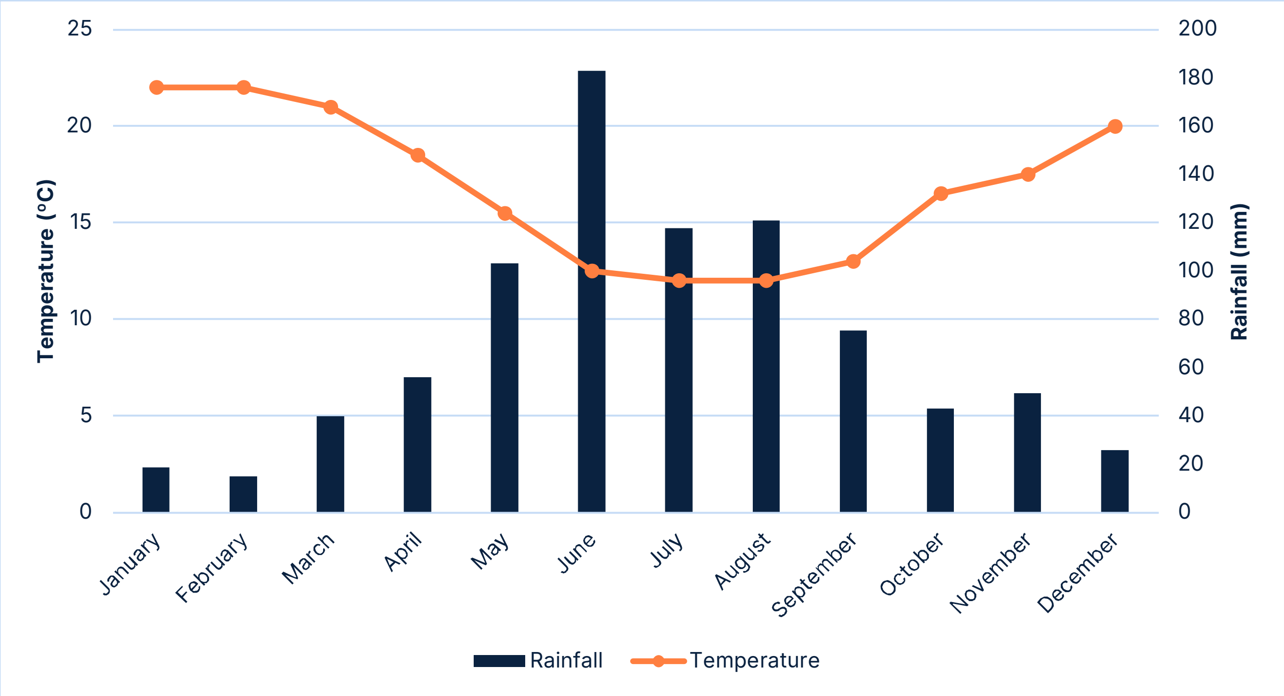

Figure 2-1: Summary of Climatic Data in Stellenbosch Region (World Weather Online, 2023)

The climate is a pivotal factor for geotechnical considerations as it determines the mode and rate of rock mass weathering and, thus, the formation of soils. Weinert (1980) developed the N-Value to differentiate between regions of similar weathering characteristics. The N-value for this region is between 2 and 5, indicating that although disintegration will happen, chemical decomposition will be the dominant type of weathering, resulting in the formation of thick residual and weathered profiles.

Figure 2-2: Regional Scale Site Location

Figure 2-3: Site Location within Stellenbosch

2.3 Topography, Drainage and Vegetation

The regional topography of the town is generally gently sloping to the west at an average gradient of approximately 2%, with the minimum and maximum elevation points at 95 m and 245 m above the mean sea level, respectively. The town of Stellenbosch is surrounded by higher topographical features such as the mountainous landscapes of the Hottentot-Holland Mountain range to the east and southeast at a regional scale, with elevation reaching up to 1 500 m above mean sea level, and the undulating agricultural hills to the north and west. The site is characterised by a relatively flat topography with an elevation of approximately 115 m above mean sea level.

The site is locally bounded by a southward flowing Eerste River about 1 km to the west and its tributary, Jonkershoek River, about 0.6 km to the south (see Figure 2-4). Stormwater management in the vicinity of the site is highly developed, however localised ponding of water is possible across the site due to a flat topography during heavy rainfall.

According to 1:1 000 000 SANBI vegetation map (2018), the study area is regionally characterised by the Coastal Renosterveld vegetation comprising hardy low shrubs, small trees and various grass varieties, including the renosterbos plant from which the vegetation type is named, and there is a notable lack of fynbos plants.

2.4 Regional Geology

A review of 3318 Cape Town, 1:250 000 Geological Series indicates that the site is largely underlain by the recent sediments of Quaternary Age mainly comprising alluvial terrace gravels (Figure 2-5). These sediments are underlain by the greywacke and phyllite of the Tygerberg Formation, Malmesbury Group.

The flat topography of Stellenbosch was formed by the large paleo-fluvial plain of coarse boulder alluvium eroded from the mountainous region to the east. The origin of the alluvium largely consists of the Table Mountain Sandstones that top the Hottentot-Holland mountains to the southeast but will also contain eroded sediments from the igneous plutons that underlie the sandstones and make-up the base of the surrounding hills and mountains. The igneous plutons in the region are part of the Cape Granite Suite and belong to the Stellenbosch Pluton to the east and the Kuilsriver-Helderberg Pluton to the west.

2.5 Regional Hydrogeology

The groundwater environment characterising the site comprises fractured aquifers associated with undifferentiated metasedimentary rocks of the Malmesbury Shale Group. The borehole yielding potential within these aquifers ranges between 0.5 L/s and 2.0 L/s (see Figure 2-6). Unconfined aquifers associated with the Quaternary deposits are also expected in the study area and will often form perched groundwater tables during high rainfall periods; this is anticipated along or near the drainage lines on the site.

The depth of groundwater obtained from the existing registered borehole database (National Groundwater Archive) in the vicinity of the study area indicates groundwater levels between 2 m and 26 m below ground level within the fractured aquifer. Groundwater levels within the quaternary aquifers may be shallower than these depths; however, local variances may exist at the site.

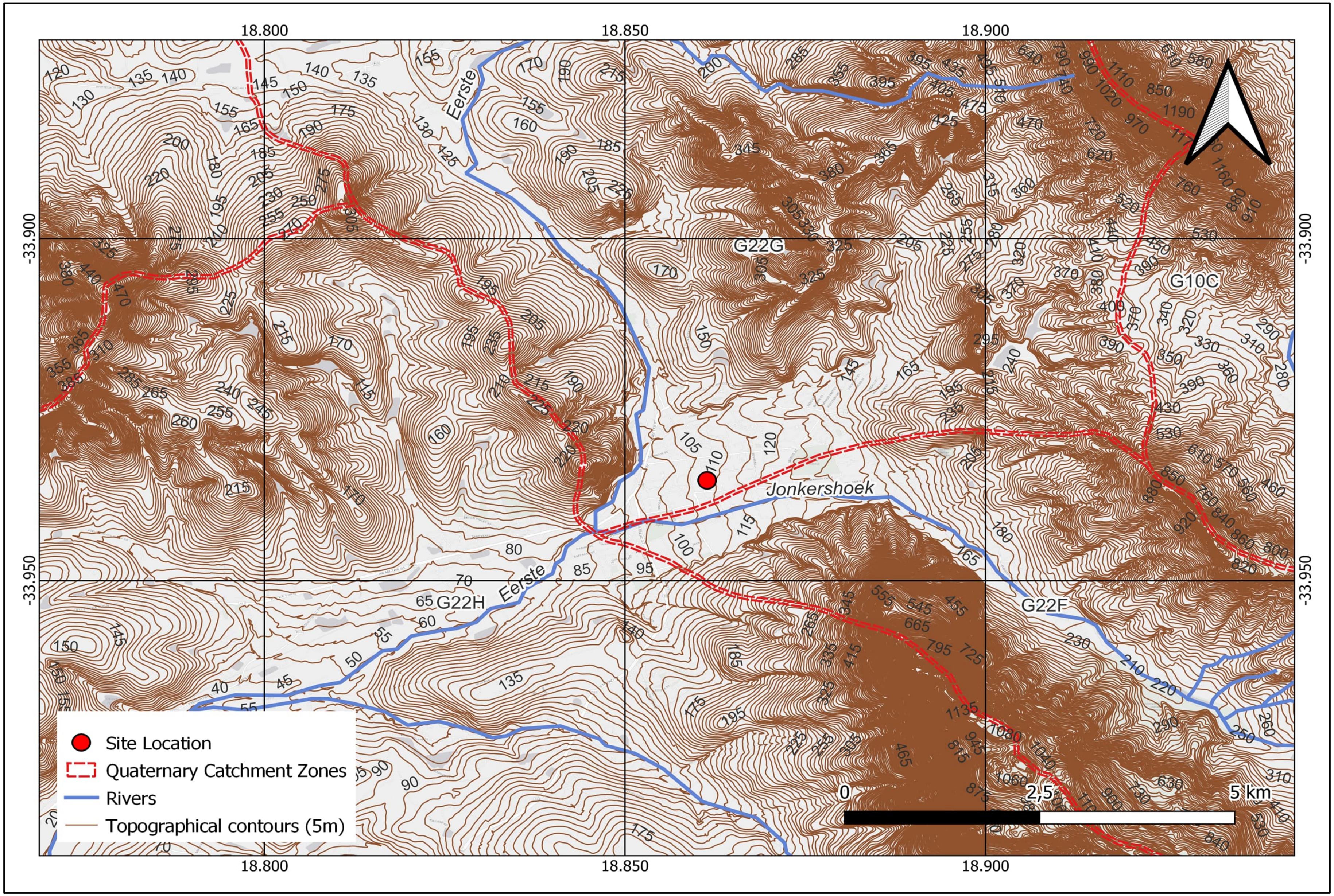

Figure 2-4: Topography and Drainage of the Study Area

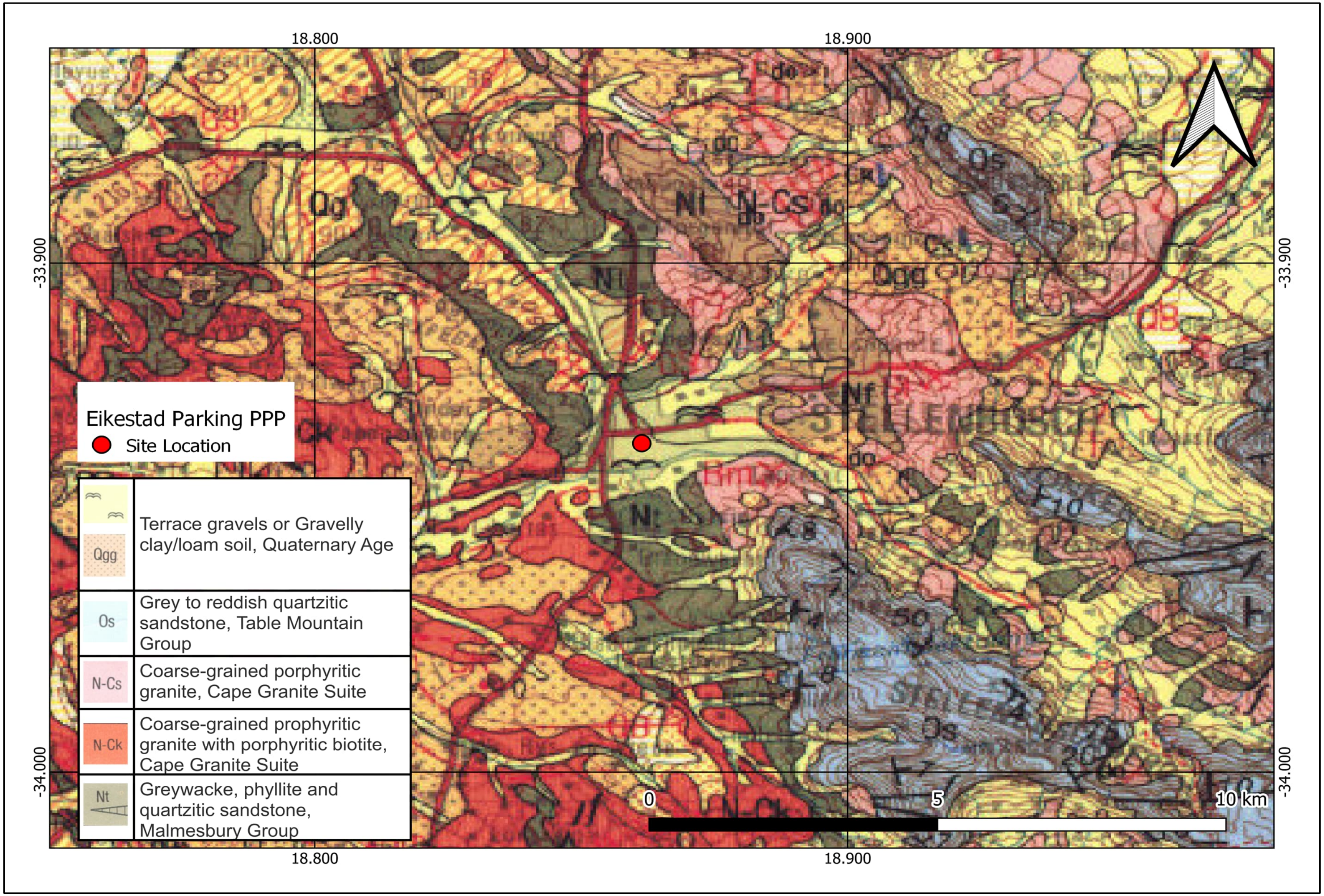

Figure 2-5: Extract of 3318 Cape Town, 1:250 000 Geological Map

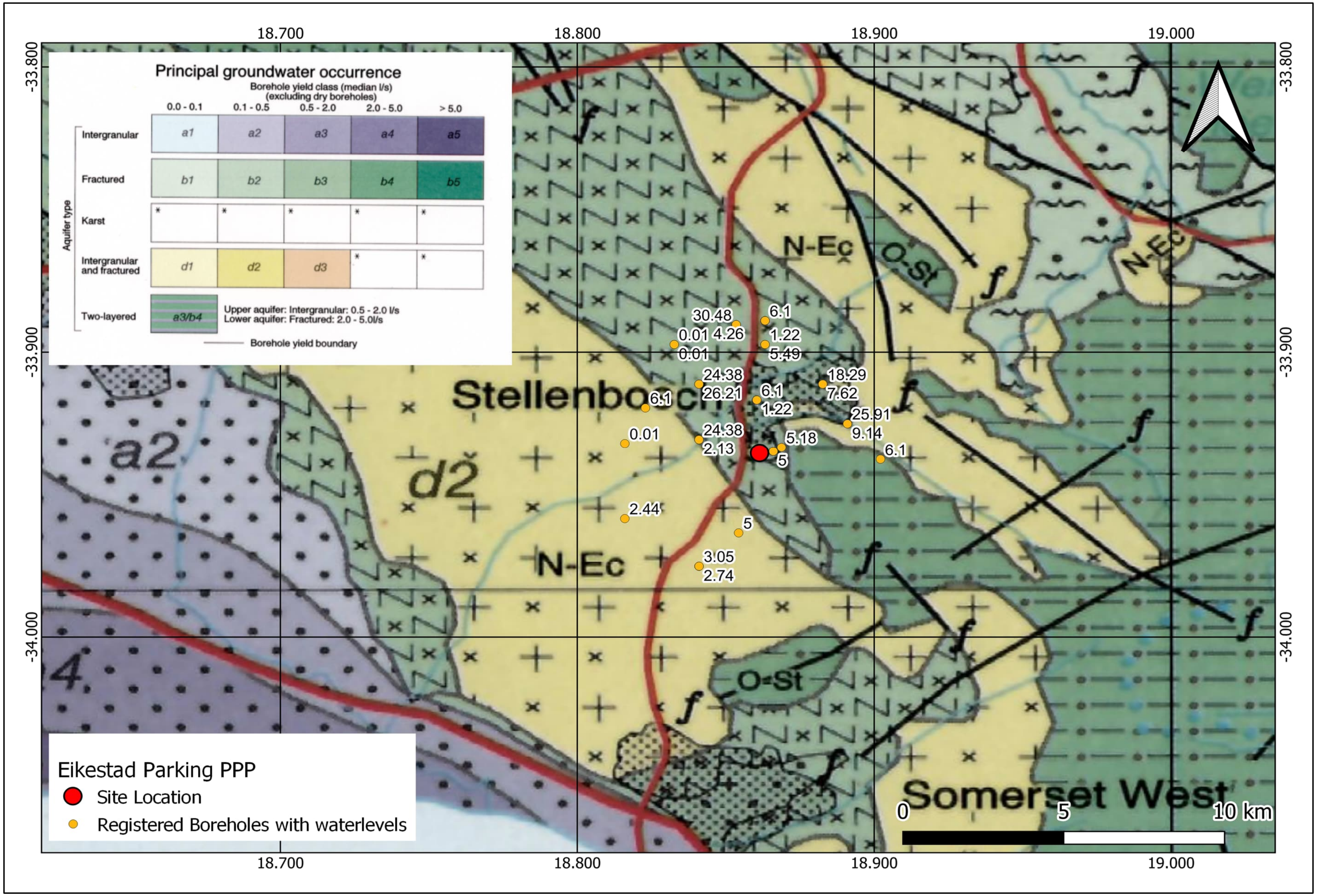

Figure 2-6: Abstract of 3317 Cape Town, 1:500 000 Hydrogeological Map with registered boreholes within 5 km of site location

2.6 Seismicity

South Africa is located on the African Tectonic Plate, which, compared to other tectonic plates, is relatively stable with low degrees of seismic risk. Much of the African Plate, except for the East African Rift Zone and localities of intensive underground mining, can be considered to have low seismic risk. This does not suggest that no seismic activity occurs but instead that the probability of activity is much lower.

Seismic hazard is represented by any particular area's peak horizontal ground acceleration (PGA): the greater the PGA, the more severe the potential seismic activity at the given site. Figure 2-7 provides indicative seismic risk across South Africa and the corresponding peak ground accelerations with a 10% probability of exceedance within a 50-year period. For design purposes, a baseline PGA in the range of 0.15g is considered applicable for the Eikestad Parking site (in line with Figure 2-7 and SANS 10160-4), which equates to a Degree VII ("Very Strong") classification on the Modified Mercalli Scale.

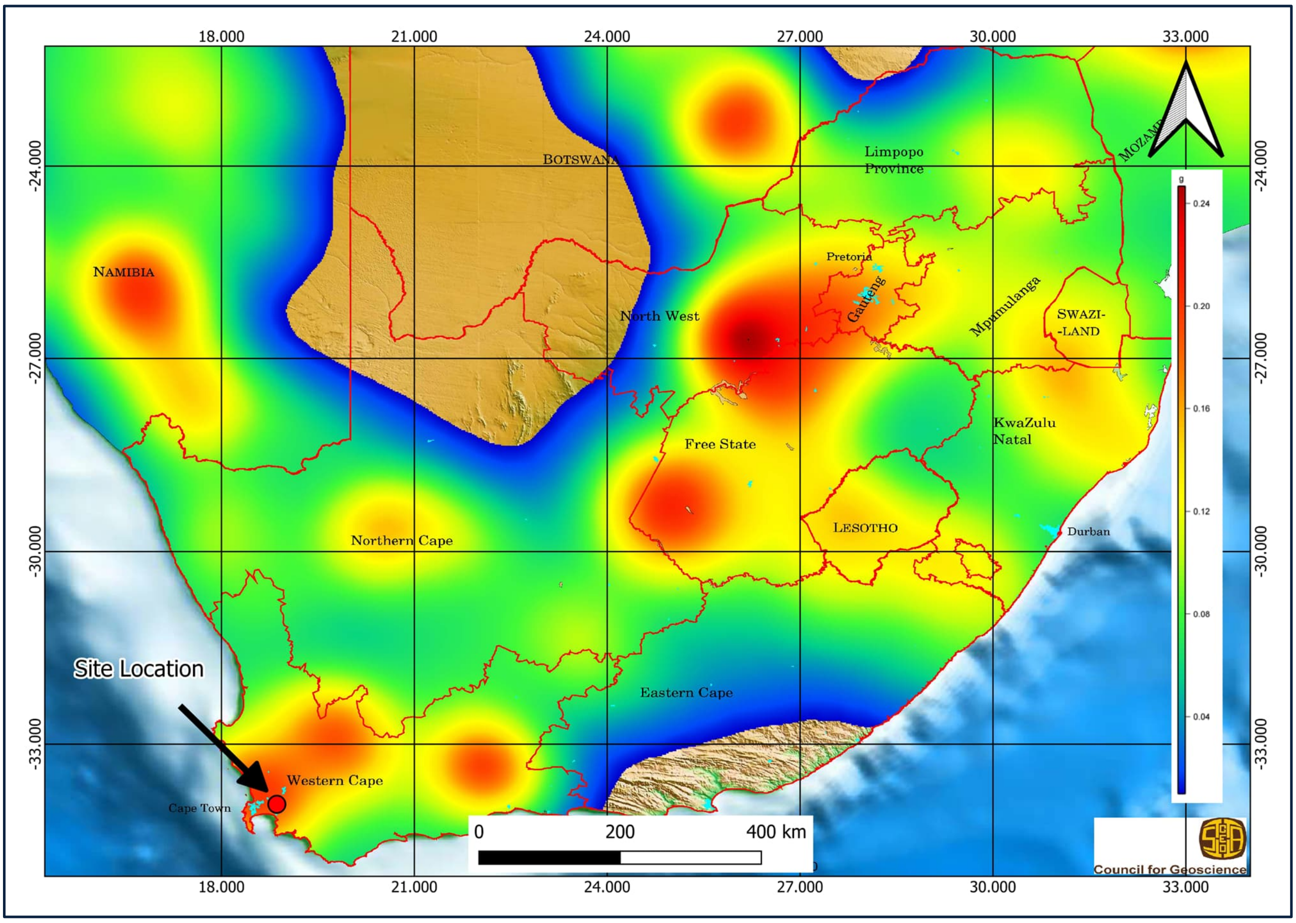

Figure 2-7: Seismic Hazards Map of South Africa (Council for Geoscience, 2003)

2.7 Previous Geotechnical Investigations

Three geotechnical investigations were completed in the area, two under the name of Vela VKE (former name of SMEC) in 2010 and 2011, and one investigation as SMEC in 2013. All three investigations were within 850 m of the current parking facility development as shown in Figure 2-8 below. In each respective case, these investigations were aimed at facilitating the design of multi-storey buildings (without a basement level). All recommendations were for shallow foundations within the boulder layer of the alluvial sediments. The archived reports were reviewed and summarised below to inform the geotechnical understanding of the current site and the anticipated geology.

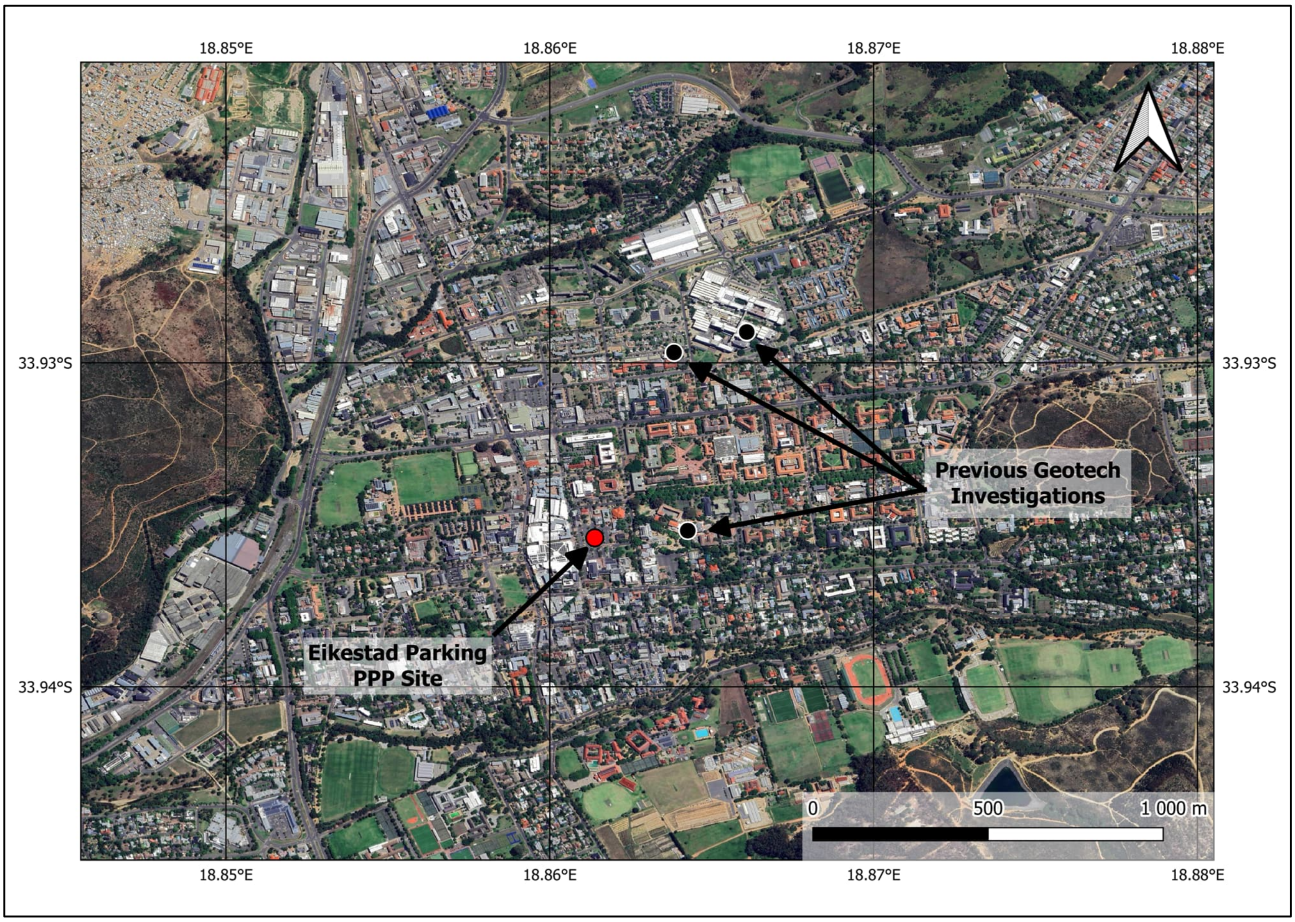

Figure 2-8: Site plan of site location in relation to previous investigations

Overall, the investigations comprised of trial pitting, laboratory testing and, in two projects, geophysical surveys to verify the geological conditions and geo-mechanical parameters. All uses of a TLB machine for trial pitting resulted in refusal on the boulder layers while one investigation used an 18-ton excavation to excavate past the boulder layer. The trial pits revealed a thin layer of transported sand or fill with a thickness of 0.2-1.0 m. This was underlain by the clast supported boulder layer with a matrix of sand that progresses to a clay matrix with depth. The boulder layer varied in thickness but generally the lower clay-rich boulder layer ended at a depth of 2.1-3.0 m below existing ground level (EGL). Underlying the boulder packed alluvium was a firm to stiff clay layer designated as the residual phyllite down to a depth of 2.8-4.0 m below EGL. This residual phyllite was shown to grade into very soft rock phyllite until the final depth of 5.0 m below EGL was reached, as required by the scope.

Geophysical surveys were conducted in two of the investigations in the form of continuous surface wave (CSW) tests to assess ground stiffness for settlement calculations. The CSW test results revealed consistency in ground stiffness until the soft rock bedrock of phyllite. This allowed for confidence in shallow founding on sandy boulder layer. The settlement calculations were within serviceability limits (<13mm) with minimal differential settlement calculated, given the allowable bearing capacity stated for each design.

Groundwater was only observed in one project located 850 m away from the current site. Groundwater was encountered at 1.5 m below EGL in the trial pit dug past the boulder layer with the 18-ton excavator. The other two projects did not encounter any groundwater as all trial pits refused on the upper part of the boulder layer. Based on this, it is presumed that groundwater at the site can be encountered as early as 1.5 m below EGL.

3 Site Assessment

3.1 Site Observations

A site visit was conducted by SMEC on Thursday, 26 October 2023. The objective of the site visit was to conduct a site walk-over of the project area with a view of assessing the current conditions and providing an accurate scope for the required geotechnical investigation.

The following observations were made during the site walkover:

- The site is flat terrain with a slight gentle gradient to the west;
- There is an existing paved open parking lot with a few small buildings;
- The boundary of the parking lot is surrounded by existing buildings on three of the four sides, with the Andringa Street separating site from the Eikestad Shopping Mall;
- Consideration to building stability and potential foundation movements will need to be given for the existing buildings depending on the proximity to the boundary of the basement level.
- Underground services were indicated by a number of man-hole covers (11 no. in total) identified on site.

They were not inspected thus the type of underground service(s) are unknown. However, wayleave applications and communications with service providers have revealed a number of different services in the proposed site footprint. As of writing this desktop study, the following services have been indicated: electrical cabling, stormwater pipelines, water pipeline (possibly for irrigation), and sewerage. The electrical cabling runs east to west in the southern half of site with a branch going south off site. These cables run just north of an electrical substation that is managed by the municipality. The stormwater pipeline has multiple branches and runs across the site. The water pipeline was a single line and enters from the east. It is potentially for irrigation as the line ends abruptly in the centre of the parking lot. The sewerage pipeline is relatively short and runs between two small buildings with a connection running west under Andringa Street. These two buildings are understood to be two public toilets that have been decommissioned and disused. No overhead electrical lines were observed but street/parking lights present would require underground cabling.

Figure 3-1: North entrance from Victoria St looking south into the parking lot.

Figure 3-2: View of parking lot from the northern side looking southwest towards the Eikestad Shopping mall.

Figure 3-3: View from northwest corner of the parking next to Andringa Str., looking southeast.

Figure 3-4: View of western side of the parking lot and Andringa str. (looking south).

Figure 3-5: View of electrical substation from the parking lot (looking south-southwest).

Figure 3-6: View of decommissioned public toilets on west side of the site (looking northwest).

3.2 Anticipated Geotechnical Conditions

Given the previous investigations and the reviewed regional information, the following geological profile is anticipated:

- 0.0 – 0.6 m (±0.4 m): Medium dense, fine sand (Transported/Fill)
- 1.0 – 2.5 m (±0.6 m): Medium dense, boulders and cobbles in sand matrix progressing to clay matrix (Alluvium)
- 2.5 – 4.0 m (±1.0 m): Firm to stiff, clay. (Residual Phyllite)
- Below 4.0 m (±1.0 m): Very soft phyllite rock, occasionally recovered as dense gravel. (Phyllite)

Based on NGA data and previous investigations, groundwater/ perched water table is anticipated from a depth of 1.5 below EGL within the alluvial layer of boulders and cobbles.

4 Conclusions

This geotechnical study report highlights the anticipated geological and subsequent ground conditions, as well as boundary conditions and potential fatal flaws as far as the investigation level will permit.

The regional topography is flat with an overall very gentle gradient to the west. Climate data indicate that the area receives most rainfall between June and August during the cold winter months, with the summers dry and hot, especially over December to February. The seismicity study indicated a minimum PGA of 0.15g to be taken into consideration for design purposes.

Conceptually, the site is anticipated to be underlain by alluvial gravels and boulders of the quaternary sediments which in turn is underlain by the phyllite and greywacke of the Tygerberg Formation of the Malmesbury Group. Historical investigations in the vicinity of the site within the same geological zonation revealed the anticipated geological profile below:

- 0.0 – 0.6 m (±0.4 m): Medium dense, fine sand (Transported/Fill)
- 1.0 – 2.5 m (±0.6 m): Medium dense, boulders and cobbles in sand matrix progressing to clay matrix (Alluvium)
- 2.5 – 4.0 m (±1.0 m): Firm to stiff, clay. (Residual Phyllite)
- Below 4.0 m (±1.0 m): Very soft phyllite rock, occasionally recovered as dense gravel. (Phyllite)

Based on the previous studies and NGA data, a perched ground water table is anticipated from 1.5 m below EGL within the alluvial deposits.

A site visit was conducted to assess the conditions across the site and geotechnical risks. The physical assessment of site conditions would help to firstly confirm elements of the desktop study findings but also to provide an accurate scope and specifications for the required geotechnical investigation. The scope and specification have been submitted previously for approval by Client.

The observations made during the site visit align with the elements of the desktop study findings, that is, general topography and indications of the potential underground services. Due to the paved and highly developed nature of the area, no natural ground was exposed to assess the geology but previous investigations in the area were drawn upon. A number of manhole covers were observed on site and the wayleave applications, and subsequent communications, have revealed existing underground services in the proposed site footprint including, but not limited to, electrical cabling, stormwater pipes, water pipe and disused sewerage line. Linked to these services is an electrical substation to the south of site and two small disused toilets to the west of site. There were also indications of telecommunication infrastructure running through the parking lot, but this has not been confirmed with the service provider as of writing this study.

It is important to note that all wayleave applications need to be completed and a ground penetrating (GPR) survey will need to be conducted prior to any intrusive investigations carried out. This is to ensure the safety of the contractors as well as the cost and time implications of damaging any underground services. The site has easy accessibility for investigation works and construction works, however appropriate plans will need to be arranged to block off sections of the whole of the parking lot so that pedestrians and cars are not in the way.

5 Recommendations

Based on the findings presented above, SMEC is of the view that the proposed parking facility project is feasible and from a geotechnical point of view, the project can be progressed to the geotechnical investigation stage. Cognisance must however be given to the risks identified in this study that have an impact on both the geotechnical investigations and the design and construction of the parking infrastructure.

The risk of striking underground services must be highlighted for the intrusive investigation works due to the variety of services present. However, the investigation can be accommodated within the site plan indicating the location of the underground services.

SMEC has previously submitted a scope and specifications document detailing the geotechnical works required and recommended that the geotechnical investigations be conducted based on the quantum of work and specifications contained in this document. In summary, the following scope of work is recommended:

- A ground penetrating radar (GPR) survey of the area to confirm the location of buried services;
- 4 no. rotary cored boreholes to 12 m below EGL;
- Installation of piezometer standpipes for groundwater level monitoring;
- A Competent Engineering Geologist or Geotechnical Engineer on site to supervise investigation works and profile the boreholes according to the SIACE Guidelines of Soil and Rock Logging (2002); and,
- Laboratory testing of samples obtained from boreholes.

Note rotary core boreholes are favoured over other methods of investigation, such as depp trial pits excavated by 20 t excavator. The reasons for this include, inter alia:

- Boreholes will offer more information on the soil horizons at depth as well as the opportunity to monitor the long-term groundwater profile. This information is pertinent to the design of basement levels and deep foundations, as well as to the design of the building's waterproofing/ damp-proofing measures and to managing uncertainty during construction;
- Boreholes will also create less disturbance (and more localised) than test pits. This means the parking facility can be returned to normal operation with minimal rehabilitation of the pavement layers being necessary.
- Boreholes can also be located more strategically to avoid the risk of striking buried services.

Notwithstanding, if Client's budget does not allow for rotary core drilling at this time the above scope may be adjusted, but note we deem this disadvantageous in so far as gaining the requisite information to manage the risk of deep foundations, basement levels and shallow groundwater relevant to this site.

6 References

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Traffic Analysis

MOVEMENT SUMMARY

Site: 1 [Victoria St / Andringa St (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour
Site Category: Existing
Stop (All-Way)

Vehicle Movement Performance																
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St															
1	L2	All MCs	24	0,0	24	0,0	0,703	32,6	LOS D	4,5	32,1	1,00	1,56	3,80	38,8
2	T1	All MCs	123	5,0	123	5,0	0,703	32,8	LOS D	4,5	32,1	1,00	1,56	3,80	38,7
3	R2	All MCs	134	1,0	134	1,0	0,703	32,1	LOS D	4,5	32,1	1,00	1,56	3,80	38,6
Approach			281	2,7	281	2,7	0,703	32,5	LOS D	4,5	32,1	1,00	1,56	3,80	38,7
East: Victoria St															
5	T1	All MCs	7	0,0	7	0,0	0,277	22,6	LOS C	1,1	7,5	0,97	1,21	2,28	43,3
6	R2	All MCs	73	1,0	73	1,0	0,277	22,6	LOS C	1,1	7,5	0,97	1,21	2,28	43,1
Approach			80	0,9	80	0,9	0,277	22,6	LOS C	1,1	7,5	0,97	1,21	2,28	43,2
North: Andringa St															
7	L2	All MCs	209	0,0	209	0,0	0,485	20,8	LOS C	2,2	15,7	0,94	1,33	2,76	44,3
9	R2	All MCs	13	0,0	13	0,0	0,485	20,7	LOS C	2,2	15,7	0,94	1,33	2,76	44,3
Approach			222	0,0	222	0,0	0,485	20,8	LOS C	2,2	15,7	0,94	1,33	2,76	44,3
West: Mall Exit															
10	L2	All MCs	5	0,0	5	0,0	0,010	13,1	LOS B	0,0	0,2	0,79	1,15	1,78	48,7
11	T1	All MCs	6	0,0	6	0,0	0,016	14,8	LOS B	0,0	0,3	0,86	1,16	1,85	47,8
Approach			12	0,0	12	0,0	0,016	14,0	LOS B	0,0	0,3	0,83	1,16	1,82	48,2
All Vehicles			595	1,4	595	1,4	0,703	26,4	LOS D	4,5	32,1	0,97	1,42	3,17	41,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [Victoria St / Access to Parking (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows [Total	HV]	Arrival Flows [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
South: Access to Parking															
1	L2	All MCs	17	0,0	17	0,0	0,031	8,3	LOS A	0,1	0,6	0,18	0,90	0,18	51,1
3	R2	All MCs	17	0,0	17	0,0	0,031	8,4	LOS A	0,1	0,6	0,18	0,90	0,18	50,9
Approach			34	0,0	34	0,0	0,031	8,3	LOS A	0,1	0,6	0,18	0,90	0,18	51,0
East: Victoria St															
4	L2	All MCs	27	0,0	27	0,0	0,051	5,6	LOS A	0,0	0,0	0,00	0,16	0,00	56,1
5	T1	All MCs	72	1,0	72	1,0	0,051	0,0	LOS A	0,0	0,0	0,00	0,16	0,00	58,5
Approach			99	0,7	99	0,7	0,051	1,5	NA	0,0	0,0	0,00	0,16	0,00	57,8
West: Victoria St															
11	T1	All MCs	205	1,0	205	1,0	0,174	0,0	LOS A	0,7	4,8	0,16	0,24	0,16	57,5
12	R2	All MCs	112	0,0	112	0,0	0,174	6,1	LOS A	0,7	4,8	0,16	0,24	0,16	55,0
Approach			317	0,6	317	0,6	0,174	2,2	NA	0,7	4,8	0,16	0,24	0,16	56,6
All Vehicles			449	0,6	449	0,6	0,174	2,5	NA	0,7	4,8	0,13	0,27	0,13	56,4

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 3 [Victoria St / Ryneveld St (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Victoria St															
4	L2	All MCs	104	1,0	104	1,0	0,236	6,9	LOS A	1,4	10,1	0,54	0,62	0,54	51,3
5	T1	All MCs	61	1,0	61	1,0	0,236	6,9	LOS A	1,4	10,1	0,54	0,62	0,54	51,7
6	R2	All MCs	57	1,0	57	1,0	0,236	10,1	LOS B	1,4	10,1	0,54	0,62	0,54	51,0
Approach			222	1,0	222	1,0	0,236	7,7	LOS A	1,4	10,1	0,54	0,62	0,54	51,3
North: Ryneveld St															
7	L2	All MCs	127	1,0	127	1,0	0,279	5,2	LOS A	1,9	13,1	0,29	0,50	0,29	52,5
8	T1	All MCs	192	1,0	192	1,0	0,279	5,2	LOS A	1,9	13,1	0,29	0,50	0,29	52,9
9	R2	All MCs	38	1,0	38	1,0	0,279	8,4	LOS A	1,9	13,1	0,29	0,50	0,29	52,1
Approach			357	1,0	357	1,0	0,279	5,5	LOS A	1,9	13,1	0,29	0,50	0,29	52,7
West: Victoria St															
10	L2	All MCs	48	1,0	48	1,0	0,100	5,0	LOS A	0,6	4,3	0,23	0,57	0,23	51,8
11	T1	All MCs	8	1,0	8	1,0	0,100	5,0	LOS A	0,6	4,3	0,23	0,57	0,23	52,2
12	R2	All MCs	67	1,0	67	1,0	0,100	8,2	LOS A	0,6	4,3	0,23	0,57	0,23	51,4
Approach			124	1,0	124	1,0	0,100	6,7	LOS A	0,6	4,3	0,23	0,57	0,23	51,6
All Vehicles			703	1,0	703	1,0	0,279	6,4	LOS A	1,9	13,1	0,36	0,55	0,36	52,1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 4 [Ryneveld St / Access to Parking (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total	HV]	Arrival Flows [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
North: Ryneveld St															
8	T1	All MCs	341	1,0	341	1,0	0,249	0,1	LOS A	0,0	0,0	0,00	0,19	0,00	58,3
9	R2	All MCs	141	0,0	141	0,0	0,249	5,7	LOS A	0,0	0,0	0,00	0,19	0,00	55,4
Approach			482	0,7	482	0,7	0,249	1,7	NA	0,0	0,0	0,00	0,19	0,00	57,4
West: Access to Parking															
12	R2	All MCs	22	0,0	22	0,0	0,021	8,2	LOS A	0,0	0,2	0,22	0,95	0,22	50,8
Approach			22	0,0	22	0,0	0,021	8,2	LOS A	0,0	0,2	0,22	0,95	0,22	50,8
All Vehicles			504	0,7	504	0,7	0,249	2,0	NA	0,0	0,2	0,01	0,22	0,01	57,1

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).

Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).

NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).

Two-Way Sign Control Capacity Model: SIDRA Standard.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Ryneveld St / Plein St (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Plein St															
4	L2	All MCs	29	1,0	29	1,0	0,246	7,5	LOS A	1,6	11,1	0,56	0,59	0,56	51,3
5	T1	All MCs	199	1,0	199	1,0	0,246	7,0	LOS A	1,6	11,1	0,56	0,59	0,56	51,8
Approach			228	1,0	228	1,0	0,246	7,1	LOS A	1,6	11,1	0,56	0,59	0,56	51,7
North: Ryneveld St															
7	L2	All MCs	89	1,0	89	1,0	0,344	7,4	LOS A	2,2	15,6	0,53	0,62	0,53	50,9
8	T1	All MCs	148	1,0	148	1,0	0,344	7,0	LOS A	2,2	15,6	0,53	0,62	0,53	51,3
9	R2	All MCs	103	1,0	103	1,0	0,344	9,6	LOS A	2,2	15,6	0,53	0,62	0,53	50,7
Approach			341	1,0	341	1,0	0,344	7,9	LOS A	2,2	15,6	0,53	0,62	0,53	51,0
West: Plein St															
11	T1	All MCs	218	1,0	218	1,0	0,150	4,8	LOS A	0,0	0,0	0,00	0,55	0,00	53,4
12	R2	All MCs	33	1,0	33	1,0	0,150	7,5	LOS A	0,0	0,0	0,00	0,55	0,00	52,7
Approach			251	1,0	251	1,0	0,150	5,2	LOS A	0,0	0,0	0,00	0,55	0,00	53,3
All Vehicles			820	1,0	820	1,0	0,344	6,8	LOS A	2,2	15,6	0,38	0,59	0,38	51,9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Andringa St / Plein St (Site Folder: 2023 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 AM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St															
7	L2	All MCs	37	1,0	37	1,0	0,099	6,5	LOS A	0,5	3,7	0,48	0,59	0,48	51,8
8	T1	All MCs	45	1,0	45	1,0	0,099	6,7	LOS A	0,5	3,7	0,48	0,59	0,48	52,1
9	R2	All MCs	14	1,0	14	1,0	0,099	10,0	LOS A	0,5	3,7	0,48	0,59	0,48	51,4
Approach			96	1,0	96	1,0	0,099	7,1	LOS A	0,5	3,7	0,48	0,59	0,48	51,9
East: Plein St															
11	T1	All MCs	248	1,0	248	1,0	0,184	4,7	LOS A	0,0	0,0	0,00	0,53	0,00	53,7
12	R2	All MCs	60	1,0	60	1,0	0,184	8,0	LOS A	0,0	0,0	0,00	0,53	0,00	52,9
Approach			308	1,0	308	1,0	0,184	5,4	LOS A	0,0	0,0	0,00	0,53	0,00	53,5
West: Plein St															
4	L2	All MCs	201	1,0	201	1,0	0,352	5,4	LOS A	2,5	17,7	0,39	0,50	0,39	52,4
5	T1	All MCs	229	1,0	229	1,0	0,352	5,6	LOS A	2,5	17,7	0,39	0,50	0,39	52,8
Approach			431	1,0	431	1,0	0,352	5,5	LOS A	2,5	17,7	0,39	0,50	0,39	52,7
All Vehicles			835	1,0	835	1,0	0,352	5,6	LOS A	2,5	17,7	0,26	0,52	0,26	52,9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1 [Victoria St / Andringa St (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour
Site Category: Existing
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St															
1	L2	All MCs	28	0,0	28	0,0	0,606	22,7	LOS C	3,3	23,7	0,95	1,45	3,27	43,4
2	T1	All MCs	142	5,0	142	5,0	0,606	22,9	LOS C	3,3	23,7	0,95	1,45	3,27	43,2
3	R2	All MCs	141	1,0	141	1,0	0,606	22,3	LOS C	3,3	23,7	0,95	1,45	3,27	43,0
Approach			312	2,7	312	2,7	0,606	22,6	LOS C	3,3	23,7	0,95	1,45	3,27	43,1
East: Victoria St															
5	T1	All MCs	31	0,0	31	0,0	0,389	16,9	LOS C	1,6	11,3	0,88	1,28	2,46	46,4
6	R2	All MCs	169	1,0	169	1,0	0,389	16,8	LOS C	1,6	11,3	0,88	1,28	2,46	46,2
Approach			200	0,8	200	0,8	0,389	16,9	LOS C	1,6	11,3	0,88	1,28	2,46	46,2
North: Andringa St															
7	L2	All MCs	167	0,0	167	0,0	0,397	17,4	LOS C	1,6	11,5	0,89	1,28	2,48	46,2
9	R2	All MCs	37	0,0	37	0,0	0,397	17,3	LOS C	1,6	11,5	0,89	1,28	2,48	46,1
Approach			204	0,0	204	0,0	0,397	17,4	LOS C	1,6	11,5	0,89	1,28	2,48	46,2
West: Mall Exit															
10	L2	All MCs	41	0,0	41	0,0	0,080	13,6	LOS B	0,2	1,7	0,80	1,17	1,87	48,4
11	T1	All MCs	52	0,0	52	0,0	0,100	13,4	LOS B	0,3	2,2	0,81	1,19	1,90	48,6
Approach			93	0,0	93	0,0	0,100	13,5	LOS B	0,3	2,2	0,81	1,18	1,89	48,5
All Vehicles			808	1,3	808	1,3	0,606	18,8	LOS C	3,3	23,7	0,90	1,33	2,71	45,2

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [Victoria St / Access to Parking (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Access to Parking															
1	L2	All MCs	68	0,0	68	0,0	0,135	8,8	LOS A	0,4	2,9	0,29	0,91	0,29	50,9
3	R2	All MCs	68	0,0	68	0,0	0,135	8,9	LOS A	0,4	2,9	0,29	0,91	0,29	50,7
Approach			137	0,0	137	0,0	0,135	8,8	LOS A	0,4	2,9	0,29	0,91	0,29	50,8
East: Victoria St															
4	L2	All MCs	7	0,0	7	0,0	0,086	5,6	LOS A	0,0	0,0	0,00	0,03	0,00	57,2
5	T1	All MCs	160	1,0	160	1,0	0,086	0,0	LOS A	0,0	0,0	0,00	0,03	0,00	59,7
Approach			167	1,0	167	1,0	0,086	0,3	NA	0,0	0,0	0,00	0,03	0,00	59,6
West: Victoria St															
11	T1	All MCs	333	1,0	333	1,0	0,188	0,0	LOS A	0,2	1,5	0,06	0,07	0,06	59,3
12	R2	All MCs	27	0,0	27	0,0	0,188	6,9	LOS A	0,2	1,5	0,06	0,07	0,06	56,6
Approach			360	0,9	360	0,9	0,188	0,5	NA	0,2	1,5	0,06	0,07	0,06	59,1
All Vehicles			664	0,7	664	0,7	0,188	2,2	NA	0,4	2,9	0,09	0,23	0,09	57,3

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 3 [Victoria St / Ryneveld St (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Victoria St															
4	L2	All MCs	102	1,0	102	1,0	0,375	7,4	LOS A	2,6	18,5	0,64	0,64	0,64	50,8
5	T1	All MCs	124	1,0	124	1,0	0,375	7,3	LOS A	2,6	18,5	0,64	0,64	0,64	51,2
6	R2	All MCs	118	1,0	118	1,0	0,375	10,6	LOS B	2,6	18,5	0,64	0,64	0,64	50,5
Approach			344	1,0	344	1,0	0,375	8,4	LOS A	2,6	18,5	0,64	0,64	0,64	50,8
North: Ryneveld St															
7	L2	All MCs	96	1,0	96	1,0	0,327	6,8	LOS A	2,2	15,7	0,57	0,60	0,57	51,5
8	T1	All MCs	176	1,0	176	1,0	0,327	6,8	LOS A	2,2	15,7	0,57	0,60	0,57	51,9
9	R2	All MCs	43	1,0	43	1,0	0,327	10,0	LOS B	2,2	15,7	0,57	0,60	0,57	51,1
Approach			315	1,0	315	1,0	0,327	7,3	LOS A	2,2	15,7	0,57	0,60	0,57	51,7
West: Victoria St															
10	L2	All MCs	112	1,0	112	1,0	0,317	5,6	LOS A	2,4	16,7	0,41	0,53	0,41	51,9
11	T1	All MCs	171	1,0	171	1,0	0,317	5,5	LOS A	2,4	16,7	0,41	0,53	0,41	52,2
12	R2	All MCs	92	1,0	92	1,0	0,317	8,8	LOS A	2,4	16,7	0,41	0,53	0,41	51,5
Approach			374	1,0	374	1,0	0,317	6,3	LOS A	2,4	16,7	0,41	0,53	0,41	51,9
All Vehicles			1033	1,0	1033	1,0	0,375	7,3	LOS A	2,6	18,5	0,54	0,59	0,54	51,5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 4 [Ryneveld St / Access to Parking (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
North: Ryneveld St															
8	T1	All MCs	454	1,0	454	1,0	0,250	0,1	LOS A	0,0	0,0	0,00	0,05	0,00	59,5
9	R2	All MCs	35	0,0	35	0,0	0,250	5,7	LOS A	0,0	0,0	0,00	0,05	0,00	56,5
Approach			488	0,9	488	0,9	0,250	0,5	NA	0,0	0,0	0,00	0,05	0,00	59,2
West: Access to Parking															
12	R2	All MCs	92	0,0	92	0,0	0,089	8,2	LOS A	0,1	1,0	0,23	0,97	0,23	50,8
Approach			92	0,0	92	0,0	0,089	8,2	LOS A	0,1	1,0	0,23	0,97	0,23	50,8
All Vehicles			580	0,8	580	0,8	0,250	1,7	NA	0,1	1,0	0,04	0,19	0,04	57,7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Ryneveld St / Plein St (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Plein St															
4	L2	All MCs	18	1,0	18	1,0	0,321	8,0	LOS A	2,2	15,3	0,66	0,63	0,66	51,1
5	T1	All MCs	263	1,0	263	1,0	0,321	7,7	LOS A	2,2	15,3	0,66	0,63	0,66	51,6
Approach			281	1,0	281	1,0	0,321	7,7	LOS A	2,2	15,3	0,66	0,63	0,66	51,5
North: Ryneveld St															
7	L2	All MCs	117	1,0	117	1,0	0,436	7,3	LOS A	3,1	21,7	0,57	0,61	0,57	50,9
8	T1	All MCs	201	1,0	201	1,0	0,436	7,0	LOS A	3,1	21,7	0,57	0,61	0,57	51,3
9	R2	All MCs	136	1,0	136	1,0	0,436	9,9	LOS A	3,1	21,7	0,57	0,61	0,57	50,7
Approach			454	1,0	454	1,0	0,436	7,9	LOS A	3,1	21,7	0,57	0,61	0,57	51,0
West: Plein St															
11	T1	All MCs	218	1,0	218	1,0	0,148	4,8	LOS A	0,0	0,0	0,00	0,54	0,00	53,6
12	R2	All MCs	33	1,0	33	1,0	0,148	7,7	LOS A	0,0	0,0	0,00	0,54	0,00	52,9
Approach			251	1,0	251	1,0	0,148	5,1	LOS A	0,0	0,0	0,00	0,54	0,00	53,5
All Vehicles			985	1,0	985	1,0	0,436	7,2	LOS A	3,1	21,7	0,45	0,60	0,45	51,8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Andringa St / Plein St (Site Folder: 2023 PM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2023 PM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St															
7	L2	All MCs	53	1,0	53	1,0	0,168	7,3	LOS A	0,9	6,6	0,56	0,62	0,56	51,4
8	T1	All MCs	83	1,0	83	1,0	0,168	7,5	LOS A	0,9	6,6	0,56	0,62	0,56	51,8
9	R2	All MCs	16	1,0	16	1,0	0,168	10,8	LOS B	0,9	6,6	0,56	0,62	0,56	51,0
Approach			152	1,0	152	1,0	0,168	7,8	LOS A	0,9	6,6	0,56	0,62	0,56	51,6
East: Plein St															
11	T1	All MCs	323	1,0	323	1,0	0,236	4,7	LOS A	0,0	0,0	0,00	0,53	0,00	53,7
12	R2	All MCs	76	1,0	76	1,0	0,236	8,0	LOS A	0,0	0,0	0,00	0,53	0,00	52,9
Approach			399	1,0	399	1,0	0,236	5,3	LOS A	0,0	0,0	0,00	0,53	0,00	53,5
West: Plein St															
4	L2	All MCs	180	1,0	180	1,0	0,346	5,9	LOS A	2,5	17,3	0,48	0,53	0,48	52,2
5	T1	All MCs	212	1,0	212	1,0	0,346	6,1	LOS A	2,5	17,3	0,48	0,53	0,48	52,5
Approach			392	1,0	392	1,0	0,346	6,0	LOS A	2,5	17,3	0,48	0,53	0,48	52,4
All Vehicles			942	1,0	942	1,0	0,346	6,0	LOS A	2,5	17,3	0,29	0,55	0,29	52,7

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 1 [Victoria St / Andringa St (Site Folder: 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour
Site Category: Existing
Stop (All-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St															
1	L2	All MCs	27	0,0	27	0,0	0,709	30,3	LOS D	4,6	33,1	1,00	1,58	3,89	39,8
2	T1	All MCs	140	5,0	140	5,0	0,709	30,5	LOS D	4,6	33,1	1,00	1,58	3,89	39,7
3	R2	All MCs	152	1,0	152	1,0	0,709	29,8	LOS D	4,6	33,1	1,00	1,58	3,89	39,5
Approach			319	2,7	319	2,7	0,709	30,2	LOS D	4,6	33,1	1,00	1,58	3,89	39,6
East: Victoria St															
5	T1	All MCs	8	0,0	8	0,0	0,201	15,6	LOS C	0,7	5,0	0,87	1,20	2,09	47,2
6	R2	All MCs	82	1,0	82	1,0	0,201	15,5	LOS C	0,7	5,0	0,87	1,20	2,09	47,0
Approach			91	0,9	91	0,9	0,201	15,5	LOS C	0,7	5,0	0,87	1,20	2,09	47,0
North: Andringa St															
7	L2	All MCs	238	0,0	238	0,0	0,561	23,4	LOS C	2,9	20,1	0,96	1,39	3,05	43,0
9	R2	All MCs	15	0,0	15	0,0	0,561	23,3	LOS C	2,9	20,1	0,96	1,39	3,05	43,0
Approach			253	0,0	253	0,0	0,561	23,4	LOS C	2,9	20,1	0,96	1,39	3,05	43,0
West: Mall Exit															
10	L2	All MCs	7	0,0	7	0,0	0,016	14,1	LOS B	0,1	0,4	0,83	1,15	1,83	48,1
11	T1	All MCs	6	0,0	6	0,0	0,016	14,8	LOS B	0,0	0,3	0,86	1,16	1,85	47,8
Approach			14	0,0	14	0,0	0,016	14,4	LOS B	0,1	0,4	0,84	1,15	1,84	48,0
All Vehicles			676	1,4	676	1,4	0,709	25,4	LOS D	4,6	33,1	0,96	1,45	3,30	41,9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 2 [Victoria St / Access to Parking (Site Folder: 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Access to Parking															
1	L2	All MCs	25	0,0	25	0,0	0,047	8,3	LOS A	0,1	0,9	0,19	0,90	0,19	51,0
3	R2	All MCs	25	0,0	25	0,0	0,047	8,6	LOS A	0,1	0,9	0,19	0,90	0,19	50,8
Approach			51	0,0	51	0,0	0,047	8,4	LOS A	0,1	0,9	0,19	0,90	0,19	50,9
East: Victoria St															
4	L2	All MCs	43	0,0	43	0,0	0,058	5,6	LOS A	0,0	0,0	0,00	0,23	0,00	55,6
5	T1	All MCs	69	1,0	69	1,0	0,058	0,0	LOS A	0,0	0,0	0,00	0,23	0,00	57,9
Approach			113	0,6	113	0,6	0,058	2,1	NA	0,0	0,0	0,00	0,23	0,00	57,0
West: Victoria St															
11	T1	All MCs	203	1,0	203	1,0	0,212	0,0	LOS A	1,0	7,0	0,21	0,31	0,21	56,8
12	R2	All MCs	173	0,0	173	0,0	0,212	6,2	LOS A	1,0	7,0	0,21	0,31	0,21	54,3
Approach			376	0,5	376	0,5	0,212	2,8	NA	1,0	7,0	0,21	0,31	0,21	55,7
All Vehicles			539	0,5	539	0,5	0,212	3,2	NA	1,0	7,0	0,16	0,35	0,16	55,5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 3 [Victoria St / Ryneveld St (Site Folder: 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour
Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Victoria St															
4	L2	All MCs	118	1,0	118	1,0	0,281	7,3	LOS A	1,8	12,8	0,61	0,64	0,61	51,0
5	T1	All MCs	69	1,0	69	1,0	0,281	7,3	LOS A	1,8	12,8	0,61	0,64	0,61	51,4
6	R2	All MCs	64	1,0	64	1,0	0,281	10,5	LOS B	1,8	12,8	0,61	0,64	0,61	50,7
Approach			252	1,0	252	1,0	0,281	8,1	LOS A	1,8	12,8	0,61	0,64	0,61	51,0
North: Ryneveld St															
7	L2	All MCs	144	1,0	144	1,0	0,371	6,2	LOS A	2,6	18,7	0,50	0,55	0,50	51,8
8	T1	All MCs	218	1,0	218	1,0	0,371	6,2	LOS A	2,6	18,7	0,50	0,55	0,50	52,2
9	R2	All MCs	43	1,0	43	1,0	0,371	9,4	LOS A	2,6	18,7	0,50	0,55	0,50	51,5
Approach			405	1,0	405	1,0	0,371	6,5	LOS A	2,6	18,7	0,50	0,55	0,50	52,0
West: Victoria St															
10	L2	All MCs	55	1,0	55	1,0	0,187	5,1	LOS A	1,3	8,9	0,27	0,53	0,27	52,1
11	T1	All MCs	105	1,0	105	1,0	0,187	5,0	LOS A	1,3	8,9	0,27	0,53	0,27	52,5
12	R2	All MCs	77	1,0	77	1,0	0,187	8,3	LOS A	1,3	8,9	0,27	0,53	0,27	51,8
Approach			237	1,0	237	1,0	0,187	6,1	LOS A	1,3	8,9	0,27	0,53	0,27	52,2
All Vehicles			894	1,0	894	1,0	0,371	6,9	LOS A	2,6	18,7	0,47	0,57	0,47	51,8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 4 [Ryneveld St / Access to Parking (Site Folder: 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour
Site Category: Existing
Stop (Two-Way)

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total	HV]	Arrival Flows [Total	HV]	Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue [Veh.	Dist]	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			veh/h	%	veh/h	%	v/c	sec		veh	m				km/h
North: Ryneveld St															
8	T1	All MCs	387	1,0	387	1,0	0,313	0,1	LOS A	0,0	0,0	0,00	0,23	0,00	57,9
9	R2	All MCs	216	0,0	216	0,0	0,313	5,8	LOS A	0,0	0,0	0,00	0,23	0,00	55,1
Approach			603	0,6	603	0,6	0,313	2,1	NA	0,0	0,0	0,00	0,23	0,00	56,8
West: Access to Parking															
12	R2	All MCs	34	0,0	34	0,0	0,035	8,4	LOS A	0,1	0,4	0,26	0,97	0,26	50,7
Approach			34	0,0	34	0,0	0,035	8,4	LOS A	0,1	0,4	0,26	0,97	0,26	50,7
All Vehicles			637	0,6	637	0,6	0,313	2,5	NA	0,1	0,4	0,01	0,27	0,01	56,5

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Minor Road Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
NA (TWSC): Level of Service is not defined for major road approaches or the intersection as a whole for Two-Way Sign Control (HCM LOS rule).
Two-Way Sign Control Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Ryneveld St / Plein St (Site Folder: 2028 AM)]

Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance

Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
East: Plein St															
4	L2	All MCs	34	1,0	34	1,0	0,284	7,5	LOS A	1,9	13,2	0,61	0,61	0,61	51,3
5	T1	All MCs	226	1,0	226	1,0	0,284	7,2	LOS A	1,9	13,2	0,61	0,61	0,61	51,8
Approach			260	1,0	260	1,0	0,284	7,3	LOS A	1,9	13,2	0,61	0,61	0,61	51,7
North: Ryneveld St															
7	L2	All MCs	101	1,0	101	1,0	0,389	7,5	LOS A	2,6	18,3	0,58	0,63	0,58	50,8
8	T1	All MCs	168	1,0	168	1,0	0,389	7,2	LOS A	2,6	18,3	0,58	0,63	0,58	51,2
9	R2	All MCs	117	1,0	117	1,0	0,389	10,1	LOS B	2,6	18,3	0,58	0,63	0,58	50,6
Approach			386	1,0	386	1,0	0,389	8,2	LOS A	2,6	18,3	0,58	0,63	0,58	50,9
West: Plein St															
11	T1	All MCs	247	1,0	247	1,0	0,168	4,8	LOS A	0,0	0,0	0,00	0,54	0,00	53,6
12	R2	All MCs	37	1,0	37	1,0	0,168	7,7	LOS A	0,0	0,0	0,00	0,54	0,00	52,9
Approach			284	1,0	284	1,0	0,168	5,1	LOS A	0,0	0,0	0,00	0,54	0,00	53,5
All Vehicles			931	1,0	931	1,0	0,389	7,0	LOS A	2,6	18,3	0,41	0,59	0,41	51,9

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

Site: 5 [Andringa St / Plein St (Site Folder: 2028 AM)]

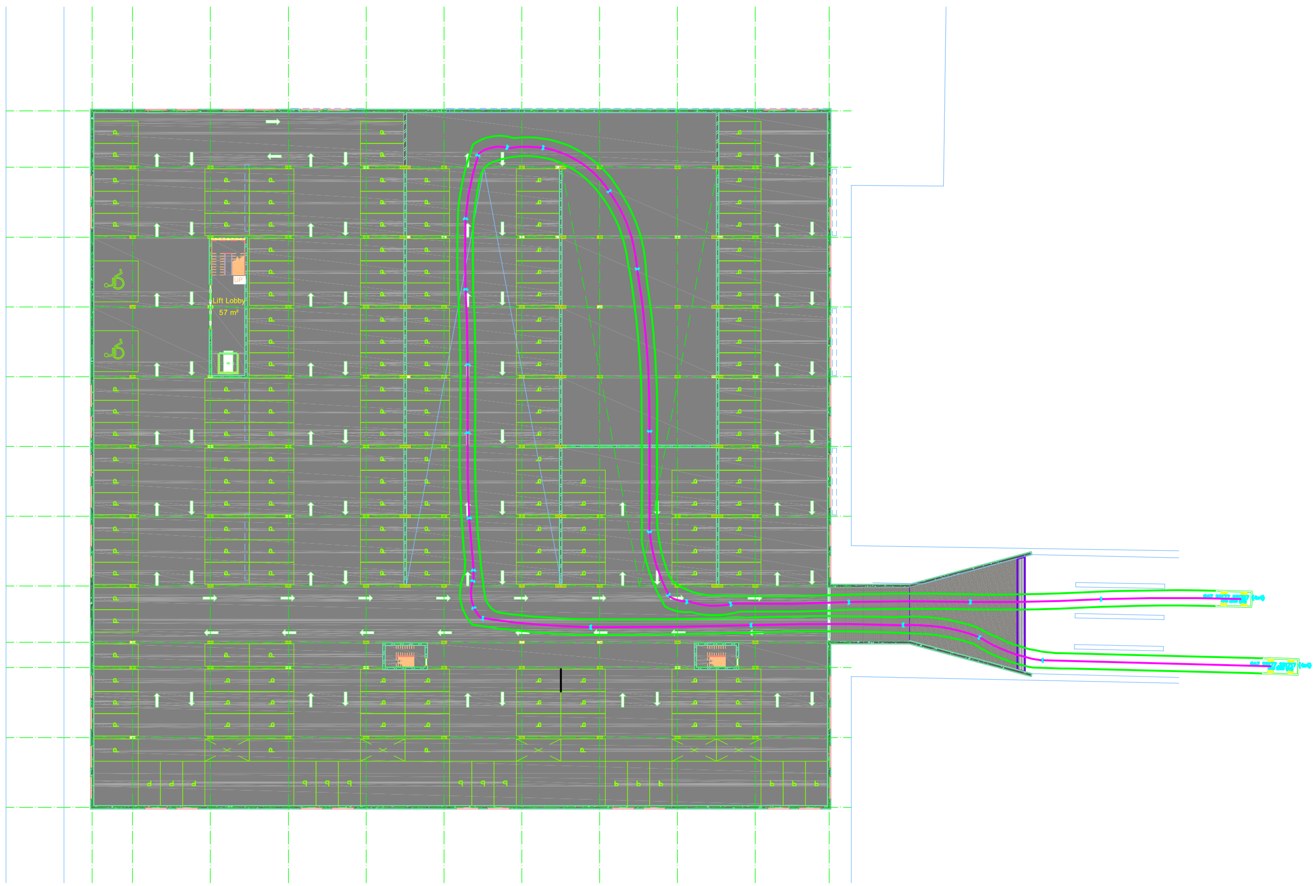
Output produced by SIDRA INTERSECTION Version: 9.1.3.210

2028 AM Peak Hour

Site Category: Existing
Roundabout

Vehicle Movement Performance																
Mov ID	Turn	Mov Class	Demand Flows [Total veh/h	HV] %	Arrival Flows [Total veh/h	HV] %	Deg. Satn v/c	Aver. Delay sec	Level of Service	95% Back Of Queue [Veh. veh	Dist] m	Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed km/h
South: Andringa St																
7	L2	All MCs	42	1,0	42	1,0	0,117	6,8	LOS A	0,6	4,4	0,51	0,61	0,51	51,6
8	T1	All MCs	52	1,0	52	1,0	0,117	7,0	LOS A	0,6	4,4	0,51	0,61	0,51	51,9
9	R2	All MCs	16	1,0	16	1,0	0,117	10,3	LOS B	0,6	4,4	0,51	0,61	0,51	51,2
Approach			109	1,0	109	1,0	0,117	7,4	LOS A	0,6	4,4	0,51	0,61	0,51	51,7
East: Plein St																
11	T1	All MCs	282	1,0	282	1,0	0,207	4,7	LOS A	0,0	0,0	0,00	0,53	0,00	53,6
12	R2	All MCs	68	1,0	68	1,0	0,207	8,0	LOS A	0,0	0,0	0,00	0,53	0,00	52,9
Approach			351	1,0	351	1,0	0,207	5,4	LOS A	0,0	0,0	0,00	0,53	0,00	53,5
West: Plein St																
4	L2	All MCs	228	1,0	228	1,0	0,403	5,6	LOS A	3,1	21,6	0,44	0,51	0,44	52,3
5	T1	All MCs	260	1,0	260	1,0	0,403	5,8	LOS A	3,1	21,6	0,44	0,51	0,44	52,7
Approach			488	1,0	488	1,0	0,403	5,7	LOS A	3,1	21,6	0,44	0,51	0,44	52,5
All Vehicles			948	1,0	948	1,0	0,403	5,8	LOS A	3,1	21,6	0,29	0,53	0,29	52,8

Site Level of Service (LOS) Method: Delay & v/c (HCM 2010). Site LOS Method is specified in the Parameter Settings dialog (Options tab).
Roundabout LOS Method: SIDRA Roundabout LOS.
Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.
LOS F will result if v/c > 1 irrespective of movement delay value (does not apply for approaches and intersection).
Intersection and Approach LOS values are based on average delay for all movements (v/c not used as specified in HCM 2010).
Roundabout Capacity Model: SIDRA Standard.
Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).
Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.
Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).
HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.
Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.



1 Level 00
1 : 200

23 SECOND AVENUE, WESTDENE,
BLOEMFONTEIN, 9301
TEL: (051) 411 8700,
FAX: (051) 447 6000
e-mail: gerhard.linde@smec.com

CLIENT

APPROVAL

PROJ.ENG AND PROCESS
NAME: ....
DATE: ....
SIGNATURE: ....

PROJ.ENG. (OPS)
NAME: ....
DATE: ....
SIGNATURE: ....

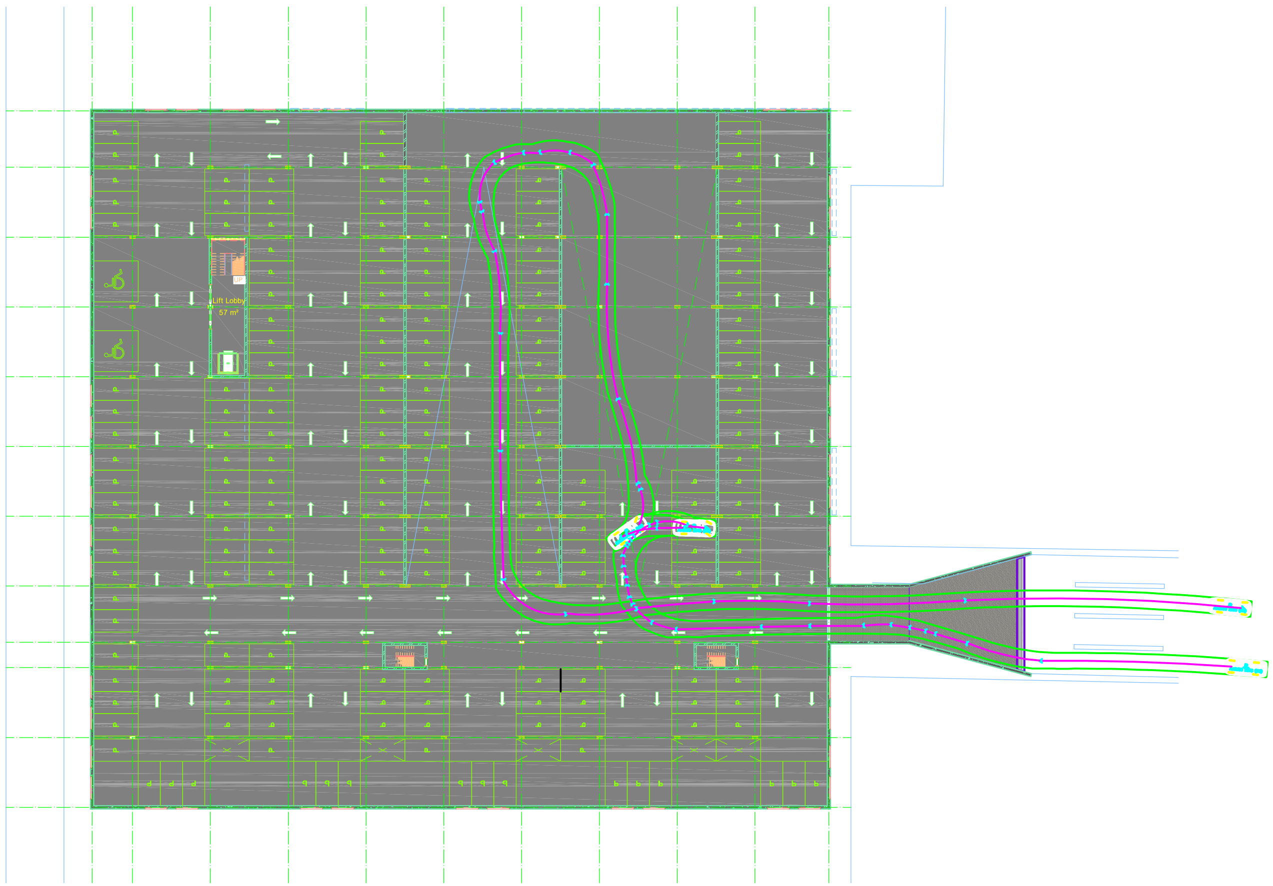
No.	Description	Date

Stellenbosch Municipality

Eikestad Parking Facility

Project number	C1761
Date	2021.04.29
Drawn by	J. Theron
Checked by	G. Linde
C1761-SMEC-01-ARC-DRG-0100	Rev
Scale	1 : 200

2023/10/31 11:58:20



1 Level 00
1 : 200

23 SECOND AVENUE, WESTDENE,
BLOEMFONTEIN, 9301
TEL: (051) 411 8700,
FAX: (051) 447 6000
e-mail: gerhard.linde@smec.com

CLIENT

APPROVAL

PROJ.ENG AND PROCESS
NAME: ....
DATE: ....
SIGNATURE: ....

PROJ.ENG. (OPS)
NAME: ....
DATE: ....
SIGNATURE: ....

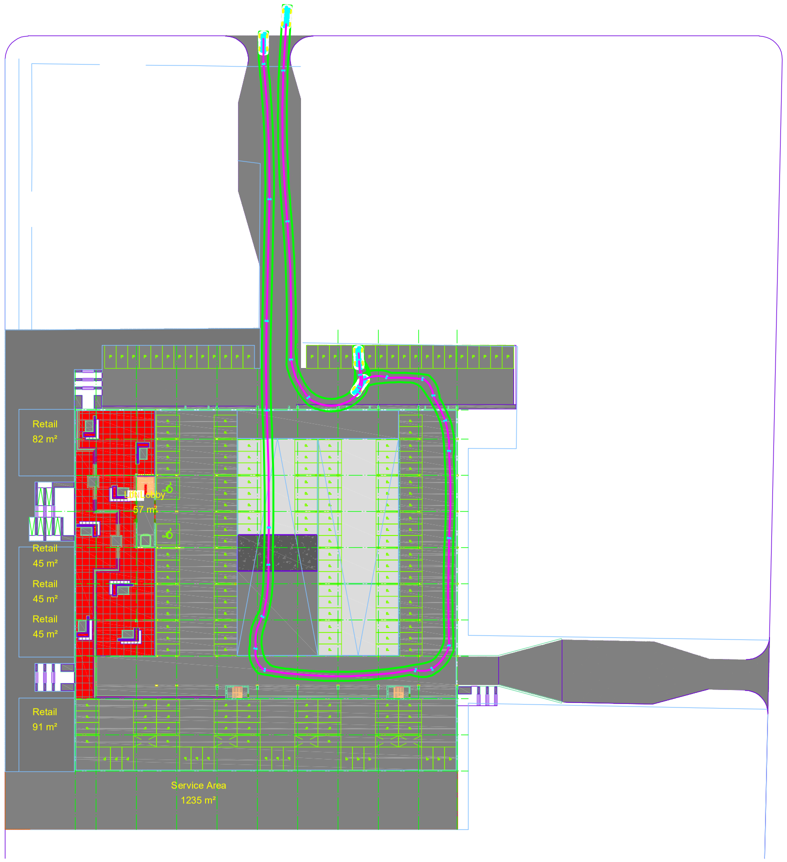
No.	Description	Date

Stellenbosch Municipality

Eikestad Parking Facility

Project number	C1761
Date	2021.04.29
Drawn by	J. Theron
Checked by	G. Linde
C1761-SMEC-01-ARC-DRG-0100	Rev
Scale	1 : 200

2023/10/31 11:58:20



1 Street Level Site Layout
1 : 500

23 SECOND AVENUE, WESTDENE,
BLOEMFONTEIN, 9301
TEL: (051) 411 8700,
FAX: (051) 447 6000
e-mail: gerhard.linde@smec.com

CLIENT

APPROVAL

PROJ.ENG AND PROCESS
NAME: ....
DATE: ....
SIGNATURE: ....

PROJ.ENG. (OPS)
NAME: ....
DATE: ....
SIGNATURE: ....

No.	Description	Date

Stellenbosch Municipality

Eikestad Parking Facility

Project number	C1761
Date	2021.04.29
Drawn by	Author
Checked by	Checker
C1761-SMEC-01-ARC-DRG-0104	Rev
Scale	1 : 500

2023/10/31 11:58:32

Appendix D Eikestad PSC Base and Risk Adjusted Model

Please scan the QR code below to access the files.

Alternatively, please follow the link below to access the files.

https://surbanajurong.sharepoint.com/:f:/s/africa/C1978/EoQJ4DbzgppCsUWWztI0KhQBJHzq7VSiiCQ11Sh_D0WmEg?e=WHNsZF

Appendix E   Eikestad PSC Risk Retained Model

Please scan the QR code below to access the files.

Alternatively, please follow the link below to access the files.

https://surbanajurong.sharepoint.com/:f:/s/africa/C1978/Eq5bhfe1MB5CtmyPwT-eACoBKfKL8JdS4kVanQIL6fHeBQ?e=3BaMNz

Appendix F PPP Reference and Risk Adjusted Model

Please scan the QR code below to access the files.

Alternatively, please follow the link below to access the files.

https://surbanajurong.sharepoint.com/:f:/s/africa/C1978/Eha8Wy9GaYJAh9-CkSipdEcBzTqruYyiqXrcbu1vj0Q3JQ?e=HSGfY2