STELLENBOSCH MUNICIPALITY
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Royal HaskoningDHV
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TRANSIT ORIENTATED DEVELOPMENT:
A CONCEPT FOR THE TOWN OF STELLENBOSCH (FINAL DRAFT)

This report represents a working draft report for the:

Transit Orientated Development:
A Concept for the Town of Stellenbosch

Prepared on 18 October 2014
Revised on 26 June 2015 for:
Stellenbosch Municipality
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1 Introduction

1.1 Background to the Study

The success of Stellenbosch as a primary tourism, business and residential destination linked to its heritage and the wine industry, as well as, its university town status and the institution's recent growth, has resulted in significant development pressure being placed on the infrastructure of the town. These conditions, however, also present significant development opportunities for the re-imagination of the role of the town and for the spatial restructuring of the town.

The Municipality of Stellenbosch has been proactive in meeting these challenges and is currently driving a number of initiatives that will impact on the manner in which the town will accommodate future growth and development. In particular, the review of the Spatial Development Plan (SDP) is being undertaken in an innovative and inclusive manner and which is identifying and exploring new ways of managing urban settlement, protecting the town's heritage and making its infrastructure more efficient.

The Municipality's initiatives resonate well with the current national emphasis and investment to shift from low density, mono-functional and private transport orientated development to higher density, compact, diverse mixed use, public transport and Non-Motorised-Transport (NMT) solutions i.e. Transit Oriented Development (TOD) for towns and cities.

In this context, the investigation of the role, function and character of the Adam Tas Corridor (i.e. the section of the town of Stellenbosch adjacent to, and either side of, Adam Tas Road (R44) and the railway and which lies between the Eerste and Krom Rivers as the primary gateway to Stellenbosch, and as a potential TOD catalyst for change in the way the town works, is both timeous and necessary to prepare it for future growth and new development opportunities.

1.2 Purpose of the Document

This document describes the work undertaken by the professional team and provides additional inputs into the conversations between all stakeholders about the way forward for Stellenbosch and the region.

1.3 The Area of Study

The terms of reference for the study demarcated specific areas to be investigated. These included, but were not limited to:

- the Stellenbosch and Du Toit Rail Stations
- PRASA land holdings along the R44 corridor
- George Blake Road
- the Van Der Stel Sports Complex
- the Bergzight Taxi Rank and Informal Traders Area
- Open Space parcels around R44/Adam Tas Road

Each of these areas has been investigated within the context of the town and the surrounding region (FIGURE 1).

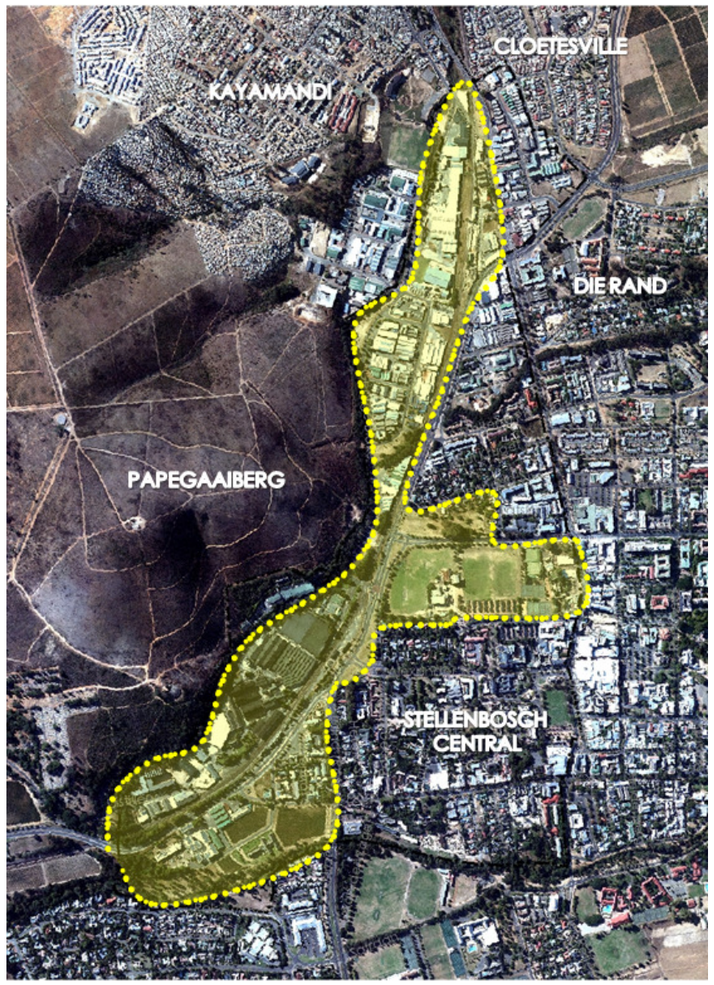


FIGURE 1: STUDY FOCUS AREA

1.4 The Planning Process

The project process was designed to optimise technical stakeholder engagement in the formulation of the outputs.

This entailed "filtering" outputs of the various stages through technical workshops with Municipality officials and members of the SDF project team.

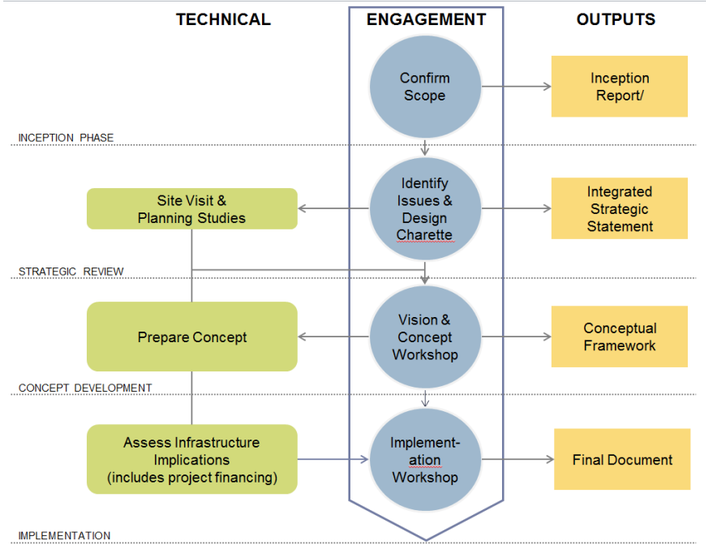


FIGURE 2: PROJECT PROCESS

2 What Does TOD mean for Stellenbosch?

2.1 What is TOD?

2.1.1 Overall Concept

South Africa is firmly committed to implementing high quality and affordable public transport as part of its strategies to redress spatial imbalances and to reduce high impact private car travel. This transition from predominantly car oriented transport and associated development patterns to public transport and NMT is based around the concept of Transit Oriented Development (TOD).

> ***"Transit-Oriented Development (TOD) is a development pattern that is characterized by a mix of uses where buildings and uses cater to the pedestrian accessing the area via alternate modes of transportation. It typically incorporates compact development and dense activity centres within easy walking distance of transit stops (typically a half mile). It generally includes a mix of residential, employment and shopping opportunities designed for transit riders, cyclists, and pedestrians. TOD includes new development or reconstruction whose design and orientation facilitate transit use. It tailors new development in the context of existing residential and business districts and emphasizes neighbourhood, business, and historic preservation. Automobile use is still accommodated in a TOD, but is not treated as the sole or predominant mode of transportation[1]".***

All of the above, when in place, enables a pedestrian to get from origin to destination without walking further than 500m, irrespective of the distance or type of each journey the user may undertake (i.e. short urban focused trip or longer metropolitan or regional journey).

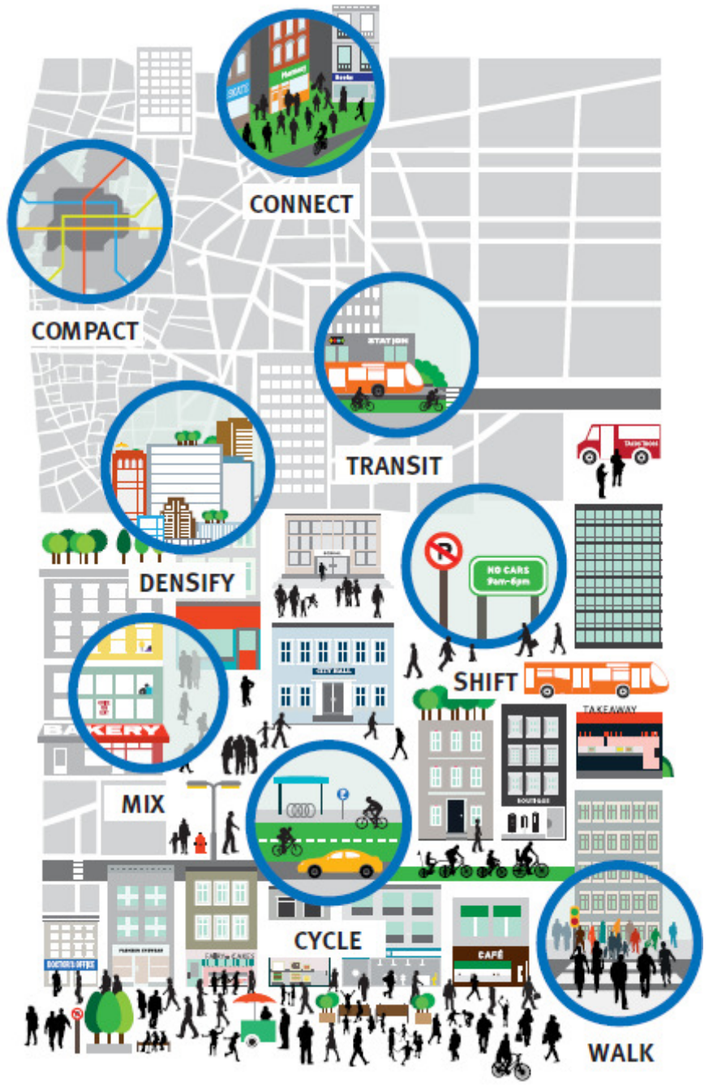


FIGURE 3: PRINCIPLES FOR TOD[2]

COMPACT

In a compact city, activities are located closer to one another, requiring less time and energy to connect. When all the principles are applied collectively, a thriving compact city is created.

DENSIFY

By building up instead of out, cities absorb urban growth in a more compact way. Density supports a lively mix of activities and better transport services, but also requires that the transport systems can handle the increase in people.

TRANSIT

Public transit connects and integrates more distant parts of the city. Transit corridors are the natural places where densification should begin. High quality transit is critical to create a prosperous and equitable city that is accessible by all.

CONNECT

A city needs a tight network of streets and paths for pedestrians and cyclists as well as public transit. Creating highly permeable places allows for a variety of mobility options that makes trips more direct.

MIX

A connected city becomes more animated when there is a mix of activities along the streets and paths. Different uses encourage shorter trips and more lively neighbourhoods.

CYCLE

Like mixed uses, cycling activates streets and provides people with an efficient and convenient way to travel for medium distances. Cycling increases a person's access to a larger area, as well as increases the coverage of transit.

SHIFT

With the above principles in place, getting people out of their cars becomes easier but it is not enough. Pricing and traffic reduction tools encourage people to shift away from cars.

WALK

When all the principles come together, the results are most keenly felt by the pedestrian. Vibrant, active streets where people feel safe are fundamental to the successful twenty-first century city.

[1] City of Tucson (undated) "Transit-Oriented Development Handbook"

[2] Institute for Transportation and Development Policy

2.1.2 Regional Implications

At a regional level successful TOD implies that the urban nodes of a metropolis and towns of a region are linked by one or other form of public transport, but preferably rail. However, to be attractive and competitive to the private car TOD must offer a convenient and easy to use service on both sides of the regional commuter journey i.e. origin and destination. This means that for commuters travelling from Stellenbosch to other destinations in the region it will be important for TOD systems to be in place at those other destinations and vice versa for commuters travelling to Stellenbosch.

TOD can however also work at a town or urban level only for Stellenbosch in that, in the absence of regional TOD systems, effective park and ride systems coupled with PT and NMT systems can accommodate users making regional trips to the town by private car.

2.1.3 Municipal Implications

Whilst great strides are being made in the region with respect to TOD it is likely to take some time to be implemented at the regional level. This is mainly due to the roll out of rail services being prioritised in metropolitan and or urban areas across the country. This provides some time for the Municipality to plan for the shift to TOD in order for it to accommodate the anticipated increase in growth of the population and economy of the municipality in a manner that protects its heritage (i.e. regional landscape as well as town and built form assets)

The spatial development structure of Stellenbosch has been evolving over time and currently displays many of the TOD characteristics and associated potential discussed above.. Through actively implementing TOD principles the town will begin functioning more efficiently, by minimising urban sprawl, focusing on mixed use and more compact development and by integrating various income groups into the urban system of the town. TOD translates into more effective and efficient use of public open space and will prioritise the protection, management and more economic use of the natural attributes and features that exist within Stellenbosch. Furthermore, TOD will connect the Stellenbosch community more effectively through efficient pedestrian and cycle systems, re-energise the public transport system – with rail as the backbone - and linking people from places of employment to their homes, shopping, education, health or recreation. A more focused and aggressive application of TOD and associated sustainable development principles will increase the opportunity for a more sustainable city to evolve.

2.1.4 Role of Adam Tas Corridor

The Adam Tas Corridor is a critical portion of the regional movement infrastructure network due to both road and rail routes converging between the town and the base of the Papegaaiberg (see FIGURE 1). In addition to this infrastructure this section of the town comprises of a mix of important economic and social land uses and valuable environmental assets.

As a result of this spatial configuration this corridor is the primary gateway to the town on the one hand, and a critical conduit for regional through traffic generated north and south of the town. The resultant very high level of accessibility within this corridor, the mix of land uses and the availability of substantial vacant or underutilised land, generates significant opportunity for the establishment of high value land uses and activities that can boost the local and regional economy and that could accommodate at least some of the regional growth currently being experienced in the region.

The real opportunity is inherent in the above is to create a high quality, high performance dense, mixed use and pedestrian oriented urban environment which contributes to the current initiatives striving to “reshape” Stellenbosch.

The following images reflect the current state of the corridor, which in stead of representing the 'gateway' to Stellenbosch reflect a neglected back-side.


CORNER OF DORP/ADAM TAS


STRAND ROAD NEAR STATSIE STREET


STELLENBOSCH RAIL STATION


RAIL RESERVE AT STELLENBOSCH STATION


OPEN SPACE OPPOSITE STELLENBOSCH STATION


CORNER MERRIMAN/ADAM TAS


ADAM TAS NEAR BIRD/304 INTERSECTION


BIRD STREET NEAR ADAM TAS INTERSECTION


BERGZIGHT TAXI RANK

3 Regional Context

3.1.1 Linkages with other towns in the regional economy

The historic settlement pattern of the Greater Stellenbosch area features a number of discrete towns and villages located adjacent to strategic transport and river systems. With increasing development pressure this pattern has been disrupted by unplanned informal settlements and low-density (at times gated) suburbs on the periphery. This pattern places unnecessary pressure on ecosystems, arable land and other resources.

In recognising the unsustainable growth trajectory in the area, the Stellenbosch Municipality has taken a very bold step towards halting this pattern by suggesting that higher density developments be encouraged and channelled into town limits, and that a clear "urban edge" be defined and enforced in order to control rampant urban sprawl.

The result is a network of well designed, ecologically sustainable high density development nodes structured around integrated public transport services, dubbed as a, 'String of Pearls' (the transport system – rail – being the 'string' that connects the 'pearls' i.e. the nodes). This provides a well resourced and well connected urban system of movement and service centres that protects valuable agricultural and ecological resources. .

The proposed nodes include:

- Stellenbosch
- Franschhoek
- La Motte
- Wemmershoek
- Groot Drakenstein
- Dwars Rivier
- Klapmuts
- Muldersvlei Crossroads
- Koelenhof
- Jamestown/ De Zalze
- Vlottenburg
- Spier
- Lynedoch
- Raithby

.

TOD solutions are being investigated in planning authorities across the country at municipal, provincial and national level and the Western Cape Government and the City of Cape Town have embarked on various projects within the province and the metro that are exploring the redevelopment of particular nodes through the application of TOD principles and sustainable development thinking. This places Stellenbosch in a strong position to link into the emerging regional TOD system and for extending and / or expanding the :
"String of Pearls" within the Stellenbosch Municipal area to link into , the Voortrekker corridor and the City bowl, with the potential for focusing increased intensifcication around other existing nodes within the Western Cape i.e. Belville.

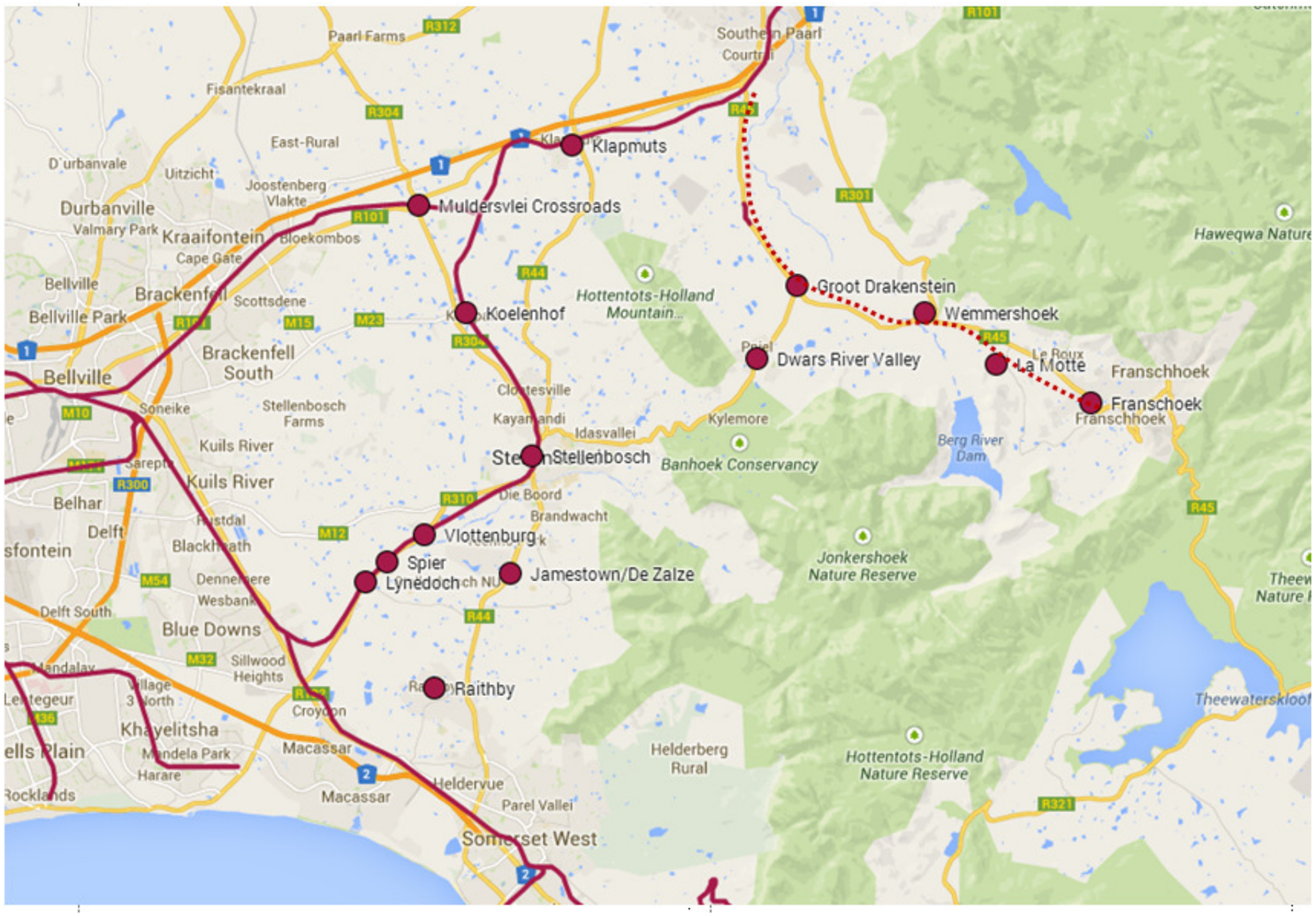


FIGURE 4: REGIONAL CONTEXT

4 Strategic Assessment of the Corridor

4.1 Assessing the Performance of the Study Area

The following table is a summary of the high level investigations into the strengths and weaknesses of the study area and some of the key opportunities and threats which need to be accounted for in the future planning of the area (i.e. SWOT).

In assessing the SWOT a number of urban performance dimensions, generated by urban planner Kevin Lynch were used to focus the outcomes of the various investigations undertaken by the team.

These performance dimensions revolve around the identification and definition of a set of urban form dimensions that can be used to measure or evaluate the **performance** of a City or part thereof in terms of the usefulness and meaning for its inhabitants and users and in terms of how it responds to and accommodates human needs.

Lynch's work recognises that Cities and their neighbourhoods are unique and that they perform different roles and functions over time as they change and grow. As such the dimensions provide a tool that can be used to evaluate an urban area in any specific context.

Further details related to various sectoral high level investigations are included in the Annexure.

TABLE 1: SWOT ANALYSIS

	ACCESS	VITALITY	SENSE	FIT	CONTROL
	the ability to reach other persons, places, resources, services and information.	the degree to which the form of the area supports the vital functions and biological requirements of human beings.	the degree to which the area can be clearly perceived and to which it connects to the values and identity of its residents	the degree to which the form and capacity of the area matches the pattern and quantity of activity of the residents (Capacity and Quality)	the degree to which the use of, creation of and management of spaces can be influenced by those who use them
STRENGTH	• High regional rail and road access to town. • Established compact town with fine grain movement grid. • Flat topography for ease of walking and cycling.	• Established network of natural assets providing ecosystem services. • Strong riverine corridors. • Unique biodiversity habitat.	• Intact Built form Heritage assets /clusters. • Established human scaled block and street pattern. • Good visual and physical connection to surrounding landscape. • University town architecture. • Strong connection with wine industry and associated heritage assets.	• Established infrastructure networks and systems. • Established residential stock for middle to high income earners. • Established commercial and industrial assets. • Underdeveloped land. • Low development densities. • Municipal owned land for redevelopment.	• Strong Institutions e.g. University, Wine Industry, Municipality, Heritage, Property. • Inclusive planning process. • Well established business sector and role players.
WEAKNESS	• Sub-optimal location of rail stations. • Incomplete arterial network and infrastructure. • Limited public transport system. • Incomplete NMT network. • Congestion compromising access to town.	• Encroachment in Flood Zones. • Transformed and underperforming biodiversity assets. • Pollution of water resources.	• Poor entrance/gateway precinct into town. • Poor linkage between precincts either side of Adam Tas.	• Lack of capacity in road, water & energy infrastructure. • Gaps in housing supply for lower income earners. • Lack of space for informal economy.	• Under capacitated informal sector. • Transient population (students).
OPPORTUNITY	• Integration with rail upgrading programme. • Integration with metropolitan public transport programmes.	• Consolidation of the urban open space system. • Opportunity to improve air quality.	• Redevelopment of older districts in the town. • Creation of new urban spaces and streets. • Redevelopment of heritage buildings for alternative uses. • Diversification of the economy.	• Strong demand for residential accommodation across all sectors. • Strong demand for relocation of offices (HQ's) to Stellenbosch. • Significant appetite for techno sector expansion.	• Strong partnerships building. • Appetitive to change to sustainable future.
THREAT	• No direct rail access to Somerset West. • Weak appetite for Public Transport mind set (but changing). • Increasing car ownership.	• Inappropriate upper catchment management. • Increased uncontrolled storm water runoff from new development. • Increased pollution. • Loss of valuable agricultural land.	• Incongruent low density type development. • Insensitive densification. • Use of inappropriate building typologies. • Insufficient design control. • Uncoordinated / uncontrolled development.	• Propensity for sprawl. • Land for relocation of Stellenbosch recreation facilities. • Infrastructure backlogs.	• Crime and anti-social behaviour. • Non alignment between key external stakeholders. • Exclusion of less organised stakeholder groups.

5 A Conceptual Framework

5.1 Towards a Vision for the Corridor?

The Adam Tas Corridor is an essential component ingredient for achieving the vision for Stellenbosch as described in the recently prepared "Quo Vadis" strategy. The corridor will be a highly identifiable gateway district for the town of Stellenbosch featuring highly accessible mixed use business, tourism, recreation, entertainment and residential urban precincts established to enable the mix of academic, business, government and residential communities of the region to interact in an innovative and productive manner.

It will provide a high quality, safe and secure, convenient and attractive working, living and playing environment supported by innovatively designed buildings, spaces, infrastructure and urban services that provide a platform for the achievement of higher levels of efficiency, innovation and quality urban living.

It will contain a number of identifiable and integrated mixed use and high density urban precincts, each with their own role and purpose, but interconnected by fully integrated and convenient public transportation and associated infrastructure that prioritises pedestrians and cyclists.

A structured network and hierarchy of high quality public places will enable impromptu business and social interactions and the integration of the activities of work, live and play for all communities in the districts without compromising the operational characteristics and quality of each.

The district will provide the backbone for accommodating and balancing urban development with nature and ensuring a realistic level of resilience to effects of environmental impact.

This is a district in the town which promotes and supports innovation in a multi dimensional way i.e. innovative transport, land use, building form, services, public space, telecommunications and development management.

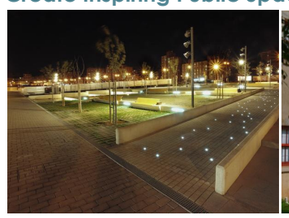
5.2 Key Principles for the Development of the Adam Tas Corridor

5.2.1 Provide for inter linked mixed use clusters/precincts/ neighbourhoods


5.2.2 Increase densities without impacting negatively on existing heritage character


5.2.3 Create a gateway landscape and form

5.2.4 Create Inspiring Public Space




5.2.5 Accommodate regional through traffic

5.2.6 Improve multi modal access to the town and region

5.2.7 Enable and Promote the shift form private modes of travel to Public Transport (PT) and Non-Motorised Transport (NMT)

5.2.8 Protect, enhance and integrate environmental assets and systems with the town


5.2.9 Protect and enhance heritage assets of the town


5.2.10 Create leading edge IT capacity


5.3 Development Concept

The strategic position of the ATC at the confluence of regional transportation routes and at the entrance to the town results in an opportunity for the corridor to operate as an "armature" which links the energy of the town to the region, and brings the energy of the region to the town.

As such the corridor is an area on the periphery of the town which can provide opportunity for anticipated new growth and redevelopment to be accommodated in such a manner as to ensure the protection and enhancement of the character of the historic town. In addition it also provides some opportunity for accommodating growth in an existing regional node thus restricting urban sprawl and reducing impact on the regional landscape character.

The core idea for the corridor is to upgrade and/or add new rail, road and NMT infrastructure and integrate it into a **multi modal system of access and circulation** (the "**armature**") that will accommodate regional through movement, improve access to the town, and improve vehicular and NMT connection to and between the various precincts, neighbourhoods and town blocks both east and west of the corridor. As such it must be able to convey and manage multi modal access and movement efficiently and effectively so as to add value to immediately adjacent and surrounding land and infrastructure.

The "armature" is to be focused around two multi modal interchange nodes located around the relocated Stellenbosch and Du Toit rail stations. These nodes are to provide new multi modal gateways to the town and will provide focus and structure for new development and redevelopment of existing precincts.

Each of the precincts, neighbourhoods and blocks adjacent to the corridor will accommodate an increased mix and density of land use and activities commensurate with its specific location in the town and its inherent development characteristics, but each will contribute to creating a diverse, vibrant, "24/7" urban environment"

The other component of the "armature" is the system of public open space centred around the Plankenbrug River System which connects with the Krom River and drains into the Eerste River. This system integrates the natural landscape features of the region with the corridor thereby adding a "riverfront" character that can provide a backdrop to intense urban development, but simultaneously providing some protection from flooding, and other climatic conditions.

FIGURE 5: THE CONCEPT

5.4 Adding Diversity and Vibrancy

The following land use and activity proposals seek to increase levels of diversity and vibrancy within the study area:

5.4.1 Mixed Use

- Mixed use is to be encouraged as far as is possible. This can take the form of general mixed use in a precinct or town block, mixed use on a single site and or mixed use in a building (see Section 5.7).
- Higher densities in general should be encouraged in infill or redevelopment to increase activity thresholds and development viability, but these should be commensurate with the character of adjacent existing development, capacity of historic buildings and the general scale of surroundings.
- Higher densities to be promoted in greenfield developments
- Land use fronting onto public places and key pedestrian routes should encourage active edges at ground floor levels i.e. shops, cafes, restaurants etc.

5.4.2 Commercial

- Establish a new mixed use precinct on the existing sports field sites and Merriman Avenue sites which will contain retail, office, medium/high density residential and public open space. Commercial edges at ground floor level with offices and or residential above
- Mixed commercial development to be located around both station plazas

5.4.3 Residential

- New high density residential development is to be established on the municipal site fronting onto Merriman Avenue
- Infill and densification of precincts east of the corridor to be encouraged
- Upgrading, Infill and densification in Kayamandi
- Limited additional high density infill along R 304

5.4.4 Industrial

- Precincts west and north east of the corridor to be consolidated as light industrial, but can also to accommodate demands for high tech space.

5.4.5 Institutional

- The corridor should also provide new social facilities (such as health, education) and governmental / municipal service hubs closely linked to the public transport hubs so as to improve accessibility for all communities in the municipality, as well as, increase thresholds for commercial development.

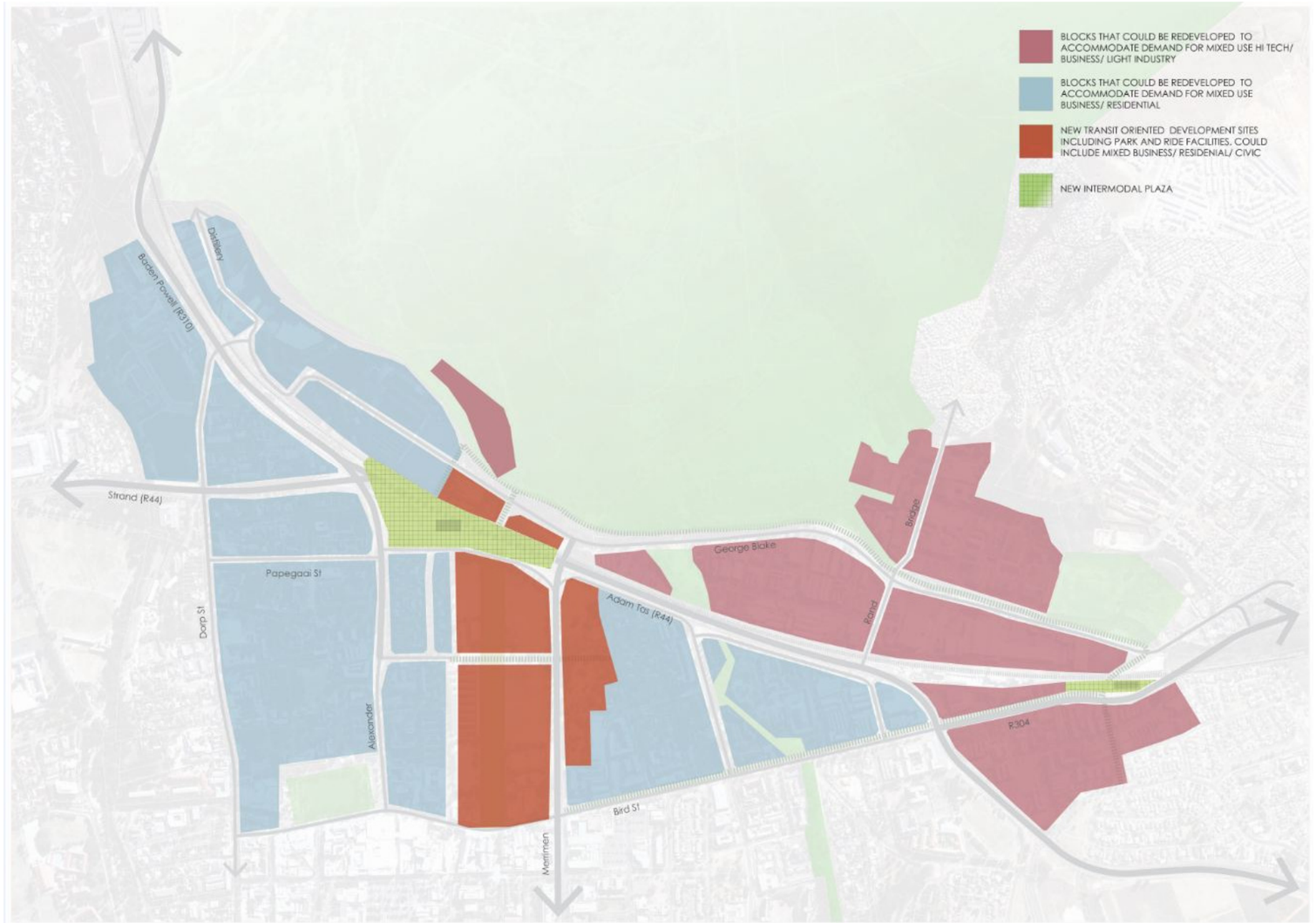


FIGURE 6: ADDING DIVERSITY AND VIBRANCY

5.5 Managing Access and Circulation

In terms of vehicular transport the Adam Tas corridor serves a dual function, firstly it provides access into the Stellenbosch CBD and secondly serves as a through road providing mobility for vehicles moving from Somerset West to Paarl and Wellington and vice versa. The Adam Tas corridor also houses two rail stations, Stellenbosch Station and Du Toit Station which implies that it also forms part of a larger public transport network. As a result the Adam Tas corridor is a crucial link which encourages accessibility and mobility.

What is currently happening however is that this corridor, during the peak, becomes a mobility and accessibility vehicular bottleneck. For pedestrians the Adam Tas corridor inhibits efficient access and mobility into the CBD and essential forms a barrier. The NMT network within this corridor is also limited, with no pedestrian right of way and limited pedestrian friendly intersections and walkways.

The untapped land potential on the west side of the Adam Tas Corridor provides an incentive to provide efficient access and mobility in order to unlock this potential. In sinking a portion of the road, to accommodate the through traffic, and the rail line and providing efficient NMT networks the necessary accessibility and mobility into the town to and from this corridor can be realised.

The following suite of integrated transportation supply (TSM) and demand management (TDM) strategies and interventions could be used to precipitate a modal shift from private to public transport and NMT, as well as, accommodate future growth in all modes of travel.

5.5.1 Rail

- Relocate rail stations to locations that serve the central area and the residential area of Kayamandi more conveniently and effectively
- Establish multi use rail station plazas at both new stations that accommodate transition from rail to other forms of public transport and NMT, as well as, accommodate new commercial opportunities
- Rail Line Options:
    - Sink rail lines in the vicinity of new Stellenbosch Station within their current reserves so as to facilitate development of plaza over them and enable safe pedestrian linkage between east and west sides of the corridor
    - Build a platform plaza over rail lines at new Stellenbosch Station to enable safe pedestrian linkage between east and west sides of the corridor
- Note that integration is the key strategy for rail. Whether the track is lowered or a platform is created, there needs to be a connection across road and rail that is safe and more convenient than crossing Adam Tas Road. In the case of the elevated platform, this would be more than a bridge – it needs to create the sense of a "false ground" that pedestrians will use for its convenience, and may incorporate activities on the platform.

5.5.2 Road

The general concept is to improve access to the Plankenbrug precinct while altering the road configuration to reduce conflict between through traffic and right-turning traffic into the town. In this, it is important to distinguish the kind of access provided. For Plankenbrug, the concept is to provide good motorised and public transport access from outside the town, while encouraging pedestrian connections with the town.

FIGURE 7: MANAGING ACCESS AND CIRCULATION

There are a number of sub-options to achieve this, depending on the budget, phasing and priorities. Different designs will favour different travel markets. In general:

- Realign and reconfigure R 44 and R 310 interchanges and intersections to operate in a parallel system to provide for vehicular through traffic and to provide access to the central area of the town and to the Plankenbrug precincts
- Establish new parallel road and associated interchanges and intersections with R44/310 system to link Plankenbrug precincts and to effectively connect the precincts with the regional access system
- Extend Rand Road to establish link between Kyamandi and Plankenbrug precinct
- Establish pedestrian bridge as eastern extension to Rand Road and link into town at Papegaairand Road

Specific options include:

- The primary choice relates to the road configuration in the vicinity of the relocated Stellenbosch railway station. In Option One, the R44 becomes discontinuous in order to avoid crossing the new interchange plaza with a busy road, and north-south through trips rely on a connection to the Plankenbrug internal spine road via Dorp Street. Option Two creates a grade-separated partial interchange at the intersection of the R44 and R310 near the station so that through traffic is allowed on the existing R44, but the R44 runs below the new interchange plaza.
- Merriman Ave is extended across the railway line to link Plankenbrug with the town in both options. In Option One it connects at grade with a realigned portion of the R44; in Option Two it passes over, but does not connect with, the R44. In Option Two there could be a suboption for southbound traffic on the Plankenbrug spine road to turn left onto Merriman then turn right after crossing the R44 to enter a ramp onto the R44 southbound – this provides an alternative to right turns at busier intersections such as Adam Tas / Bird and Papegaai / Alexander.
- In Option Two, ramps are added to the R310 east of Devon Park to allow strong connection between the R310 and the Plankenbrug internal spine. This can be phased in as needed.
- At the entrance to Kayamandi, provide ramps to improve traffic flow between the R304 and the internal spine in the Plankenbrug precinct. This can be phased in as needed.

5.5.3 Public Transport

- Establish town system (5kms radius form centre of town) of PT based on bus/taxi that links all suburbs/districts/precincts to each other, to the CBD, the University and with the rail stations to reduce car travel trips in town
- PT system should link all schools to residential area in the town

5.5.4 NMT Systems

Nonmotorised transport is currently important as a primary travel mode, and facilities need to be improved both to enhance this mode and to support public transport.

- Establish a primary circular NMT route that links the stations to the precincts on either side of the movement corridor along George Blake, Bird and a new pedestrian Spine through the Stellenbosch Country Club site to connect with Bird Street.
- Establish NMT routes that link the town to the corridor
- Develop a strategy to encourage building owners / managers to provide bicycle lock-up and changing facilities – particularly with public buildings and university buildings.

5.5.5 Parking Strategy

- Restrict car use in the CBD area through street system design and through a parking fee structure that discourages parking during peak times.
- Encourage short-term parking on streets for shoppers, and long-term parking off streets in locations that are best served by high frequency and high quality public transport.
- Establish a park and ride system for travellers outside the town. Can include parking garages on town fringe or near the station on "TOD land" that is accessible without bringing more traffic into the core of the town.

5.6 Making Productive Public Spaces

5.6.1 Links

- Establish a new pedestrian spine to link the new Stellenbosch Station plaza with the public space on Bird Street
- Reinforce and enhance the pedestrian links along Bird Street and George Blake

5.6.2 Spaces

- Establish new Station Plazas at Stellenbosch and Kayamandi Stations to provide for intermodal transfers and provide gateways to town
- Establish new urban squares

5.6.3 Parks

- Linear parkway along the Plakenbrug River to support town wide NMT routes and provide public spaces for surrounding development
- Papegaaiberg conservation area to be upgraded with access for Plankenbrug Precinct

5.6.4 Built Form

- Buildings will be a mix of old and new and will retain identity with the history of the area whilst celebrating change, growth and transformation.
- Buildings will reflect progressive architecture but will include urban typologies and features

FIGURE 8: MAKING PRODUCTIVE PUBLIC SPACES

5.7 Infrastructure

The following principles have been used to guide the medium to long term provision of infrastructure and services so as to shift from conventional systems to more efficient systems.

5.7.1 Water Reticulation And Efficient Water Use

- Matching water treatment to water use - many water uses do not require water at potable standards. Efficient water and energy use must therefore include designs that separate water 'streams' into reticulation systems that can utilise grey water (for ablution facilities, irrigation etc.), black water etc.
- Demand Side Management and Water Conservation measures will ensure efficient water use - this includes water efficient fittings to reduce the quantity of water used, water-wise landscaping, water re-use, stepped water tariffs, rainwater harvesting through permeable paving or water tanks, etc.

5.7.2 Sanitation

- On-site black water treatment can be considered if incentives from the municipal side coupled to the benefits of water and energy (methane) recovery outweigh the costs of formal sewer system connections and disposal. Such initiatives include the use of biodigesters or package treatment plants.
- Elimination of gravity fed bulk sewer systems will reduce the impacts of bulk conveyance along watercourses (especially since the ATC is already congested)

5.7.3 Stormwater Management

- The close proximity to riparian zones and flood zone warrants a stormwater management system that is pro-active in terms of pollution control and flood attenuation. Therefore, it is necessary that the stormwater design relies on Sustainable Urban Drainage Systems concepts. In particular, the following will be sought from a stormwater management system for the study area:
    - Permeable surfaces wherever possible, e.g. on and alongside pathways and open parking spaces. Decreasing the amount of impermeable surfaces will reduce the volume and intensity of surface water runoff, thereby reducing erosion and ameliorating flooding.
    - Artificial wetlands to filter pollutants from stormwater. These could be incorporated as buffer zones to riparian wetlands especially in areas with noticeably high stormwater runoff.
    - Wetlands (artificial or natural) will act as a flood attenuation measure, and can be incorporated as green infrastructure component in the form of bioswales, ponds, landscaping, road verges, traffic islands etc. Some intentional attenuation features can double as wetland features.
    - Increasing tree canopy cover, either as trees or shrubs, will reduce erosion associated with the intensity of runoff raindrop impact.

5.7.4 Energy efficiency

- Building design will determine energy efficiency. New structures or refurbishings need to follow green design principles promoted by the Green Building Council of South Africa (GBCSA).
- Energy design must aim to provide for off-grid renewable/alternative energy connections even if immediate shifts to alternates are not possible. This could extend to provision for battery arrays, electric vehicle charging points, structural support for solar panel arrays, etc.
- Energy efficiency in buildings can include daylight sensing systems, LED lighting, passive heating and cooling etc.

5.7.5 Transportation

- Transportation is resource intensive, and is therefore a significant determinant of the overall sustainability of urban areas. Switching to alternative modes of transport, other than private vehicles, is therefore ideal.
- By implication, sustainable transportation infrastructure needs to provide for:
    - Non-motorised transport (NMT) routes (pedestrian walkways and cycle lanes) connecting places of work, recreation spaces and places of residence)
    - Development and redevelopment of road and rail infrastructure that incorporates space and facilities for NMT and mass public transport modes, even if these are not yet in existence
    - Intelligent transportation systems that will improve movement efficiency - for example adjustable synchronisation of traffic signals
- New road infrastructure should incorporate Greenroads principles into their designs

5.7.6 Solid Waste

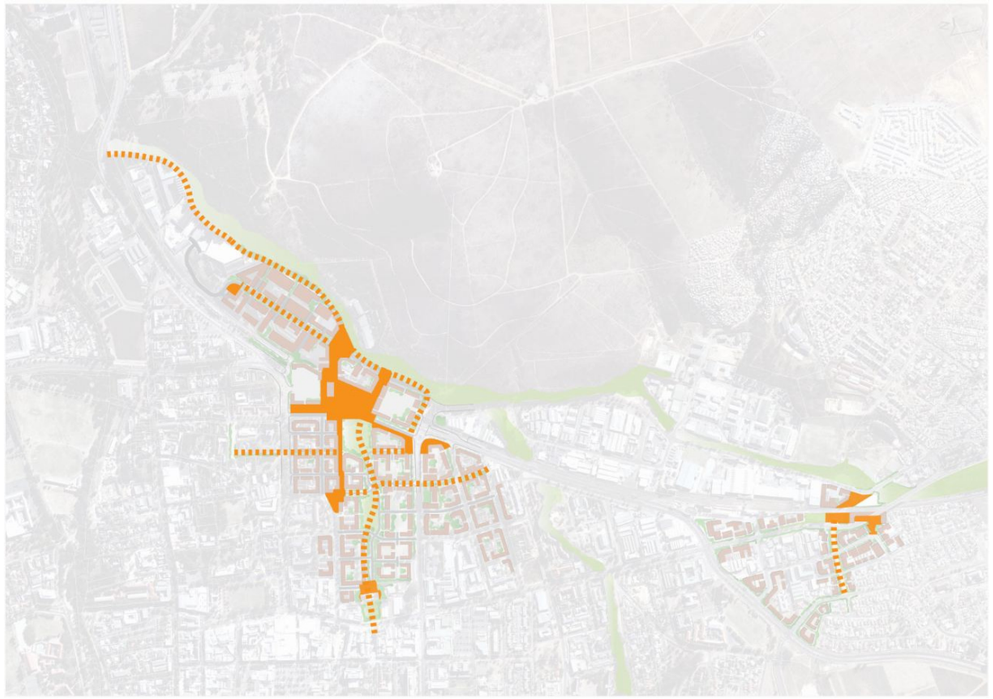
- Waste reduction must take preference over waste disposal. This can be achieved through aggressive waste management strategies at the source of waste that encourage re-use and eliminates unnecessary waste generation.
- Waste separation at source and immediate diversion out of the waste stream must be present, with connections to activities that can implement resource recovery - e.g. composting, biogas, materials recovery facilities

5.7.7 Biodiversity Corridors

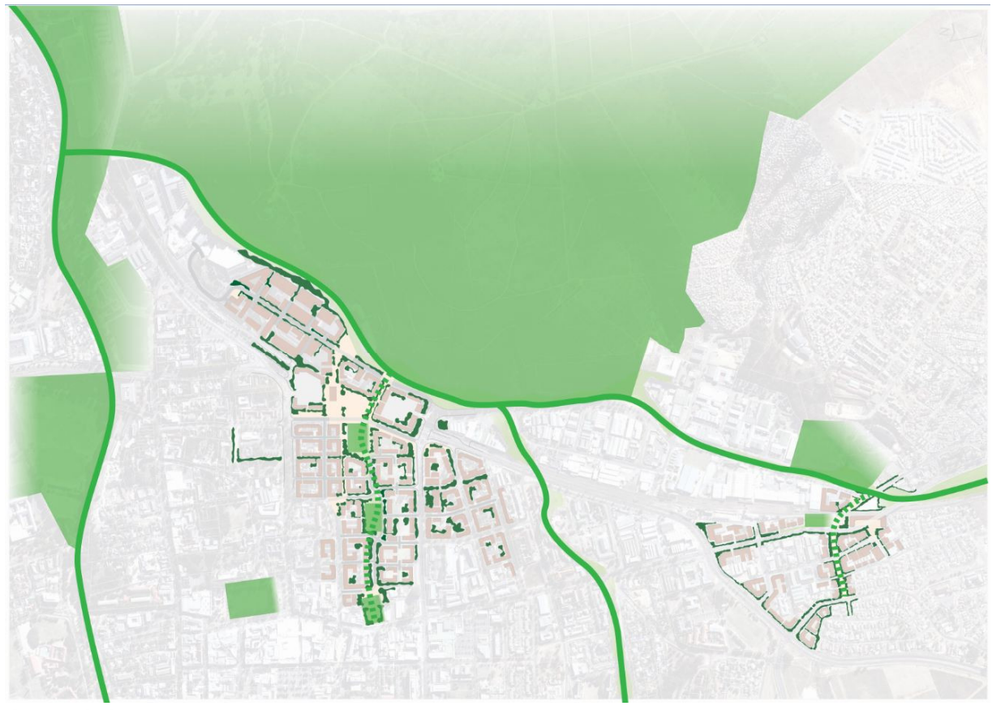
- Retention and use of the river system as a continuous open space corridor will benefit the area and the city in a multitude of ways, notably in relation to maintaining overall ecological functioning, but specifically as alternatives to formal built infrastructure:
    - Stormwater conveyance
    - Water treatment
    - Microclimatic control
    - Open space landscaping
    - Human wellness facilities
    - Erosion control
    - Air pollution control

5.8 Urban Built Form Response

5.8.1 Adam Tas Corridor



PUBLIC SPACE AND PEDESTRIAN NETWORK



GREEN SYSTEM

STELLENBOSCH MUNICIPALITY
STELLENBOSCH - PNIEL - FRANSCHHOEK

Royal HaskoningDHV
Enhancing Society Together

6 Towards an Implementation Strategy

6.1 Developing Implementation Capacity

- Development Planning
- Stakeholder Coordination and Alignment
- Funding – Sourcing / Alignment / Monitoring
    - One of the overall goals of any municipality is to achieve and maintain financial sustainability and resilience, which is necessary to enable the Municipality to implement its development strategies. Therefore, in order to implement the various elements described in this document it is imperative to develop a sustainable funding strategy, to not only access the various potential funding sources that may be available to the Municipality, but also to pursue innovative opportunities for revenue/ funding generation.

6.2 Funding Sources

The primary sources of infrastructure finance available to municipalities are internally generated funds and transfers from National Government. However, these sources are insufficient to meet the demand for new infrastructure while covering the operation and maintenance of existing infrastructure. Consequently, it is necessary for municipalities to explore ways of leveraging private funding sources to promote sustainable development of infrastructure which is core to the social and economic development of the municipal area. The sources of funds are broadly covered as follows:

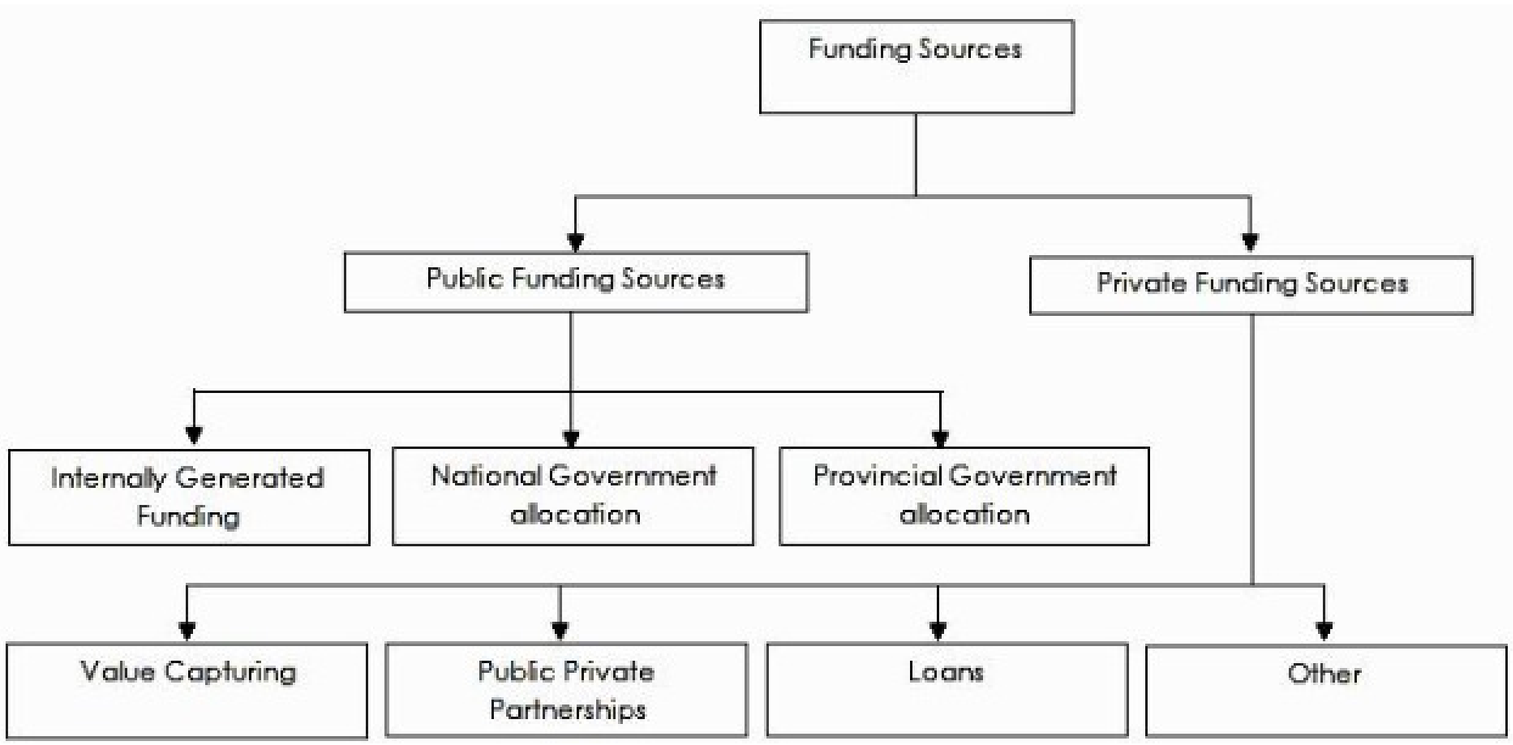


FIGURE 9: FUNDING SOURCES

6.2.1 Public Funding Sources

Internally generated funding

Stellenbosch is a destination of choice for both business and private investors. The proposed developments are expected to further enhance the municipality's attractiveness for economic investment. This new economic development will have a positive impact on the municipality's finances as it will increase the pool of rate payers resulting in increased property taxes and service charges. Furthermore, the improvement of property values will also contribute to additional property taxes. However, such development comes with a substantial infrastructure requirement and even though the increased revenue stream will contribute to the cost of this infrastructure the challenge faced by the municipality is to match the timing of the infrastructure spend with the receipt of the additional revenue streams. Careful consideration should be given to the phasing of the various developments to alleviate this potential mismatch.

A further factor to bear in mind is that these revenues are largely utilised for the day to day operation of the municipality and the operation and maintenance of infrastructure. Consequently, the municipality may only be able to utilise a small portion of these funds for development of new infrastructure.

In order to match the timing of the infrastructure spend with the "new" revenue generated by such infrastructure the municipality may consider debt funding against dedicated revenue streams. This will be discussed in more detail below.

National Government allocations

The main source of external funding of the municipality is allocations made by National Government on an annual basis as promulgated in the Division of Revenue Act (DoRA). The allocations are either unconditional allocations or conditional allocations. The unconditional allocations are made in the form of an "Equitable share", which can be utilised at the discretion of the Municipality in order to meet their constitutional and legislative mandates and responsibilities.

The conditional allocations are made as a number of conditional grants earmarked for specific infrastructure delivery. The following are some of the grants available under DoRA for which the municipality may qualify:

- **Municipal Infrastructure Grant (MIG)** - The largest infrastructure transfer is made through the municipal infrastructure grant, which supports government's aim to expand service delivery and alleviate poverty. The grant funds the provision of infrastructure for basic services, roads and social infrastructure

for poor households in all non-. metropolitan municipalities. **The Neighbourhood Development Partnership Grant (NDPG)** - is administered by the National Treasury and has two components in the 2014 MTEF. One focuses on urban areas and the other focuses on towns and rural areas. The urban component supports and facilitates the development of urban network plans to create a platform for third-party public and private investment to improve the quality of life in township urban hubs. Projects in towns and rural areas will be implemented in conjunction with the Department of Rural Development to support catalytic projects in these areas

- **Public Transport Infrastructure Grant (PTIG)** - is administered by the Department of Transport (DoT). This grant was previously the public transport infrastructure and systems grant. The operational portion of the previous grant has been separated as the public transport network operations grant since 2013/14, meaning that the infrastructure grant will only fund capital expenditure. The grant aims to help cities create new and improve existing public transport and non-motorised transport infrastructure. This includes the provision of infrastructure for bus rapid transit systems. Although Stellenbosch is not one of the areas identified in terms of the National Public Transport Action Plan, and currently does not qualify for a PTIG allocation, an application for this grant should be considered for any infrastructure development that forms part of an Integrated Public Transport Network (IPTN) , as this cannot be legally precluded.
- Closely linked to the PTIG is the **Public Transport Network Operations Grant (PTNOG)** which is earmarked to subsidise the operational costs of public transport systems built through the Public Transport Infrastructure Grant. As said above both these grants formed part of the public transport infrastructure and systems grant.

Provincial Government allocations

The municipality is situated at the centre of one the region's transport congestion challenges. Consequently, the Provincial Government of the Western Cape has indicated that funds have been made available in order to implement a solution to this problem. The Province is looking into the possibility of constructing a by-pass road, which will divert through traffic past the town. However, the proposed TOD Concept includes an alternative solution to the through flow of traffic which is more beneficial to the economic development of the town. It is therefore recommended that the Council approach the Provincial Government to make the funds intended for the by-pass available to be used on the main arterial infrastructure suggested in this TOD concept.

6.2.2 Private Funding Sources

Unfortunately public funding sources are inadequate to fund all the required infrastructure to implement the proposed TOD Concept and as a result the Municipality will have to explore innovative alternatives to mobilise private party funds. A number of options have been identified:

Value Capturing

Value capturing entails the principle of local government "harvesting" the increase in property value created by some form of public investment. This investment is normally by way of new infrastructure development or the renovation or improvement of existing infrastructure. Especially transport infrastructure has proven to be a great catalyst for economic development thereby generating opportunities for wealth creation. The various mechanisms that may be considered are discussed in section 6.3 below.

Public Private Partnerships

The term Public-Private Partnership (PPP) has no legal definition and is used to describe a wide variety of arrangements between the public and private sectors working together to deliver a Governmental function. Although in many instances Governments tend to largely lose operational control over the underlying project, the ultimate accountability to the citizens for the delivered service remains with the appropriate Governmental Function. The provision of public infrastructure under long term contracts can be structured in two main "types" of PPPs.

- **Concession PPP** – The municipality grants a private party the right to design, build, finance, and operate a public sector owned infrastructure asset. The concession contract normally covers a fixed period around 25–30 years, after which responsibility for operation reverts back to the municipality. The concessionaire recoups its investment, operating, and financing costs, while making a return commensurate with the risk assumed by charging members of the public a user fee. Consequently, a key feature of a concession is that the private party usually assumes the market or demand risk, in addition to the risks of design, finance, construction, and operation. However, demand risk may be shared with the public sector, e.g.: the municipality may share the risk by underwriting a minimum level of usage. Typical concession examples include toll roads, railways, urban transport schemes, ports and airports.
- **Availability-Based PPP** – This arrangement is similar to a concession, i.e. the private party also assumes design risk, financing risk, construction risk, and subsequently operation and maintenance risk. However, in this case, the municipality (as opposed to the user) pays the private party to the extent that a public service (not an asset) is made available, based on certain output criteria. As a result, the demand or usage risk remains with the public sector. This is often referred to as a take-or-pay contract of which a power purchase agreement used in power generation projects, is a prime example. This principle has also been successfully used for the provision of social infrastructure such as schools, hospitals, prisons, or government buildings, where payments are generally based on the availability of the accommodation facility, equipment, or system and not on the volume of usage

A well-structured PPP offers both public and private participants with a number of advantages. From the Municipality's point of view these benefits include:

- Transfer of risk to the party best placed to manage the risk.
- The public sector benefit from private sector skills, often achieving more efficient and effective project implementation and operation.
- Mobilisation of private funding.
- Access to increased capacity available in the private sector.
- Numerous examples exist globally where Governments have found PPPs to be very effective in ensuring that public facilities are delivered on time and on budget, are properly maintained, and are able to deliver public services in the context of constrained resources.

Unfortunately PPPs are not always the optimal procurement option as it also comes with considerable challenges. The disadvantages of a PPP procurement process include the following:

- The number of parties involved and the long-term nature of their relationships often result in complicated contracts and complex negotiations, and therefore high transaction and legal costs. PPP projects can take years to complete.
- Transferring of risks to the private sector comes at a price which may outweigh the benefits to be gained.
- Regulation 16 of the PFMA requires specific approvals by treasury and the process laid out in the PPP manual requires significant specialised capacity and resources form Government.

It is therefore essential, as stipulated in the PPP manual, to assess the suitability of a PPP for a specific project already at an early stage of the project. To assess whether a PPP procurement strategy is suitable for a specific project the PPP manual prescribes the following criteria to be evaluated:

- **Scale** – The net present cost of the probable cash flows should be large enough to allow both the public and the private parties to achieve value-for-money outputs given the likely levels of transaction advisor and other costs. In this regard the investor fraternity applies a rule of thumb of a minimum project size of around R1 billion in the absence of any enhancing factors that may warrant the use of a PPP procurement, for example if the project has significant revenue generation possibilities.
- **Outputs specification** - It must be possible to specify outputs in clear and measurable terms, around which a payment mechanism can be structured.
- **Opportunities for risk transfer** - The allocation of risk to a private party is a primary driver of value for money in a PPP. Where opportunities for allocating risk to the private party are limited, the potential for a PPP to deliver value for money compared with a conventional procurement choice is reduced. Furthermore, the process of risk transfer also places an administrative burden on the Municipality in order to monitor the performance of the private party and administrate the payments, penalties, etc.
- **Market capability and appetite** - The project must be commercially viable, and there must be a level of market interest in it. This will largely be driven by the aspects mentioned above as well whether the service or asset to be delivered through the project is something in which the private sector is actively involved in.

Loans

Loans represent a significant source of funding for the municipality, however, the availability of loans are limited by the financial standing and performance of the municipality.

In order to leverage future cash flow to be earned as a result of infrastructure investment the municipality should explore the possibility of incurring loans against predictable new revenue streams. The main requisites for such an arrangement to succeed are:

- The value and timing of the revenues must be reasonably predictable.
- The revenue streams must be sustainable, at least for the duration of the loan.
- The revenue stream must be ring-fenced and dedicated to the repayment of the loan.

The loans may also be in the form of municipal bonds. The repayment of the bonds can be structured to match the expected revenue streams that will be used to repay the bonds.

Other

Economic opportunities at public transport facilities

The municipality can generate revenue by making space available at public transport facilities that private operators can utilise for some form of commercial gain. Opportunities would include selling of advertising space or leasing space to traders in or around at transport precincts. The municipality may also make space available for business ventures in return for maintaining the adjacent transport facility, for example the so called adopt-a-taxi-rank principle where the private sector upgrades and maintains the rank in order to obtain a certain privilege such as filling station or fast food rights.

User charges

The popularity of user lay in the fact that it creates a clear link between payment and benefit received. The municipality has already implemented a number of these charges and may look to expand on the use thereof. For example:

- Congestion charges which is aimed at discouraging the use of roads in certain areas or at certain times. This can be implemented through charging of fees to enter certain areas at certain times or through parking charges. Overuse of these mechanisms may however lead to encourage developments to shift elsewhere. These charges are less effective as a source of funding for infrastructure development but rather seen as instruments for travel demand management.
- Parking fees. Off-street and on-street parking provides a good opportunity for revenue generation to the Municipality. These parking facilities also provide ideal opportunity for concessions, from a full BOOT concession, where the Municipality receives a periodic concession fee to a management concession, where the Municipality pays an operator to manage the parking facility for the Municipality's benefit.

6.3 Value Capturing

Studies have shown that infrastructure investment and especially road infrastructure can significantly contribute to the increase in value of property in close proximity there to, while reliable transport infrastructure stimulates growth by facilitating the movement of goods and people into the area. Consequently, land values near major transport arteries and transport hubs tend to increase in value as investors and developers wish to capitalise on the opportunities for new developments created by the improved accessibility into these areas.

Transit-Oriented Development (TOD) therefore provides a significant opportunity to capture the increase in market value created by the improved accessibility and "additional feet" that it generates as it facilitates the movement of large numbers of people. A number of value capturing mechanisms can be considered.

Incentive Zoning

Incentive zoning is where developers are incentivised by allowing them higher density developments in exchange for some form of contribution from them which is to the benefit of the community or assist the municipality to deliver on their mandate. Higher densities may be achieved by allowing a developer an additional floor of office space in an office block development or allowing additional residential units per hectare. In return the developer may obliged to develop affordable housing units, establish public facilities, build infrastructure, historic preservation or contribute to a fund earmarked for a specific purpose.

The principle of this mechanism is that the additional density awarded improves the financial profitability of the project thereby enabling the developer to afford the required contribution. For example this could be applied to the proposed multi-purpose development over the station, where the development also contributes to the cost of lowering the road and rail underground in exchange for additional development rights.

This mechanism brings the added benefit that it supports the municipality's densification goals. The municipality, however, needs to ensure that areas identified enjoy adequate demand to support the densification and that the infrastructure in the area can support the added burden.

Inclusionary Zoning

Zoning regulations for a specific area require developers to include a certain number or percentage of low to moderate income housing. This could be further enhanced through additional density, thereby creating greater opportunity for cross subsidisation.

Such an initiative will facilitate the development of mixed income communities, allowing lower income brackets of the community to share in the prosperity of the town, created by new developments. It also allows a greater portion of

the work force to live in closer proximity to their place of employment.

These initiatives should be initiated with great care to avoid a situation where the differential between the upper and lower income brackets catered for become too big thereby jeopardising the desirability and ultimately the feasibility of the developments. For example instead of implementing such a scheme on individual buildings it may be more successful if applied to a development area. Alternatively (or in addition) the range of income groups targeted maybe limited or the lower income accommodation could be made available as rental units which could improve the management and maintenance of the units.

Air Rights

Additional development "space" is created by making the Air rights above public infrastructure and facilities available for development. This could include development above stations or parking areas or across rail lines or roads. The airspace could be made available against cash compensation or contributions in kind. Alternatively local government could enter into a joint venture with the developer, thereby sharing in the future benefits of the development.

Joint Development

Council enters into a joint development agreement with a developer with both parties contributing to the cost of the development (also see PPPs below). Council's contribution will typically be the land on which the development takes place. Council could make the land available on a long lease basis thereby creating a revenue stream which would bolster Council coffers.

City improvement Districts

City improvement districts or Special Rating areas can be established where property owners within an area agree to pay a tax or levy in addition to their normal rates and taxes to be used to uplift and maintain the area. These additional payments are ring-fenced for use only in the Special Rating Area. The services included would normally be services over and above the normal service provided by the Council, such as cleaning and maintenance, safety and security, social services and capital improvements. Capital improvements could include upgrading of pavements, provision of streetlights or lighting of walkways, landscaping, etc.

Development charges or contributions

Development charges or contributions which represent levies imposed on developers when land is rezoned or development permits or building permits are issued. The municipality needs to ensure that all costs are recovered on the services that it provides, including security access restrictions, way leaves and pavement reinstatement. The current developer contribution formula, and the manner in which it is applied, may need to be reviewed to ensure that total cost recovery is achieved

6.4 Development Contribution model

An Excel model was developed based on the Directorate Engineering Services' Development contribution levies in respect of civil engineering services for the greater Stellenbosch levies and usage categories.

The model projects the applicable rates by escalating the current rates at an assumed escalation rate. The model is populated by the technical team to give a high level indication of when the various developments may take place based on the development concept reflected in this document. Using the usage rates per the 2014/ 15 final tariff book, the model calculates the potential development contribution that may be available to the Municipality from these developments.

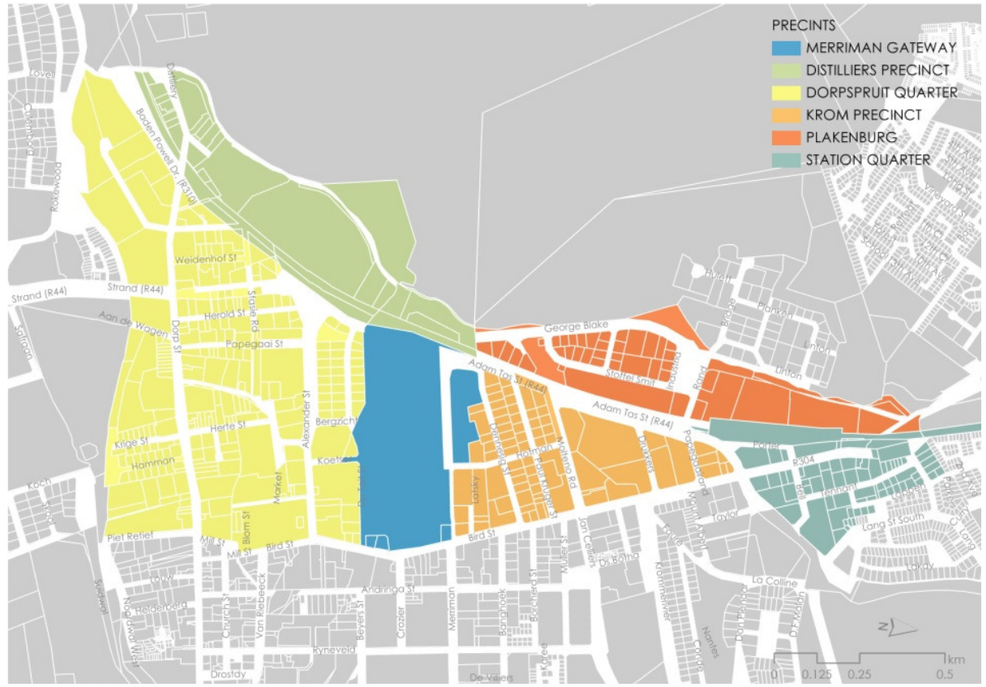


FIGURE 10: DEVELOPMENT PRECINCTS

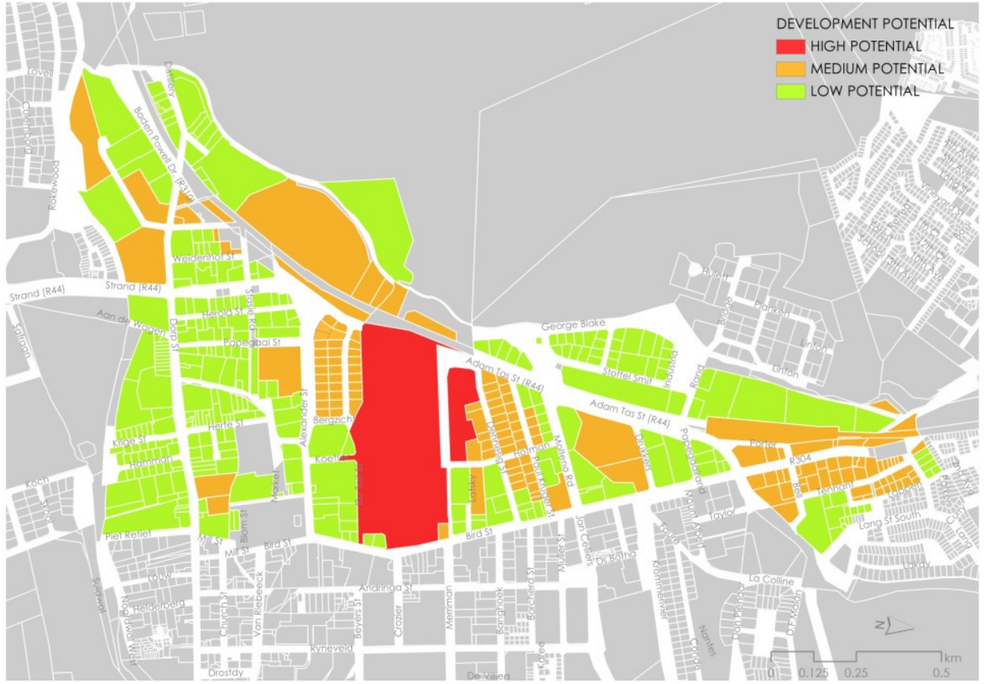


FIGURE 11: DEVELOPMENT POTENTIAL

TABLE 2: FULL ZONING TAKE UP (HIGHER DENSITY OPTION)

DEVELOPABILITY	AREA (m²)	F.A.R[3].	POTENTIAL FLOOR AREA	LAND USE MIX	COMMERCIAL (m²)	INDUSTRIAL (m²)	RESIDENTIAL (m²)
HIGH POTENTIAL	172,769		734,266		367,133		367,133
Merriman Gateway	172,769	4.25	734,266	50-0-50	367,133	0	367,133
MEDIUM POTENTIAL	392,973		884,190		385,876	158,085	341,360
Merriman Gateway	1,488	2.25	3,348	100-0-0	3,348	0	-
Distillers Precinct	100,496	2.25	226,117	33-33-33	75,749	75749	75,749
Dorpspruit Quarter	115,958	2.25	260,906	50-0-50	130,453	0	130,453
Krom Precinct	83,547	2.25	187,980	50-0-50	93,990	0	93,990
Plakenburg	4,178	2.25	9,400	40-40-20	3,760	3760	1,880
Station Quarter	87,306	2.25	196,440	40-40-20	78,576	78576	39,288
LOW POTENTIAL	723,860		1,628,685		745,125	211,013	670,344
Merriman Gateway	2,504	2.25	5,635	100-0-0	5,635	0	-
Distillers Precinct	97,940	2.25	220,365	33-33-33	72,721	72721	72,721
Dorpspruit Quarter	379,279	2.25	853,379	50-0-50	426,689	0	426,689
Krom Precinct	90,478	2.25	203,575	50-0-50	101,787	0	101,787
Plakenburg	127,889	2.25	287,750	40-40-20	115,100	115100	57,550
Station Quarter	25,770	2.25	57,982	40-40-20	23,193	23193	11,596
TOTALS	1,289,602		3,247,141		1,498,133	369,098	1,378,837

TABLE 3: REDUCED ZONING TAKE UP (LOWER DENSITY OPTION)

DEVELOPABILITY	AREA (m²)	F.A.R.	POTENTIAL FLOOR AREA	LAND USE MIX	COMMERCIAL (m²)	INDUSTRIAL (m²)	RESIDENTIAL (m²)
HIGH POTENTIAL	172,769		388,729		194,365		194,365
Merriman Gateway	172,769	2.25	388,729	50-0-50	194,365	-	194,365
MEDIUM POTENTIAL	392,973		392,973		171,500	70,059	151,514
Merriman Gateway	1,488	1.00	1,488	100-0-0	1,488	-	-
Distillers Precinct	100,496	1.00	100,496	33-33-33	33,666	33,465	33,465
Dorpspruit Quarter	115,958	1.00	115,958	50-0-50	57,979	-	57,979
Krom Precinct	83,547	1.00	83,547	50-0-50	41,773	-	41,773
Plakenburg	4,178	1.00	4,178	40-40-10	1,671	1,671	836
Station Quarter	87,306	1.00	87,306	40-40-10	34,923	34,923	17,461
LOW POTENTIAL	723,860		723,860		331,460	94,077	298,224
Merriman Gateway	2,504	1.00	2,504	100-0-0	2,504	-	-
Distillers Precinct	97,940	1.00	97,940	33-33-33	32,614	32,614	32,614
Dorpspruit Quarter	379,279	1.00	379,279	50-0-50	189,640	-	189,640
Krom Precinct	90,478	1.00	90,478	50-0-50	45,239	-	45,239
Plakenburg	127,889	1.00	127,889	40-40-10	51,156	51,156	25,578
Station Quarter	25,770	1.00	25,770	40-40-10	10,308	10,308	5,154
TOTALS	1,289,602		1,505,562		697,325	164,136	644,103

[3] Floor Area Ratio (F.A.R)

6.4.1 Total Cost

TABLE 4 SUMMARISES THE ESTIMATED COST AND REVENUE FOR THE PROPOSED UPGRADES TO THE ADAM TAS CORRIDOR AS DISCUSSED IN THE REPORT.

TABLE 4: STELLENBOSCH DEVELOPMENT FUNDING SUMMARY

STELLENBOSCH DEVELOPMENT FUNDING SUMMARY*

DEVELOPMENT COSTS (in thousands of Rand)	Low Estimate	High Estimate
CAPITAL		
National Roads	R	R
Provincial Roads	R 450 000	R 1 248 000
Municipal Roads	R	R
NMT	R 10 000	R 20 000
Rail Infrastructure	R 200 000	R 1 156 000
Parking	R 685 000	R 856 000
Water	R 210 000	R 400 000
Sanitation	R 128 000	R 250 000
Electricity	R 130 000	R 250 000
SUB TOTAL	***R 1 813 000***	***R 4 180 000***
REVENUE SOURCES (est over a 20 year period)		
CAPITAL		
Development Contributions	R 1 392 000	R 1 500 000
Municipal Capital	?	?
National Grants	?	?
MIG	?	?
NPDG	?	?
Other	?	?
SUB TOTAL	R 1 392 000	R 1 500 000
OPERATIONAL		
Parking fees	R 2 000 000	R 2 500 000
Municipal Rates	R 1 929 000	R 2 894 000
Other	?	?
SUB TOTAL	R 3 929 000	R 5 394 000
TOTAL	**R 5 321 000**	**R 6 894 000**

TABLE 4 illustrates the estimated, capital and operational development cost for the proposed upgrade as well as the estimated potential revenue generated through this development. The development capital cost is comprised of the development of the various roads i.e. national, provincial and municipal roads, NMT, rail infrastructure, parking and bulk infrastructure and range between approximately R1.8 billion (low estimate) and R 4.2 billion (high estimate). The capital revenue sources are comprised of development contributions, and a number of potential national and municipal grants, as well as operational revenue sources which include revenue generated from the proposed parking facilities i.e. parking fees, municipal rates from the development and others. These potential revenue sources could generate between an estimated R5.3 billion (low estimate) and R6.9 billion (high estimate) in revenue. The revenue estimates have been based on accumulated revenue over a 20 year period and have not been discounted to the present value.

A number of potential revenue sources, such as the revenue generated from land sales, and in the form of national and municipal grants, have not been estimated, but have the potential to increase the total revenue. Other potential revenue cost implications such as the property development cost has been excluded as this cost is assumed will be covered through private investment and the return thereof i.e. rental (assuming office or residential property is built) will be earned by the property owner or developer. Capital development costs such as the cost associated with the proposed upgrading of Adam Tas corridor (a provincial road) could be an investment cost funded by both the local and provincial road authorities. Similarly, with the rail infrastructure cost, this cost can be funded through both the municipality and the rail authority and potentially private investors.

Furthermore, it should be noted that even the low estimated revenue (R 5.321 billion) exceeds the high estimated development cost (R 4.18 billion) by approximately R1billion.

***Additional notes regarding Development Funding summary**

These figures are based on assumptions obtained from a variety of similar projects and are therefore indicative only

The capital works include a range of values and are dependent on the extent of works assumed:

~ 4 000 to 5 000 parking bays

~ sunken rail and road facilities from 300m to 2 000m

The operational revenue includes a range of values dependent on a

~ municipal rate of 0.4% (low est) and 0.6% (high est) per annum

~ 4 000 to 5000 parking bays at R8/ hr

The high estimate rail infrastructure cost includes a 2 track railway line, signalling power and tunnelling

The high estimate road infrastructure includes a cut and cover tunnel for a 4 lane divided freeway of 2km length

7 Conclusion and Next Steps

7.1 Conclusion

Stellenbosch is an established town characterised by a mix of high quality heritage, residential, business and public open space assets. These have encouraged and supported a development growth trend that requires the municipal planning authority to re-imagine the future vision and management of the town in a manner that will conserve and enhance these assets for the future.

The conceptual proposals discussed in this document build on the exciting "Shaping Stellenbosch" initiative by focusing on the Adam Tas corridor as a key new spatial and economic restructuring intervention in the town as it strives to accommodate growth and change though the application and implementation of TOD and sustainable development principles.

The concept has illustrated the potential to provide the residents of, and visitors to, the town with increased mobility and accessibility, a reduction of negative externalities and impacts on the high quality living environment, improved conservation and utilisation of public and green open space, more efficient use and shared infrastructure and associated costs and an increase in and diversification of economic activity.

The implementation of the interventions identified will require leadership by the Municipality and significant public and private investment, and will need to be funded and managed through a suite of innovative and creative financial models and partnerships.

7.2 Next Steps

Stellenbosch Municipality needs to urgently respond to current infrastructure backlogs and attendant traffic problems. However, it needs to intervene in a manner that attends to current issues, but that simultaneously takes them forward into the new spatial development paradigm envisaged in their recent planning initiatives.

A possible approach at this stage could include the Municipality taking the lead role in development and committing to developing its municipal landholdings (i.e. Van Der Stel Sports ground and parcels of land north of Merriman Ave) as the development catalyst that will generate capital for infrastructure, motivate DoT and PRASA to commit to investing in related infrastructure upgrades, as well as, attract the private sector to invest in the development or redevelopment of their landholdings in the Precinct.

In order to fulfil this role the Municipality should follow a strategy that will:

- Cleary signify their development intentions and vision to the general and development community
- More accurately determine the yields of their landholdings and surrounding properties in the Precinct
- More accurately determine the capital and operation costs of accommodating such development
- Prepare a Development Programme that will include feasibility assessments that will determine the priorities and phasing of projects in a manner that can enable a sustainable cash flow for the municipality.

These steps are elaborated on below.

1. Identify the role of the STOD Hub in the new spatial vision for Stellenbosch and build the concept into the current SDF review process to secure the vision within other planning and development initiatives and priorities, with other investment stakeholders, and ensure that it is embedded in the longer term planning of Stellenbosch.

2. Initiate more detailed precinct planning that will refine and articulate the vision and concept more clearly and that will inform IDP processes and budgets, identify roles and responsibilities of Municipality, other spheres of Government and private sector in the implementation of the vision.

Precinct Plan outputs

- Refined and more detailed planning and design
- Tested transport proposals and infrastructure
- Identification and articulation of other infrastructure requirements
- Land Use and Density proposals at a cadastral level
- Guidelines for review of Town Planning Scheme
- Identification of projects, their phasing, prioritisation and costs and identified sources of funding
- Identification of specialised studies,
- Identification of authorisations that will be necessary e.g. EIA, Heritage etc.
- Identification of legislative changes and or implications e.g. bye laws for parking, development contributions, building regulations etc.

The Precinct Planning process and pre-feasibility analysis should include the stakeholder engagement process that enables stakeholders to engage with the vision and concepts and then be part of refining, enhancing and taking ownership of them (i.e. particularly DoT, PRASA). This process will also assist in identifying and developing appropriate implementation vehicles and associated processes for different projects and interventions as the precinct develops. These vehicles and processes would include the establishment of a process for managing development in the precinct as a whole and ensuring that planning and development by both public and private stakeholders in the precinct is integrated and expedited.

3. Prepare A Development Programme

The development programme will consist of the following:

Project identification, prioritisation and phasing

Develop a comprehensive list of projects or interventions necessary for the implementation of the TOD. A prioritisation model needs to be developed in conjunction with the municipality, to determine the most desirable implementation program. Some of the criteria that such a model needs to take into account are:

- Capital cost of the project
- Operating and maintenance costs
- Environmental considerations
- Stakeholder preferences (including landowners, business owners and the general public)
- Social criteria
- Economic benefit
- Financial criteria

- Sustainable Cash Flow

High level feasibility of each project

This element of the project needs to be repeated for each project and may well inform the prioritisation of the projects, for example the preferred procurement/ implementation method for a specific project may be more onerous than originally anticipated thereby warranting the delay of the project or a project may prove to be more lucrative than expected and worth implementing earlier in order to contribute to the implementation of future projects. The work in this section is intended to constitute a pre-feasibility study, which will be expanded to a bankable feasibility study in a next phase of the implementation. It is not anticipated that the prefeasibility study for all the projects identified from the TOD Concept be completed before the projects are progressed to a bankable stage and consequently implemented. As each project proves to be feasible the bankable feasibility study or procurement process can commence. The following activities would for part of the prefeasibility stage:

Project description

Provide a description of the project, all infrastructure requirements and how the project fits into overall strategy of the Municipality and the overall TOD plan. Provide the anticipated input and output specification of the project (this may change at a later stage for example during negotiations with developers where value capturing mechanisms are introduced by the municipalities). The output specification should include outcomes that could be achieved through value capturing mechanisms.

Technical analysis

A detailed technical analysis needs to be performed on the project in order to determine and demonstrate the technical feasibility of the project and to provide a reasonable estimate of the costs associated with the project. All cost needs to be considered over the full lifecycle of the project which includes project development cost, capital expenditure and operating and maintenance cost.

Financial analysis

A detailed financial model needs to be developed for each project to determine the financial feasibility of the project. The structure of the model will depend on the proposed implementation plan and resultant stakeholder, e.g. if the project is a development by a private sector party it will accommodate an Internal Rate of Return (IRR) calculation and perhaps a section to calculate the benefit to the Municipality, if the aim is to achieve more than just cost recovery. It is therefore important to define the scope, objectives and output of the project properly to ensure that the model include appropriate calculations to facilitate the optimisation of the elements and supports the implementation team in the negotiations. This goes hand in hand with the funding and affordability assessment of the project.

Funding and affordability

Funding options need to be considered as this will also influence the requirements of the financial models and the implementation/ procurement strategy. Funding options may include:

Conventional public procurement funded by own or other sources.

Recovering cost from a development that is the direct cause of the additional infrastructure requirement.

- Private funding including Public Private Partnerships.
- Value capturing mechanisms.

The funding structure needs to be tested and optimised through the financial model and will in many cases be a combination of funding sources.

Where the municipality is required to contribute to the funding of the project one would need to assesses the affordability and it may be necessary to restructure the project to improve its affordability. In addition other sources of revenue need to be identified that could be generate from the various projects to supplement the Municipality's ability to fund the projects, for example rental for land, concession fees, value capturing arrangements. This may lead to changing the priority of the projects in favour of projects with greater revenue potential which can in turn fund subsequent projects.

Risk factors

An initial assessment of the risk attached to the project needs to be under taken and a high level mitigation strategy devised to ensure that the risk can adequately be managed. Where a PPP is considered it should be determined if equate risk transfer to the private party is possible.

It may be necessary to test the sensitivity of the financial viability of the projects through sensitivity analysis in the financial model.

Site issues

Issues related to the identified sites need to be identified and a strategy devised as to how these can be addressed and whose responsibility it will be. Issues may include

- Procurement of land.

- Land use and zoning rights.
- Geotechnical and environmental issues
- Relevant national or provincial heritage legislation.

Market appetite and stakeholder engagement

Assess the market appetite for each project in its envisaged form. It may also be necessary to perform market investigations to determine certain elements to be included in the cash flow model, for example rental rates, parking fees, etc.

It may also be necessary for initial stakeholder engagement at this stage to determine the stakeholder requirement or restrictions. This may include approaching Provincial or National Government departments to canvas their support for a specific project, e.g. availability of additional grants, etc.

Socio-economic issues

Develop an output specification in terms of desired socio-economic outcomes of the projects, for example BEE targets.

Legislation and regulations

Perform a high level legal review to determine all laws and regulations applicable to the project or that the project needs to comply with before it can progress to the implementation phase, for example where a PPP is considered the project needs to be developed in accordance with National Treasury's PPP guidelines.

Resources

Establish all the resources necessary to implement the project, including progressing it to bankable feasibility. This may require the appointment of specific external advisors and consultants. An early determination of the cost of additional resources needs to be made to ensure that the project in fact warrants the cost required to develop it. In addition, the timing of these appointments needs to be determined to ensure an efficient implementation process.

Qualitative factors

Whist financial considerations will in most instances dictate decisions around project viability and affordability to the Municipality, it is important to consider any qualitative factors that may prove a project necessary and beneficial to the overall TOD even though it may in itself not be financially viable on a standalone basis.

8 Annexure

8.1 Proposed Future Adam Tas Rd Upgrade vs Bypass

8.1.1 Introduction

As part of the Transit Oriented Development: A concept for the town of Stellenbosch study this technical note has been drafted as input to the study. This technical note discusses the purpose of the study, the assumptions made, the results and conclusion.

8.1.2 The Purpose

As part of the traffic and transportation evaluation a high level economic evaluation was conducted for the proposed rail and road upgrades which may serve to alleviate the current traffic problems, as illustrated under point 5.5 in the main report.

The transport economic evaluation serves to illustrate the cost of the proposed road and rail upgrade alternatives.

8.1.3 Contextualising

As discussed in the main report under section 4.4 the current traffic and transportation issues have been highlighted. Section 4.4.4 mentions the inadequate infrastructure supply for the peak travel demand. This capacity constraint is currently experienced within the Adam Tas corridor, which includes the R44, and accommodates inbound traffic to the Stellenbosch area as well as through traffic travelling south toward Somerset West (SW) and through traffic travelling north toward Paarl and Wellington (PW). For the purposes of the evaluation inbound and through traffic from the Durbanville, Kraaifontein and Brackenfell (DKB) area have been included.

Two alternatives were considered for this evaluation, i.e. the proposed road upgrades focused in the Adam Tas corridor, between Dorp and Bird street and the proposed R44 Bypass as illustrated in the Comprehensive Integrated Transport Plan for the Stellenbosch Municipality (March 2011)

FIGURE 12: PROPOSED FUTURE ADAM TAS ROAD SECTION THROUGH STELLENBOSCH

FIGURE 13: PROPOSED FUTURE ADAM TAS ROAD UPGRADE

Proposed Future Adam Tas Road upgrade (Alternative 1) – This includes dropping a section of the Adam Tas road (R44) to accommodate through traffic.

Bypass (Alternative 2) – This includes the construction of a 12km bypass, connecting the R44, through the R310, R304 and connecting at the R44 again.

FIGURE 14: BYPASS4

8.1.4 Approach

The relevant commuter desires from Stellenbosch, Paarl, Wellington, Somerset West, Durbanville and Kraaifontein was used to calculate the likely vehicle flows inbound into Stellenbosch CBD and through the Adam Tas corridor study area[5]. These vehicle flow can be illustrated in FIGURE 15.

The vehicle volumes in relation to FIGURE 15 are summarised in TABLE 5. These values are based on the traffic forecasting. These values are based on 2013 commuter data This table indicates that approximately 955 vehicles travel from the SW area northbound, through the town of Stellenbosch and 614 in the opposite direction during the AM peak hour. The table also indicates that approximately 876 vehicles coming from the SW area travel inbound into the town (CBD) of Stellenbosch and 2707 vehicles coming from the PW (and DKB) area do the same.

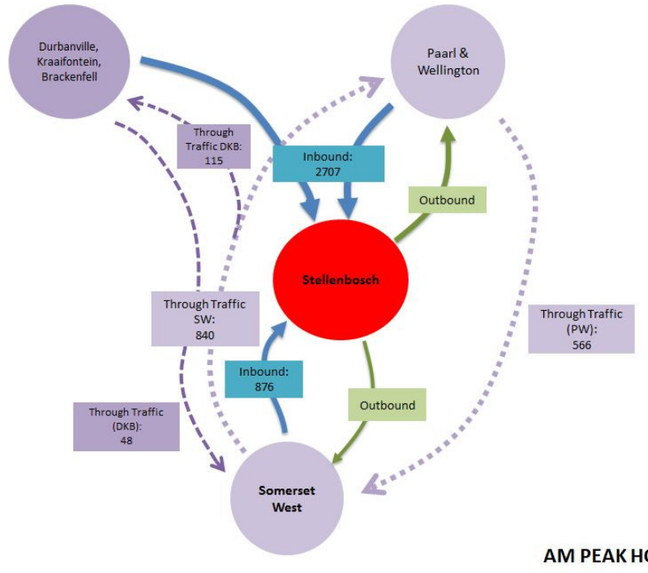


FIGURE 15: CURRENT VEHICLE FLOWS (AM PEAK HOUR)

The proposed upgrade alternatives cost components were calculated. The calculated costs include, capital cost (CAPEX[6]) i.e. Construction cost[7], and routine Maintenance cost of the alternatives, the Road User Costs (RUC), the commuter Travel Time (TT) and vehicle accidents costs.

The vehicle volumes were then used to calculate the current, 2014, RUC, TT and Accident cost for each of the abovementioned alternatives. The infrastructure investment and maintenance costs for each alternative were also calculated. The costs were then calculated for a 20 year period.

The total cost for each alternative was calculated and can be found in Table 5.

TABLE 5: VEHICLE FLOWS

Direction:	SW (toward PW)	PW & DKB (toward SW)
Through Stellenbosch (AM Peak Hour)	955	614
Inbound Stellenbosch (AM Peak Hour)	876	2,707

8.1.5 Assumptions

The main assumptions made for the economic evaluation can be summarised as follows:

- Where possible economic costs were used
- 2014 Prices
- Passenger flows were based on future demand forecasts
- An analysis period of 20 years
- SANRAL standards for accidents cost were used
- A vehicle occupancy of 1.2 persons per vehicle was used
- A commuter value of time of R100 (a working hour) and R40 (non-working hour)
- SANRAL standards for routine maintenance
- A travel speed of 60km/h within the Adam Tas Road Upgrade study area for through traffic for Alternative 1
- A travel speed of 80km/h for commuters travelling on the Bypass for Alternative 2
- A percentage increase in road user cost was assumed for vehicles travelling at 20 km/h and 15 km/h.
- A social discount rate of 8%

8.1.6 Results

The following transport economic evaluation results are summarised in Table 5 below. Table 5 illustrates the various costs, as mentioned above, for the 20 year analysis period. These figures are presented in 2014 prices, and discounted for a 20 year period.

Table 5 indicates that the CAPEX for the Adam Tas road upgrade alternative is less than that of the Bypass alternative. This table also indicates that the Maintenance, RUC and TT (cost) and Accident cost for the proposed Adam Tas road upgrade are lower than that of the Bypass.

Therefore the total estimated cost of the proposed Bypass exceeds that of the proposed Adam Tas road upgrade

[4] Figure 3 was sourced from the Stellenbosch Local Municipality Comprehensive Integrated Transport Plan March 2011

[5] It was assumed that the outbound vehicles to the SW, PW and DKB areas would not make use of the Adam Tas Road, but that these would use alternative service roads to exit the town of Stellenbosch.

[6] The CAPEX for the Proposed Adam Tas Road upgrade includes excavation of rail reserve to accommodate possible dropping of two rail lines in future. The CAPEX for the Proposed Adam Tas Road upgrade also includes construction of the concrete base to accommodate possible dropping of two rail lines in future.

[7] The calculation of the capital cost for the Proposed Adam Tas Road upgrade can be found in Technical Note 3 – Transport Infrastructure.

TABLE 6: TOTAL COST COMPARISON (20 YEAR PERIOD)

	Proposed Adam Tas Rd Upgrade (Alternative 1)	Bypass (Alternative 2)
CAPEX	R 203 220 850	R 247 372 368
Maintenance	R 61 351 597	R 115 008 464
RUC	R 474 811 673	R 505 506 660
TT	R 305 800 894	R 330 988 823
Accident	R 61 756 672	R 71 962 956
Total	R 1 106 941 686	R 1 270 839 271

8.1.7 Conclusion

Given the input and assumptions made for this evaluation, results indicate that the Adam Tas Road upgrade is a less expensive option over a 20 year period.

It should however be noted that the wider economic benefits, that have not been considered in this evaluation, that may accrue through the proposed Adam Tas road upgrade (as opposed to a Bypass for instance) may include, reducing sprawl of the Stellenbosch town, no agricultural land expropriation and protecting the land value etc.

It is therefore recommended that a more detailed analysis be conducted to get a more accurate estimation of the economic benefits and cost to motivate for funding from PGWC.

8.2 Rail Assessment

8.2.1 Introduction

As part of the Transit Oriented Development: A concept for the town of Stellenbosch study this technical note has been drafted as input to the study. This technical note discusses the purpose of the study, the assumptions made, the results and conclusion.

8.2.2 The Purpose

An investigation was conducted to determine the estimated demand on the Stellenbosch-Cape Town rail line and assess the capacity constrains of the rail infrastructure according to the estimated demand.

8.2.3 Contextualising

There are currently two rail services running through the study area. These routes, their frequencies and travel time are indicated in the TABLE 7 below. The table indicates the current low frequencies of this service. It also indicates the very low frequency and travel time for commuter wanting to travel from Cape Town to Stellenbosch which is counter intuitive in terms of the demand estimations (higher demand towards Stellenbosch). The travel time between Stellenbosch and Cape Town is exceeding 70 minutes which could make the total journey time (door-to-door) close to two hours. It thus shows that the current rail service between Cape Town and Stellenbosch is not promoting the use of public transport and give higher incentives for commuters to use their private vehicles.

TABLE 7: EXISTING RAIL SERVICES

Line ID	Line Description	Frequency (per day)	Frequency (AM peak period)	Running time (Stel – Cpt)
CTMU	Cape Town CBD (transfer at Bellville station) through Stellenbosch to Muldersvlei (transfer to Wellington)	7	2	82 min
MUCT	Muldersvlei through Stellenbosch to Cape Town CBD	14	7	72 min

FIGURE 16 below indicates the existing rail services and existing AM peak hour passenger volumes on the Stellenbosch railway line. Currently there is a single track between Eerste River and Muldersvlei which carries a capacity of approximately 8000 passengers in the peak hour in both directions. This railway line is thus currently operating below capacity with sufficient spare capacity for future growth in passenger demand.

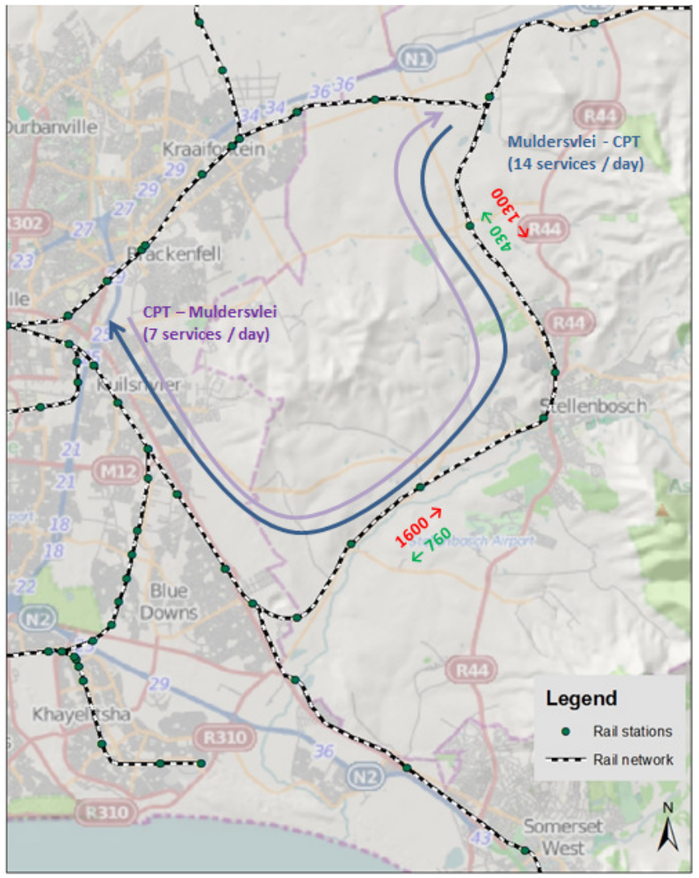


FIGURE 16: EXISTING RAIL NETWORK AND PASSENGER DEMAND (2013)

8.2.4 Estimated Future Demand

An investigation was conducted to assess the future capacity constraints of the railway line to Stellenbosch in the next 20 years.

Error! Reference source not found. below indicates the passenger flow in 2032 as well as the boarding, alighting and transfers at the stations. The future demand indicates that there is 70% increase in passenger demand on this line towards Cape Town and more than 300% increase in passenger demand towards Stellenbosch. The demand estimation indicates that the passenger flow in both directions is approximately 7,000 passengers. This is lower than the 8,000 passenger volume capacity in the AM peak hour, but with the expected development along this rail line in the next 20 year this could reach a volume higher than the current capacity. The demand estimation could be used to motivate for additional service on this route with increasing rail demand in the future as well as increase the priority for PRASA to invest in an additional rail line to Stellenbosch should future analysis indicate an increase in rail demand.

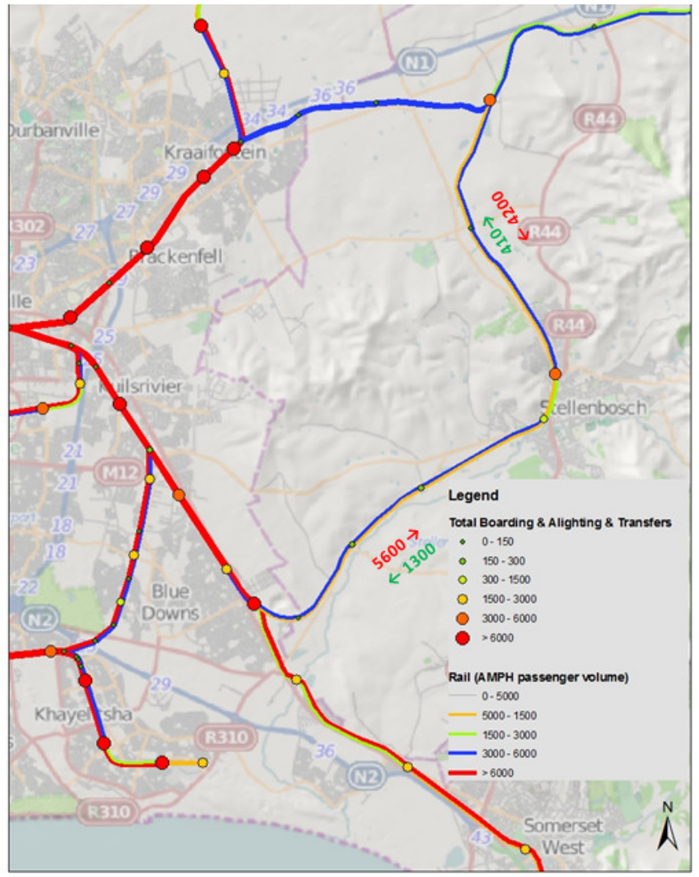


FIGURE 17: FUTURE (2032) AM PEAK HOUR RAIL DEMAND (BOARDING & ALIGHTING)

8.2.5 Conclusion

The demand estimation indicates that the rail line between Cape Town and Stellenbosch should be prioritised by PRASA for future investment in terms of additional services and potentially adding an additional rail line.

The assessment indicate that with incentives for future development to increase residential and commercial densities at stations along this route as well as other public transport investments within Stellenbosch could increase the profitability of this rail line and can increase the priority of investment for this rail service.

8.3 Transport Infrastructure

This technical note highlights the estimated costs for the proposed Road Infrastructure, Park and Ride Facilities, NMT facilities, Rail station and Rail line that fall within the Adam Tas study area.

8.3.1 Road Infrastructure

The estimated road infrastructure costs are associated with the proposed road upgrade as illustrated within the red boundary illustrated in FIGURE 18 below.

FIGURE 18: PROPOSED FUTURE ADAM TAS ROAD UPGRADE

The road infrastructure cost calculation was broken up into three parts i.e. the cost of excavation, the cost of construction, and the cost of construction of a road link.

Table 8 indicates the estimated cost associated with the excavation of land for the proposed Adam Tas Road Upgrade. Based on the parameters and the cost assumed the total estimated excavation cost are R 43.680 million. This estimation includes excavating the portion of land under the rail line, hence a width of 26m.

TABLE 8: PROPOSED FUTURE ADAM TAS RD UPGRADE EXCAVATION COST

	Excavation Cost
Cost (per cube metre)	R 140.00
Depth (m)	6
Width (m)	26
Length (m)	2 000
Total m^3	R 31 2000.00
Total Cost	**R 43 680 000.00**

The estimated cost associated with construction of the proposed Adam Tas Road Upgrade. Based on the parameters and the cost assumed for the concrete infrastructure the total estimated construction costs are R 184.24 million. The estimated cost of construction for the Proposed Adam Tas road upgrade as mentioned in Transport Economic Technical Note 1– Bypass vs Proposed Future Adam Tas road upgrade includes construction of a base for a possibly accommodating a dual rail line.

Other proposed road infrastructure costs within the study area include an extension of George Blake road to link with Dorp street at the Adam Tas Dorp street intersection.

The estimated cost of linking Dorp Street to George Blake is R 4.956 million.

The Road Infrastructure costs as mentioned above are summarised in TABLE 9

TABLE 9: ROAD INFRASTRUCTURE COST SUMMARY

Road Infrastructure	Construction cost (Adam Tas)	George Blake Extension
Cost per m^3/ m^2	R 3 500.00	R 800.00
depth (m)		
width (m)		7
length (m)		885
Total	52640 m^3	6195 m^2
Total Cost	**R 184 240 000**	**R4 956 000**

8.4 Park and Ride facilities

A number of Park and Ride facilities are proposed to be placed on the outer periphery of the Stellenbosch town, with one facility proposed at the relocated Stellenbosch Station which will serve as a Public Transport Facility. This proposed public transport facility and a parking and ride facility are illustrated within the red boarder in FIGURE 19.

FIGURE 19: PROPOSED PUBLIC TRANSPORT FACILITY

The estimated cost for the park and ride facilities are based on the number of parking bays and a cost per parking bay. These costs are illustrated in TABLE 10below. The total cost of providing 5000 parking bays is R 854 million.

TABLE 10: ESTIMATED COST OF PARK AND RIDE FACILITIES

Park & Ride - Cost per parking bay	**R 250 000**	**R 118000**
Number of parking bays (Stellenbosch PTI)	2 000	
Number of parking bay (outside of CBD)		3 000
Total Cost of P&R infrastructure	**R 000 000**	**854**

8.5 Non-motorised Transport

The estimated cost of the proposed NMT routes are R3.19 million. These costs are based on various levels of NMT sections. These levels are categorised based on space to accommodated, pedestrians, cyclists and a greening component (such as vegetation, path benches etc.). The levels used for the proposed NMT routes within the study area are illustrated in the images below.

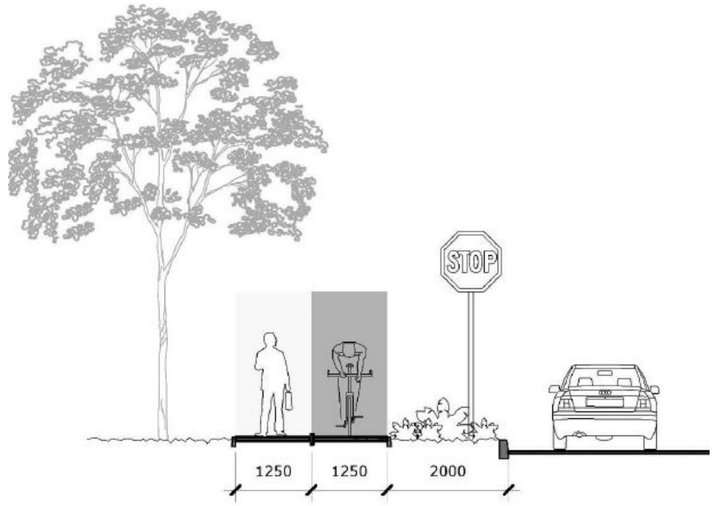


FIGURE 20: NMT SECTION LEVEL 3

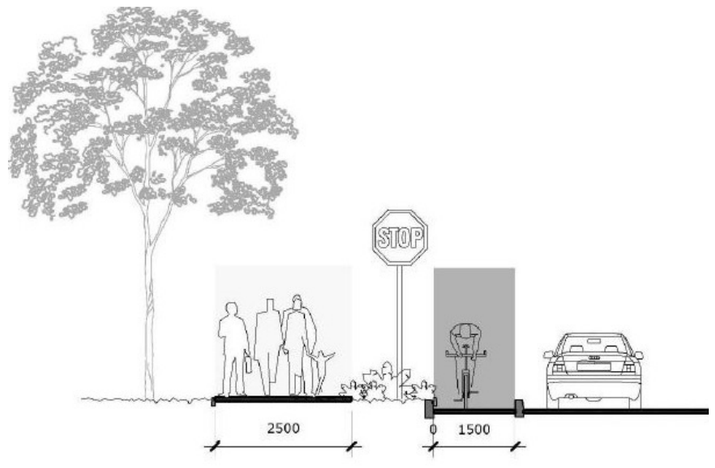


FIGURE 21: NMT SECTION LEVEL 4

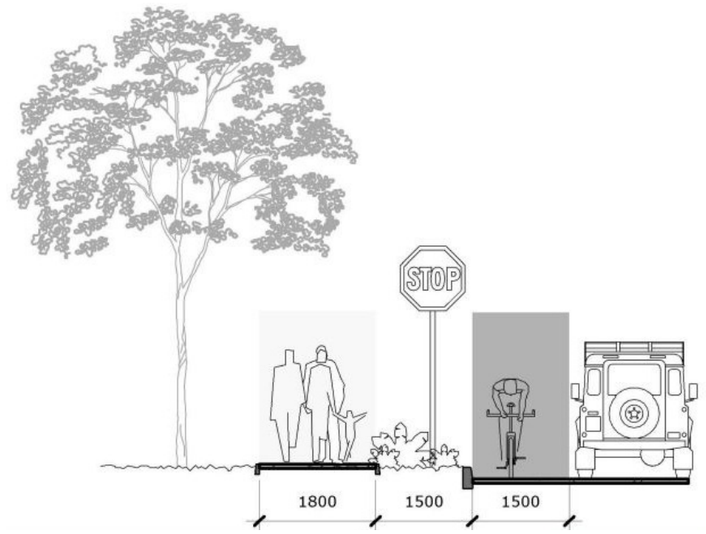


FIGURE 22: NMT SECTION LEVEL 5

These NMT levels were assumed for the proposed NMT lanes illustrated in FIGURE 23 as green dotted lines. NMT section level 3 was assumed for the section on Bird Street, NMT section level 4 was assumed for Du Toit road and NMT section level 5 was assumed for the George Blake street.

FIGURE 23: PROPOSED FUTURE NMT LANES

The total estimated cost for the various proposed future NMT lanes are R 3.19 million.

8.5.1 Rail Station and Rail Line

The proposed future rail station and rail line upgrades, include the shifting of the current Du Toit and Stellenbosch rail station and the construction of an additional rail line. The estimated cost of the Du Toit rail station is R30 million and the estimated cost for the Stellenbosch Public Transport Interchange has an estimated cost of R150 million. The estimated cost of a rail line is R10 million per km assuming that the layer work for the rail line (which is considered to be constructed during the Adam Tas road upgrade) is already done. Due to the low gradient of the rail line track, the line itself needs to taper down a significant distance before the 6meter drop. The estimated distance of additional rail line required is 3km. The estimated cost of the additional rail line is therefore R30 million

8.5.2 Conclusion

The total estimated cost of the proposed Transport improvements associated with the Adam Tas study area are: R1.35 billion.