

KOELENHOF DEVELOPMENT AREA

DEVELOPMENT FRAMEWORK

January 2026



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1.0 INTRODUCTION

1.1 BACKGROUND

Following the habitation of the broader Stellenbosch landscape by indigenous tribes since the stone age and later nomadic herders using the land to graze livestock, settlement farms were first created by European settlers in the Koelenhof area in 1692, when a number of farms were granted to free burghers along the Plankenbrug River, including the farm Nooitgedacht. This was followed by the granting of Koelenhof to the north of Nooitgedacht in 1694. Most of the properties in the study area have their origins in these two farms.

During the Anglo-Boer War Nooitgedacht, Koelenhof and Sonop Farm, to the south-west of the study area were leased to the British Army as a remounting base camp and thousands of horses passed through these farms. After the war the properties were farmed again. The Holy Spirit Catholic Church, founded by the Catholic Order of the Oblate Sisters of St Frances de Sales, was blessed and opened in 1935, and by 1938 the school and some other buildings were constructed.

Clay quarrying was already happening on the Malanshoop site and on the land that today accommodates Nooitgedacht Village by 1938. Clay mining of the current Devonbosch site was initiated by 1944. By 1959 a prison was built on the site that today houses the Lindelani & Siyakathala Child and Youth Care Centre. By 1972, the Devonvale Golf course was constructed.

In the late 1990s and early 2000s, more urban development started to emerge, including industrial buildings to the south of Bottelary Road as the accessible location at the intersection of the R304 and M23 (Bottelary – Kromme Rhee Roads) became an attractive position. This resulted in the determination of an urban edge as part of the revision of the Koelenhof Development Framework in 2007. The preparation of this document corresponded with the approval of the Nooitgedacht Village development and was followed by the approval of an Industrial Business Park on the southern part of the Devonbosch site in 2012. It was later reconceptualised and approved in 2019 as the first precinct of a mixed-use lifestyle estate.

The 2019 Stellenbosch Municipal Spatial Development Framework expanded and refined the Koelenhof urban edge and identified the area as a transit node with future growth potential. This potential is being realised and the node is experiencing significant pressure to develop with the expansion of the Devonbosch Lifestyle Estate being planned and the environmental and planning applications for the Malanshoop Retirement Estate and the Koelenhof Estate mixed-use development being in process.

However, the Stellenbosch Municipality have communicated the importance of understanding the cumulative impact of these developments on the transport and services networks before its departments can make informed decisions on the approval conditions for the individual projects. This prompted the applications being put on hold until an integrated development vision could be established for the Koelenhof node.

The three development companies involved in these projects, DB Property Development Company (Pty) Ltd (Devonbosch Lifestyle Estate), Koelenhof Plase (Pty) Ltd (Koelenhof Estate) and Peerboord Developments (Pty) Ltd (Malanshoop Retirement Estate) have proactively engaged roleplayers in the node and established the Koelenhof Development Forum in order to collaborate on the preparation of a Development Framework for Koelenhof that could address the requirements of the municipality.

1.2 DEVELOPMENT FRAMEWORK AREA

In conjunction with the Spatial Planning Branch of the Municipality it was decided to focus the development framework on the land within the approved 2019 urban edge. This is not done to exclude any existing or future development potential, but rather to facilitate the phased growth of the Koelenhof node in a sensible and efficient manner.

The area within the urban edge totals 210 ha of which 140 ha is still undeveloped and many of the developed sites have further development potential. The amount of undeveloped land within the approved urban edge will therefore need to be carefully planned and co-ordinated to maximise services and infrastructure provision whilst catering for the market potential that the area offers to various sectors.

As shown in **Figure 1** (Development Framework Area) the study area surrounds the intersection of two major mobility routes being the north-south R304 (MR174) which links Stellenbosch in the south to the N1 Freeway, Klipheuwel and ultimately Malmesbury to the north, and the east-west M23, consisting of Bottelary Road (MR187) and Kromme Rhee Road (DR1085) which links Cape Town/ Kraaifontein in the west to the R44 (which leads to Klapmuts) in the east. The Northern Line -Strand railway line (parallel to the R304) runs through the area with the Koelenhof station located within the study area.

For ease of reference and clarity related to the development rights calculations, the study area is viewed as four quadrants formed by the major roads:

- **Quadrant 1**– North of Kromme Rhee & East of R304 (N-E)
 - Malanshoop site (Farm 1060)
 - The Holy Spirit Catholic Church & Convent and St Vincent Primary School complex
- **Quadrant 2** - South of Kromme Rhee & East of R304 (S-E)
 - Koelenhof Estate site (Portion 23 of Farm 74)
 - The Lindelani & Siyakathala Child and Youth Care Centre
 - The Koelenhof railway station including several railway houses
 - The Nooitgedacht Village development
 - The Hoogenzicht residential development (Portion 35 of Farm 74)
 - An existing vineyard east of Nooitgedacht (stakeholders agreed that this will remain as vineyard and not be developed)
- **Quadrant 3** – South of Bottelary & West of R304 (S-W)
 - The Koelenbosch residential estate
 - The service station and retail outlets
 - The Basil Williams residential development (Portion 13 of Farm 74)
 - The Alltech industrial facility
 - Origin Wine Plant
- **Quadrant 4** – North of Bottelary & West of R304 (N-W)
 - Devonbosch Precinct 1 (Rem Farm 165 & subdivisions) for which rights have been approved
 - Devonbosch Remainder (various land units) including areas currently used for clay quarry/brick making

Figure 2 shows the various development sites.

1.3 PURPOSE OF THIS REPORT

Due to the mobility function and related design standards (current and future) of the road infrastructure that divide the study area into the quadrants, the design concept for each project has been understandably insular in nature as the integration of the various developments and urban components of Koelenhof will be challenging without a shared vision and the drive to achieve this shared vision by all parties involved.

This Development Framework lays the foundation in terms of which a Package of Plans and site-specific land use applications can be prepared and considered. The purpose of the Koelenhof Development Framework is four-fold:

- Establish a coherent urban design vision that brings spatial coherence across the divergent development parcels and pursues better spatial quality and performance.
- Summarize the development potential of the study area taking into consideration the environmental and heritage informants that refines the developable area.
- Identify the services and infrastructure capacities that will be required for the potential basket of rights and provide integrated services and transports master plans that supports the coordinated growth of the Koelenhof node and ensures efficiency in service provision and costs.
- Set out the implementation actions that are essential to achieve the implementation of the development framework

This Framework does not exclude future expansion but rather lays the structural foundation for the integrated development of the Koelenhof Node into a sustainable vibrant and people-friendly urban settlement.

This document is supported by the following reports:

- Urban Design Framework – Jakupa Architects & Urban Designers
- Transport Study – Integrated Transport Solutions Global
- Civil Engineering Services – BSI Consult Consulting Engineers
- Environmental Desktop Overview – Doug Jeffery Environmental Consultants
- Electrical Services – De Villiers & Moore Consulting Engineers
- Heritage Considerations – Lize Malan Heritage Consulting

Figure 1: Development Framework Area

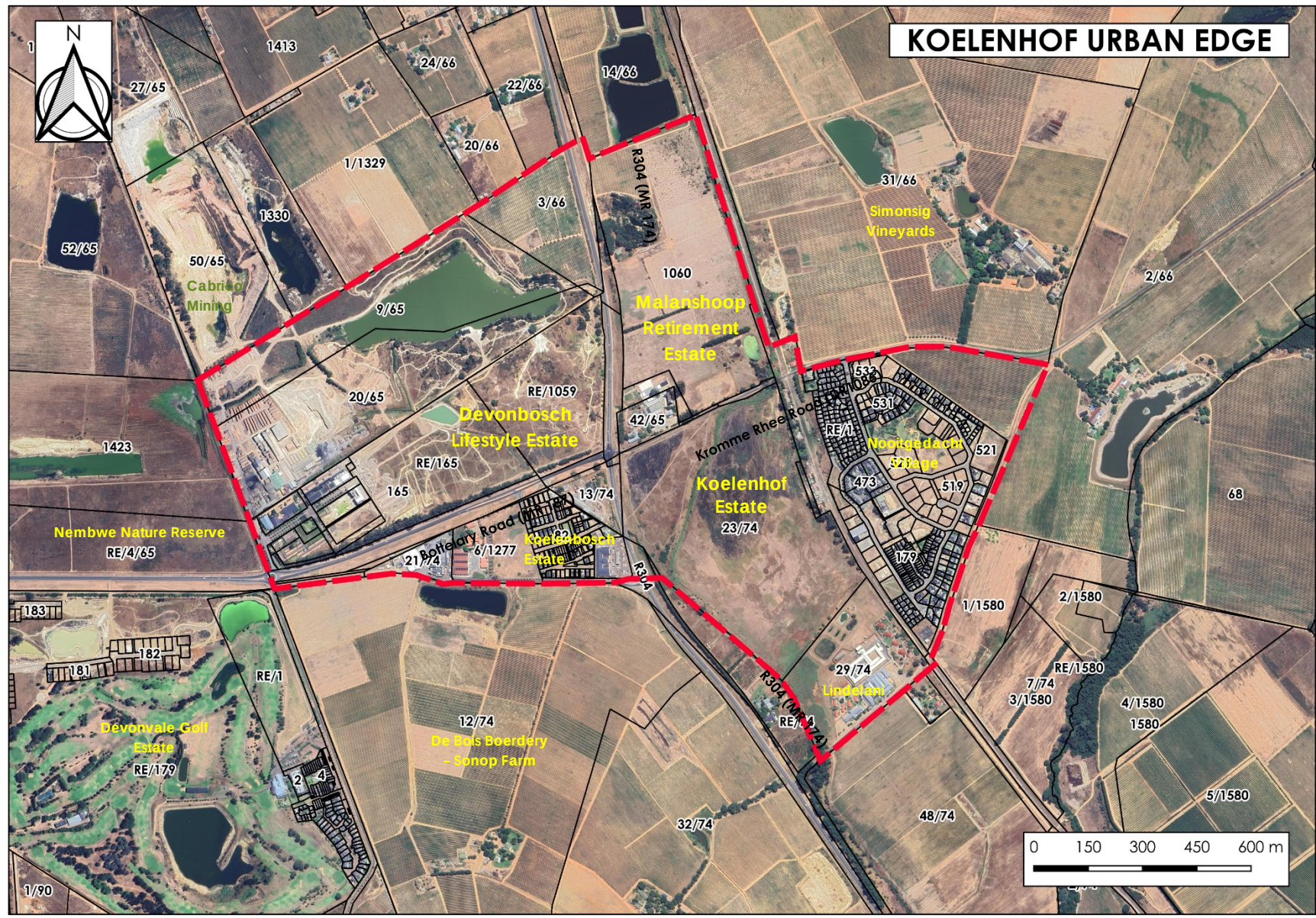
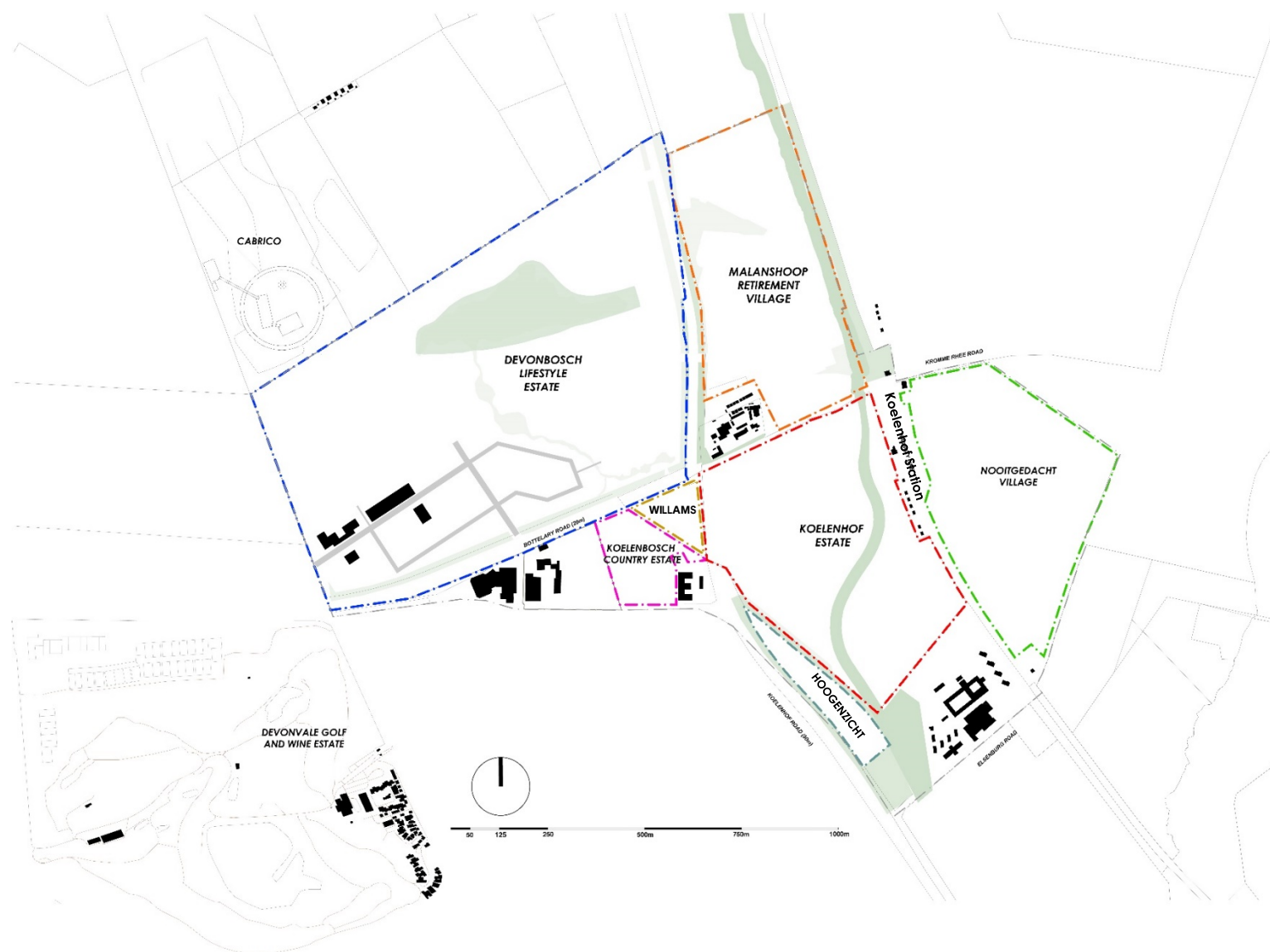


Figure 2: Development Sites (Source: Jakupa)



2.0 CONTEXTUAL ANALYSIS

2.1 PLANNING POLICY

- The Stellenbosch Municipality (SM) **Integrated Development Plan 2017-2022 (IDP)** is aimed at coordinating the efforts of various municipal departments in achieving the municipality's vision to be a "valley of opportunity and innovation". The Valley of Possibility focus area looks to attract investment, growing the economy and employment. Identification of the Koelenhof node as a Priority Development Area, will place it in position to draw public spending, thereby helping to attract further investment and growth. The "green and sustainable" directive focuses on the way settlements, nature and agricultural areas are spatially developed and managed to maintain and enhance natural resources and ensure future balance between human settlement and its use of natural resources and opportunity. The strategic direction provided to the SDF by these two directives include:
 - Containment of settlements to protect nature/ agricultural areas and enable public and non-motorized transport and movement.
 - A focus on public and non-motorized transport and movement.
 - Protection of nature areas, agricultural areas, and river corridors.
- The SM **Municipal Spatial Development Framework (2019) (MSDF)** provides direction to the current thinking regarding the role of Koelenhof which was identified as an emerging node. The MSDF is guided by various legislative and policy directives at national and provincial levels (as highlighted in the document).
- Spatial development and management of SM comprise seven key tenets:
 - Maintain and grow the natural assets - Valuable land areas, including critical biodiversity areas, agricultural land, land affecting the maintenance of water resources, cannot be built upon extensively, it cannot be the focus for significantly accommodating existing or future settlement need spatially.
 - Respect and grow the cultural heritage - The areas and spaces – built and unbuilt – that embody the cultural heritage and opportunity of SM needs to be preserved and exposed further.
 - Direct growth to areas of lesser natural and cultural significance as well as movement opportunity - within areas of lesser natural and cultural significance, the focus should be on areas where different modes of transport intersect, specifically places where people on foot – or using non-motorised transport – can readily engage with public transport.
 - Clarify and respect the different roles and function of settlements - the role of a settlement is determined by it's relationship to natural and cultural assets and the capacity of existing infrastructure to accommodate change and growth.
 - Clarify and respect the roles and functions of different elements of movement structure - Ensure a balanced approach to transport in SM, appropriately serving regional mobility needs and local level accessibility improvements, aligned with the spatial concept. –
 - Ensure balanced, sustainable communities - Ensure that settlements are balanced and sustainable, providing for different groups, maintaining minimal development footprints, walkability, etc.
 - Focus on critical lead projects - harness available energy and resources to focus on a few catalytic areas that offer extensive opportunity fastest and address present risk.
- Analysis of Koelenhof in terms of the Stellenbosch MSDF's consolidated spatial concept highlights the following (Refer to **Figure 3**):
 - Koelenhof does not form part of the World Heritage Landscape, Protected Areas or Primary Green Network of the SM and the natural assets that are located within the urban edge have been incorporated into the various development proposals
 - It is located in a Moderate Value Cultural Landscape area, but consideration needs to be given to Bottelary and Kromme Rhee Roads being scenic routes.
 - It is located on the R304 which is identified as a primary development axis/transport corridor and a primary movement route.
 - It is located at a higher-order road intersection with access to an existing railway station, allowing integration of modes of transport.
 - It is identified as a transit node with the future opportunity for high density mixed-use development as a growth node.



Figure 3: Consolidated Spatial Development Concept extract (2019)

- It is stated in the MSDF that while all settlements continually undergo change and require change to improve livelihood opportunity and convenience for existing residents, not all are envisaged to accommodate significant growth. Those envisaged to accommodate both larger scale change and significant growth are situated on the Baden Powell Drive-Adam Tas-R304 corridor. Furthermore, given the railway running on this corridor, the opportunity for settlement closely related to public transport exists. The corridor is not proposed as a continuous development strip. Rather it is to comprise contained, walkable settlements surrounded by nature and agriculture, linked via different transport modes, with the rail line as backbone.

- Guidance provided specific to the Koelenhof & Muldersvlei nodes (Refer to **Figure 4**):
 - Maintain and improve the nature areas surrounding the settlements.
 - Work to increasingly connect and integrate nature areas, also with the urban green areas, to form an integrated green web.
 - Improve public continuity, access, and space along stream corridors.
 - Retain and improve the relationship between the settlements and surrounding agricultural land.
 - Contain the footprints of settlements within existing urban edge.
 - Retain the strong sense of transition between agriculture and human settlement at the entrances to the settlements.
 - Maintain the integrity of historically and culturally significant precincts and places.
 - Accommodate inhabitants of informal structures in the planning.
 - Ensure that residential development provides for a range of housing types and income groups.
 - Ensure that future development is woven into the urban fabric of existing settlements.
 - Consider underutilised open space within the settlements for infill development that will enhance socio-economic potential of those who currently reside in these settlements.
 - Focus on addressing service needs in cluster developments, in this way improving mixed use and enhancing economic opportunities
 - Pro-actively improve conditions for walking and NMT within and between the settlements.
 - Cluster community facilities together with commercial, transport, informal sector and other activities so as to maximise convenience, safety and socio-economic potential.
 - As far as possible, focus investment in parks, open space, and social facilities accessible by public and NMT, in this way also increasing the surveillance of these facilities.
 - Over the longer term, Muldersvlei and Koelenhof could possibly accommodate more growth, and be established as inclusive settlements offering a range of opportunities.
 - Explore the feasibility of more frequent rail or bus services along the Adam Tas-R304 corridor.



Figure 4: Proposals for the R304 Settlements (2019)

2.2 DEVELOPMENT CONTEXT

The following summarises the locational, physical and development considerations that impact on the potential development of this area:

- **Location:** Koelenhof is located 4km north of Stellenbosch town. Politically and functionally it forms part of Stellenbosch Municipality, but due to its location it is also developing functional ties to the eastern suburbs of the City of Cape Town.
- The Bottelary Hills with its rolling agricultural areas and historic wine estates will remain an important hinterland to the settlement that needs to be protected and maintained.

- **Surrounding Land Uses:** Some of the key land uses bordering the Koelenhof urban edge include (Refer to Figure 1):
 - o Devonvale Golf and Residential Estate – the estate, located to the south-west has not been included into the urban edge, but retains its role as a private open space transition between the node and the Bottelary Hills.
 - o Nembwe Wetland Reserve – Located to the west of Devonbosch, the historic wetland is described as having landscape and scenic as well as ecological significance.
 - o Cabrico Clay Mine & Brick-Making Facility: A new circular brick kiln will be built to the north of the Devonbosch land, which will replace the existing kiln facilities with clean technology that will reduce its impact on the node and its surroundings.
 - o Productive Farms: The node is surrounded by a number of larger productive farms, including a number of historic wine farms. These farmlands are to be protected.
- **Socio-Economic Context:** The population of the SM is likely to continue to grow above the average provincial rate, and urbanisation is likely to increase, with the main settlements having to absorb the bulk of this growth. Koelenhof currently accommodates 0,2% of the SM population, with a limited increase over the next 10 years as the residential projects are implemented.
- The dominant socio-economic impact of growth in the node will be created by the business growth and job creation achieved through the commercial developments taking place within the mixed-use areas. The SM population was expected to reach 190 680 in 2023 (a 8% growth rate off the 2018 base estimate) with a strong concentration within the 20-24 and 25-29 age categories.
- Due to the strong physical and functional relationship of Koelenhof with the Cape Town's northern suburbs commercial and recreational facilities within the node will also likely serve these areas

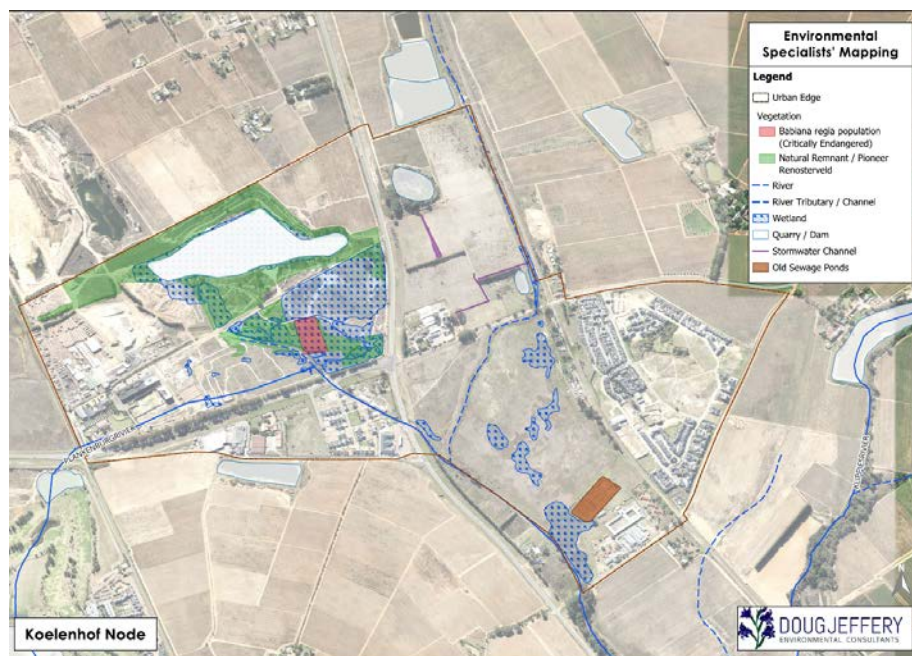


Figure 5: Environmental Mapping (Source: Doug Jeffery)

- **Environmental Informants:** A Desktop Environmental Assessment (See Annexure A & Figure 5) summarises the key environmental informants for the three main development areas:
 - o **Geology and Topography:** The landscape is characterised by gently undulating low hills and flat valley-bottom plains with a mosaic of parent materials which creates diverse soil and habitat conditions. However, duplex soils prone to shallow depth, clay hardpans, and seasonal waterlogging are widespread. The area is underlain by:
 - Malmesbury Group shales, giving rise to fertile but heavy clay soils.
 - Cape Granite intrusions, producing coarse sandy to loamy soils with better drainage.
 - Alluvial deposits along the Eerste and Plankenbrug river systems, which have shaped natural wetlands.

- o **Climate** The area has a Mediterranean-type climate, with cool, wet winters and hot, dry summers. The combination of low rainfall, high evaporation, and waterlogged soils strongly influences agricultural viability and freshwater ecosystem dynamics.
 - Mean Annual Precipitation (MAP): ± 430 mm (range 270–670 mm), with 70–80% falling in winter.
 - Evapotranspiration: 1200–1800 mm annually, creating summer water deficits.
 - Temperature range: Summer maxima often >36 °C; winter minima typically 3–4 °C but frost-free.
 - Wind regime: Southeasterly in summer; northwesterly in winter.
- o **Vegetation and Terrestrial Biodiversity:** Historically, the Koelenhof area supported two nationally threatened ecosystems listed on the SANBI Red List of Ecosystems¹:
 - Swartland Shale Renosterveld – Critically Endangered (CR)
 - Swartland Granite Renosterveld – Endangered (EN), downgraded from CR in the 2018 National Biodiversity Assessment.
 - Both ecosystems have been extensively transformed ($>90\%$ loss), largely due to viticulture, pastures, infrastructure development, and quarrying.
 - Natural vegetation has been almost entirely lost, with only scattered, degraded fragments remaining.
 - The landscape is now dominated by alien invasive trees (Acacia, Eucalyptus, Pine, Hakea) and pasture grasses (kikuyu, ryegrass).
 - Remnant patches persist mainly along road verges, riparian corridors, wetland fringes, and ecotonal transitions between shale and granite soils. These remnants are typically degraded and invaded, but still support pioneer indigenous species such as *Elytropappus rhinocerotis*, *Osteospermum moniliferum* and *Searsia tomentosa*. Although ecological integrity is low, these remnants retain conservation and restoration value, contributing to landscape connectivity, indigenous refugia, and rehabilitation potential.

O **Botanical Conservation Context**

- The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) identified extensive Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) within the Koelenhof landscape, particularly linked to river corridors and wetland systems. These areas are critical for species dispersal, ecosystem processes and ecological infrastructure, even where valley-floor habitats are highly degraded.
- The WCBSP was updated in 2023², refining biodiversity priorities. Under the revised plan, Swartland Shale Renosterveld is mapped as a CBA: Terrestrial and a CBA: Threatened Ecosystem, in a natural condition. These CBAs are required to meet provincial biodiversity targets for species, ecosystems, and ecological processes.
- The management objective for these ecosystems is to maintain them in a natural or near-natural state, with no further loss of natural habitat permitted. Where degradation has occurred, rehabilitation is encouraged, and only low-impact, biodiversity-sensitive land uses are considered appropriate in order to safeguard ecological integrity.

O **Aquatic Biodiversity:** Koelenhof falls within the Berg–Olifants Water Management Area (WMA 18), specifically the Eerste River catchment. Runoff drains into the Plankenbrug River, which flows into the Eerste River and ultimately into False Bay.

- Plankenbrug River: Once a naturally meandering watercourse, the river is now heavily channelised, with riparian zones dominated by alien reeds (e.g. *Phragmites australis*, *Typha capensis*) and invasive trees (*Acacia*, *Eucalyptus*).
- Wetlands: The area contains seasonal valley-bottom wetlands, as well as artificial dams and quarry seepage wetlands. Although degraded, these systems continue to provide important ecosystem services, including flood attenuation, sediment trapping, nutrient cycling and limited water purification.

- Ecological State: Rivers and wetlands in the area are assessed as Class C–D under the national Present Ecological State (PES) categories, indicating they are moderately to largely modified. While habitat condition and water quality have been significantly altered by human activity, key ecological processes such as hydrological regulation, sediment trapping, and nutrient cycling remain partially functional. Targeted rehabilitation would enhance both their ecological condition and their ability to provide essential ecosystem services.
- Water Quality: The broader Eerste River system is impacted by wastewater treatment works discharges, urban runoff, and agricultural inputs, resulting in elevated nutrient levels (phosphorus, ammonia), reduced dissolved oxygen concentrations, and generally poor ecological health downstream, particularly closer to its False Bay estuary.

O **Agricultural Potential - Soils and Land Capability**

- Soils are predominantly duplex types with poor drainage and seasonal wetness.
- Suitability ratings show most of the area as “not recommended” or “marginally suitable” for intensive crop production.
- Irrigation potential is limited by absence of water rights and unsuitable groundwater quality.

O **Agricultural Viability**

- Viticulture dominates the landscape but faces constraints on marginal soils. Productive blocks occur mainly on better-drained granite ridges.
- Dryland cropping (e.g. winter grains) is limited by soil wetness and shallow profiles.
- Grazing potential is very low (± 36 ha per large stock unit), restricting livestock viability.
- Long-term agricultural economics in the valley floor are weak, with many areas converted to alternative land uses.

- **Scenic Resources:** The Koelenhof landscape is defined by:
 - Mountain backdrops (Simonsberg, Bottelary Hills, Hottentots Holland).
 - Vineyards and estates, creating a strong sense of place.
 - Historic churches, schools, and farm werfs, contributing to cultural identity.
 - **Visual Quality**
 - High scenic value from vineyards and mountain views.
 - Degrading features include quarries, brickworks, and alien thickets, which contrast with the agricultural setting.
 - Tree clusters, dams, and windbreaks enhance the visual absorption capacity of the landscape.
 - **Cultural Landscape**
 - Koelenhof forms part of the Cape Winelands cultural landscape, recognised as a continuing vernacular landscape with medium–high heritage significance.
 - Centuries of viticulture and associated built fabric (farmsteads, wine cellars, avenues, churches) underpin this heritage value.
 - The South African Heritage Resources Agency (SAHRA) has highlighted its vulnerability to cumulative transformation from new developments.
 - **Heritage and Archaeology**
 - Area originally used by Khoekhoen pastoralists, later transformed during colonial farming expansion.
 - Farms such as Nooitgedacht and Koelenhof were established in the 17th –18th centuries.
 - The area was used as a remount camp during the Anglo-Boer War, adding military historical significance.
 - **Built Heritage**
 - Wine estate werfs and the Catholic church and school precinct are key landmarks.
 - Many structures older than 60 years qualify under Section 34 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999).
- **Archaeological Resources**
 - Artefacts (stone tools, early ceramics, historical material) have been recorded in the wider area, but extensive agricultural disturbance has reduced site integrity.
 - Surveys classify most finds as Not Conservation Worthy, though monitoring during earthworks is recommended.
- **Heritage Resources:** The Heritage Overview Report (**Annexure B**) provides a summary of the resources and their significance identified for each project site:
 - **Malanshoop:**
 - Low to moderate scenic significance, with a cluster of tall pine trees on the western boundary of moderate to high significance that should be retained
 - Low historical significance (despite the interesting early 20th century history of the area the connection to this site is tenuous).
 - No other aspects of heritage significance of consequence were identified.
 - The lines of beefwoods on the site, are not considered of high importance and could be replaced by similar planting on the site of other species.
 - **Devonbosch:**
 - Contextual significance as being located in the Winelands cultural landscape (graded IIIC)
 - Views from the Simonsberg werf towards Table Mountain (graded IIIB). NOTE: this view not identified in the Malanshoop HIA, which borders on Simonsig. Also, as the name implies Simonsig faces the Simonsberg.
 - Trees along the site boundary (graded IIIB)
 - **Koelenhof, Stellenbosch (Claire Abrahamse, 2023):**
 - The site plays a gateway role along the R304
 - It offers vistas towards Simonsberg and Jonkershoek with a secondary vista towards Bottelary (it is assumed the reference is to the Bottelary hills)

- Trees on the RC Church site and tree lines in the surrounding area (i.e. not on the site)
- The desire line that cuts across the north-western corner of the site.
- Study recognizes the importance of the RC Church and its tree setting as an important landmark for the node.

O Contextual indicators

- Apart from the importance of the RC Church site as a landmark in the node and the social significance of this precinct, there are no particular heritage resources both within the node and the broader context that would be of major consequence to the urban framework.
- The insistence of the Stellenbosch Heritage Survey guidelines that the node should retain a rural character, seems to be debatable as the node has been earmarked for urban development and one could argue that it would be more important to ensure the optimal use of the land for development. Low density development is inefficient and in fact a threat to the cultural landscape.
- The landmark nature of the church complex (Refer to **Figure 6**) must be enhanced and responded to as a prominent civic node within the wider context.
- The railway station is an important potential civic asset and should be acknowledged as a higher-order element in the proposed development of the site.
- The mature trees on and around the node are landmark elements within this environment that help to structure the space and provide some visual screening and should be retained.
- The proposed developments must not disrupt signature backdrops including landmarks characterising scenic outlooks– this includes vistas from within the node onto the RC Church, and from the R304 onto the mountains to the east.

- O **Key Environmental Sensitivities:** Future planning in the Koelenhof area must balance heritage conservation, biodiversity restoration, water resource management, and landscape character with the realities of agricultural decline and development pressures. The Koelenhof area is an ecologically and culturally significant part of the Cape Winelands landscape
- Critically Endangered Renosterveld: Largely lost, but regional remnants require strict conservation.
 - Aquatic ecosystems: Degraded but ecologically functional; key for flood regulation and biodiversity support.
 - Agricultural soils: Generally low potential; viticulture remains viable only on selected ridges.
 - Cultural landscape: High heritage significance as part of the Cape Winelands, but vulnerable to incremental urbanisation.
 - Visual sensitivity: Views from wine estates towards Table Mountain and Simonsberg are highly sensitive.



Figure 6: Identified Heritage Resources (Source: Lize Malan)

- **Engineering Services: Annexures C & D** provide a summary of services and electricity availability:
 - **Water:** The Sonop and Devon Valley Reservoirs currently provide water for Koelenhof with planning in the Water Master Plan for a third reservoir (4 MI) at Farm Kriekbult. The physical spare capacity in the existing reservoirs is 1224 kl/day. Capacity reservations for existing applications have been made.
 - **Wastewater:** Sewage from Koelenhof drain towards Cloeteville, Stellenbosch via the 300mm Ø bulk sewer and thereafter via a recently upgraded bulk sewer through the Plankenbrug Industrial Area to the Stellenbosch Wastewater Treatment Works in Devon Valley where it is treated. The treatment capacity of the WWTW has recently been increased through a major upgrade.
 - **Electricity:** The Electrical Supply Authority for the area is Eskom. The area is fed via various farm-feeders from the existing Koelenhof substation, along Elsenburg Road. This substation is on the edge of the Koelenhof Urban node and is fitted with a 12,5MVA 66/11kV transformer, that peaked on a load of 7,4MVA. Eskom has in 2024 started with a project to upgrade the Koelenhof substation to a 20MVA capacity, with spare space for a second 20MVA transformer, which will ensure a firm 20MVA distribution substation. This project is in the design and design-approval stages, and construction on site will commence early 2026.
- **Roads (Refer to Annexure E & Figure 7):** The Koelenhof node is served by the following roads:
 - **Koelenhof Road or R304 (MR174)** – A Class 2 Main Road within the PGWC network. It has single lanes in each direction, with paved shoulders and no sidewalks. The speed limit is 100km/h and reduces to 80km/h closer to intersections
 - **Bottelary Road (MR187)** – A Class 2 Main Road of the Western Cape Government Road network. It's a single lane in each direction, with paved shoulders and no sidewalks. The speed limit is 80km/h.
 - **Kromme Rhee Road (DR1085)** - A Class 4 Divisional Road within the PGWC network. It has a single lane per direction with a narrow gravel shoulder on the southern side of the road and a raised paved sidewalk on the northern side. The speed limit is 80 km/h. Planning includes the possibility of reclassifying this road to Class 3.

- **Blumberg Drive** - A Class 5 Local street with a speed limit of 60 km/h. This road provides access to the Devonvale Golf Estate and adjacent farms.

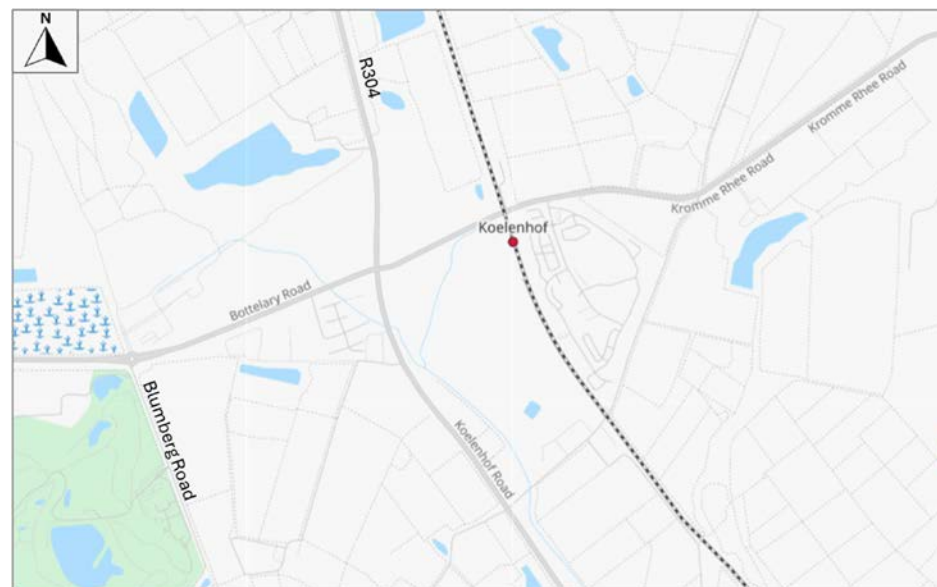


Figure 7: Existing Transport Infrastructure (Source: ITS)

- **Public Transport**
 - The Passenger Rail Agency of South Africa (PRASA) provides Metrorail services within the Cape Metropolitan Area, including SM, which is served by a branch of the Northern Line. This line includes seven stations within the Stellenbosch Municipality: Lynedoch, Vlorentburg, Stellenbosch (CBD), Du Toit, Koelenhof, Muldersvlei, and Klapmuts, spanning approximately 18 km
 - PRASA classifies its rail lines into three categories—A, B, and C—based on strategic importance and passenger volumes, with Category A lines receiving the highest priority. The Stellenbosch branch is classified as Category C (Stellenbosch Municipality, 2022).

- o It should be noted that no recent data is available on rail operations or ridership for Stellenbosch. The dualling of the Northern Line through Stellenbosch remains a priority.
- o The Koelenhof rail station is located to the west of the Nooitgedacht Village development. All land within the Koelenhof urban edge is located within a 1.4 km radius of the station.
- o Minibus-taxis (MBT) service the roads in the study area.
- **Daily movement patterns:** The following trends were observed from the transport data:
 - o The 2022 RNIS data show that Bottelary Road has a higher morning peak than afternoon peak, while Kromme Rhee Road carries roughly 50% lower peak-hour volumes compared to the R304 and Bottelary Road during the morning peak.
 - o Approximately 50% of the traffic travelling eastbound along Bottelary Road during the morning peak hour turns right towards Stellenbosch, and 25% towards the N1 and the R44 respectively.
 - o During the afternoon peak hour, approximately 40% of the traffic travelling from Stellenbosch turns left onto Bottelary Road.
 - o The morning peak volumes south of the R304/Elsenburg Road intersection are about 200 veh/h higher than those north of the R304/Bottelary Road intersection, suggesting that around 10% of northbound vehicles from Stellenbosch divert via Bottelary or Kromme Rhee Road—likely towards Kuilsrivier.
 - o The R304/Bottelary Road intersection is experiencing delays during both peak periods. The dominant movement for this intersection is the eastbound right turn during the morning peak period and the northbound left turn during the afternoon peak period.
 - o High volumes of MBTs were observed along Bottelary Road and R304 for the eastbound right turn movement and northbound left-turn and through movements. The majority of workers travel from/to Kuilsrivier along Bottelary Road. Approximately 1% of trips to/from Devonbosch travel along Kromme Rhee Road towards Stellenbosch. Approximately 28% travel to/from Stellenbosch using the R304 trip distribution of existing land uses in the larger Koelenhof area.
 - o Approximately 48% of trips to/from the Koelenhof area are split between Kuilsrivier and the N1 freeway direction.

3.0 DESIGN PHILOSOPHY & STRATEGY

(Source: Jakupa)

3.1 DESIGN PHILOSOPHY

- The design intention (Refer to **Annexure F - Design Report**) for The Koelenhof Development Framework is to make a memorable place that supports a positive and legible urban structure and is integrated into the node's underlying potential. It argues for an improved spatial quality of the public realm, promotes the creation of safe and vibrant places and it makes room for social and economic opportunities that are accessible and diverse.
- To achieve the above the following urban design principles are proposed:
 - **The Greater Public Good:** Create and link places of existing amenity value where people can come together to enjoy the shared benefits of living in a close-knit community. This is achieved through a balanced mix of residential, retail and office uses and complimented by a local transit system and amenities such as schools and sport facilities. The node has an important rural-urban interface and by creating an open space system that supports and connects existing ecological corridors into a coherent system, which in turn links into the ecological systems of the surrounding landscape broader area-wide spatial system can be initiated.
 - **The Whole Above The Parts:** Instead of continuing the existing model of fragmented development, the proposed model consolidates development into a coherent spatial system that enforces a stronger link between developments and reinforces the identity of the local area. A myriad of improvements including traffic flow/ vehicular movement improvements, pedestrian oriented spatial systems, NMT and public amenity upgrading and a range of uses have the potential to transform the area's identity into a memorable place. The proposal undertakes to improve the environmental performance of the consolidated area with integrated and holistically sustainable networks that offer connection between developments as well as amenity to residents and visitors.
 - **Identity, Context and Place-Making:** Effort needs to be made to find and extract the found potential of the site and making it evident in its genius loci. All these elements benefit from a sustained urban relationship which goes beyond the constraints of individual developments. The rural-urban identity is one that reflects the local character and identity of Stellenbosch and its farms and winelands, through making places that are relevant to locals and one that's rooted in its time and context. A place of deeper meaning will emerge through time as a node settles into its skin once it becomes inhabited and the community and businesses reflect their identity through place-making. The development will fundamentally alter the existing character of the place for the better: creating a vibrant, people-oriented and safe space.
 - **Transition Between Urban Peripheral and Rural:** As cities and towns develop, they become complex structures with edges that morph in response to the changing needs and development patterns. It is the edges of the city region that reveals its social, political, technological and environmental dynamics, through the development that takes place on the edges of its boundaries. Peri-urban areas although peripheral, play a major role in in the overall functioning of cities and towns. The study area serves as a transitional space between the urban periphery and the agricultural/rural landscape. The urban design proposal reflects this very distinct characteristic at the local level. Rather than a forced juxtaposition of conditions, the framework sets up a language of threshold and mediation.
 - **Future Proofing, Adaptation and Resilience:** Climate proofing cities for drought, flood, fire, food, water and soil security are part of the design challenge. In order to respond in a way that drives resilience, a holistic approach to these factors is paramount. This will be a process of considerations and negotiations to find the most sustainable outcomes whilst still meeting developmental goals. We need to prepare our towns for future climate challenges and acknowledge our responsibility to attempt to mitigate these challenges where possible.

3.2 SPATIAL UNDERSTANDING

- The spatial challenges of the area were analysed to establish a base set of issues that relate to the inherent nature of the place [the genius loci]. When coupling this with the interpretation of relevant municipal frameworks and policies as well as current global thought on urban design and development goals, more informed and appropriate decisions can be made that consider the surrounding urban context, including the rural-urban, urban morphology, spatial systems, movement, spatial patterns and ecological systems.
- The following issues were identified:
 - **Ecological Systems:** The ecological systems are not cohesive or congruent across the area with no collective plan straddling the proposed developments. The waterscape, ecological systems and the corresponding agricultural landscape is the overwhelming experience of the place and key to the success in maintaining the character of place is the protection, completion and engagement with the various ecological systems.
 - **Movement and Access:** The movement systems of the individual developments function in isolation and current vehicular access points via higher-order roads are prone to poor accessibility. Access to each development is restrictive with no connectivity between developments other than via primary roads.
 - **Barriers and Grain:** Nooitgedacht Village and Koelenbosch Country Estate are gated residential developments. These developments currently dominate in the landscape with their monotonous architecture and are isolated islands in the landscape. The proposed developments are at risk of replicating this phenomenon. The dangers of a predominantly gated urban landscape are that it has poor relationships with the surrounding landscape and one another, making the in-between space all the more unfriendly, unsafe, and vehicular dependent
 - **Form and Public Interface:** The existing spatial morphology (form) of the gated residential developments are limiting their public interface, however the urban morphology of Devonbosch Lifestyle Estate points to a vibrant mix of building uses and typologies that respond to the rural-urban condition.
- The intention of a contextual analysis is to provide informants that can aid in setting up guidelines and ensuring feasibility of a proposed design. These fixes will help to inform decisions on environmental and built form. The following fixes have been identified and agreed, following collaboration with the developers and the consulting team:
 - **Ecological Fixes - Topography, Water And Ecological Preservation:**
 - Expansion and integration of two ecological corridors, running north to south through the area, including water courses and their respective buffers.
 - Reestablishment of the river passing through Koelenhof Estate along its original course.
 - The creation of an ecological/recreation focus central to Devonbosch.
 - Utilisation of existing agricultural ponds to form part of the stormwater management system.
 - Protection of mature tree lines and clusters.
 - Expansion of a landscaped buffer of 20m either side of the R304 and Bottelary Road.
 - **Connectivity Fixes - Re-Organisation And Re-Alignment Accommodating Future Growth:**
 - Rehabilitation of the train station and creation of a potential NMT/public transit system.
 - Future widening of both R304 Road and Bottelary Road
 - Upgrading of Kromme Rhee Road including implementation of the bridge (PRASA responsibility) over the railway line.
 - Future intersections to access Malanshoop, Devonbosch and Koelenhof Estate from the R304.
 - An additional Intersection to access Devonbosch off Bottelary Road.
 - Linking of Malanshoop, Koelenhof Estate and station via an underpass under the future road bridge.
 - **Urban Fixes - Urban Intersection | Sacrifice For Security**
 - Using the public realm as a connector between developments by enabling a high quality pedestrianised urban interface to complement the rural character.
 - A development setback line along Bottelary Road to ensure the continuation of the public realm through a connected landscape buffer.

3.3 DESIGN STRATEGY

- The design strategy is based on **three pillars**:
 - Reinforcing the existing ecological systems across all developments as a linking device.
 - Strengthening and creating movement links between the developments, bridging barriers and encouraging integration.
 - Consolidating and enhancing the built environment with public space activation.
- **Green and Blue Network Strategies:**
 - Reinforcing the existing ecological systems across all developments as a linking device. A designed landscaped interface that meets the requirements of an ecological corridor is proposed. This space can also incorporate pedestrian movement, recreational as well as stormwater management functions (Refer to **Figure 8**).
 - Retain and enhance the natural shape of the large dam on Devonbosch. Surrounding development should make use of this visual and recreational asset.
 - Demarcate the central green space at Devonbosch as a recreational and conservation space - this area has the potential to become a large recreational park with footpaths and pocket parks/rest spaces.
 - The Bottelary Road buffer at Devonbosch should be expanded and landscaped as a protected wet buffer and the treelines extended to provide a screen from the roadway.
 - This river and wetland corridor along the eastern boundary of Malanshoop is to be maintained. Residential units along the eastern bank should be orientated towards the area to activate it. The boundary fence along this corridor needs to be transparent as to not create any visual obstruction as well as prevent contributing to unsafe spaces along the railway line.
 - The river running through Koelenhof Estate is proposed to be rerouted back to its original alignment through the centre of the property with a 30m cross section. This river corridor can become a potential asset to properties adjacent and facing onto it.
 - Water movement between the Devonbosch and Koelenhof properties has been canalized and redirected into pipes underground. Bringing this water back to the surface and rerouting

this water movement to pass through the intersection as part of a future intersection design will ensure continuity of the green system.

- Sustainable Urban Drainage System (SUDS) principles and Bio-detention ponds should be used in the implementation of stormwater systems.
 - A stormwater pond is proposed in the south-eastern corner of Devonbosch before the crossing southwards to hold water at the base of the slope.
 - SUDS-based stormwater management along the streets and sidewalks in Devonbosch will allow integration into an integrated stormwater system.
 - A stormwater retention facility in the south-eastern corner of Malanshoop will help to manage runoff for this development.
 - A series of small stormwater ponds along the river in Koelenhof Estate is proposed. These ponds provide opportunity for recreational pocket parks and walkways integrated into the layout.
 - Where possible trees and treelines should be retained.
 - The existing treelines that provide a green buffer for Devonbosch along Bottelary Road should be continued and expanded to both sides of the road.
 - The tree clusters in Malanshoop create an opportunity for a green neighbourhood park.
 - A 20m landscape buffer is proposed on either side of the R304 and should be extended up to the intersection with Bottelary/Kromme Rhee to provide a screen for pedestrian movement along the R304.
- **Movement and Access**
 - Strengthening and creating movement links between the developments, bridging barriers, encouraging integration and ensuring continuity is an important focus (Refer to **Figure 9**).
 - To reduce pressure on the Bottelary-R304 intersection and address the traffic impact of Devonbosch a northern bypass road is proposed from the Blumberg Circle along the western and northern edge of the Devonbosch project to the R304 north.
 - A southern bypass from the Blumberg Circle to link with the R304 south opposite Elsenburg Road is proposed to further ease the centralized traffic yield in the area.

- o With the implementation of the road over rail bridge, a road link between Malanshoop and Koelenhof estate via the station and with the potential to link to the R304 via Elsenburg Road is to be explored to distribute traffic and integrate the urban area.
- o Should in future the upgrade of the Bottelary Road – R304 intersection be required, it is proposed that a grade-separated design where Bottelary-Kromme Rhee continues at ground level beneath the elevated section of the R304, is utilised. This would allow the design of a primary pedestrian link/corridor through a green public open space system that would further reinforce the connectivity between the developments to the north and south of the intersection and create a direct access to the train station for pedestrians. It is further proposed that the lanes of the bridge be split to allow light in-between, thereby helping to foster a feeling of spatial continuity and safety.
- o Together with the overpass a tertiary road system of quarter link roads can be created that will provide movement alternatives to the separated intersection and allow integration of the various developments within the node. In the short-term these could function as left-in left-out or unsignalized accesses.
- o Road and traffic calming measures are to be implemented within the Koelenhof area. From the boundary edges of the node, the R304, Bottelary Road and Kromme Rhee Roads are to have signalised intersections to slow down traffic entering the area.
- o Internal movement systems within the developments are to be designed alongside pedestrian pathways to facilitate a movement network of people-centred streets. The internal street design can take precedent from Alberto Drive in Devonbosch which is public (yet secure) and have active edges such as retail, front of houses, spill-out spaces, NMT networks, pedestrian pathways and street furniture.
- o The rehabilitation of the train station will assist transit for residents, visitors and workers in and out of Koelenhof. It forms the centre of the NMT system which further endeavours to connect all the developments.
- o NMT and pedestrian walkways tie into the train station and provide access throughout the developments. Walkways and green and blue systems are interlinked and will form the backbone of the development of the node.

- **Development Interface**

- o Consolidating and enhancing the built environment with public space activation will be central to integrating the various development projects.
- o The train station should become a transit orientated hub central to the Koelenhof node.
- o The location of retail and recreational activity adjacent to the public environment will help to activate the movement system. The orientation of the retail development at Koelenhof Estate can help contribute to the public realm.
- o An 'urban public forecourt' along a pedestrian-orientated Bottelary-Kromme Rhee Road which is supported by publicly orientated retail, institutional and recreational uses will serve to connect the developments to each other and to the transit routes.
- o Green spaces such as the conservation/recreation area and large dam in Devonbosch and river corridors in Koelenhof Estate and Malanshoop should be activated with street and building interfaces that look onto the spaces. Public access should be encouraged through walkways and rest spaces or recreational amenities created where appropriate.
- o To establish positive interfaces with the river corridors developers should endeavour to create at least 70% positive interface to maintain continuity of active, people-oriented uses.
- o Rivers and open space areas should be integrated with the internal movement systems of the developments to make them publicly accessible for people living within the estates.
- o With rapid development in a predominantly rural area, it is important to support gradual transition and allow for transition space that is aware of contrast along the urban-rural interface. Development at the edges of Malanshoop and Devonbosch needs to be responsive to the agricultural landscape adjacent through the use of landscape buffers as well as positive interfaces such as frontages and visually permeable edges.
- o Development along the urban edges needs to respond in two directions. Externally to the landscape as well as internally to the neighbourhood and street.

Figure 8: Green and Blue Networks (Source: Jakupa)

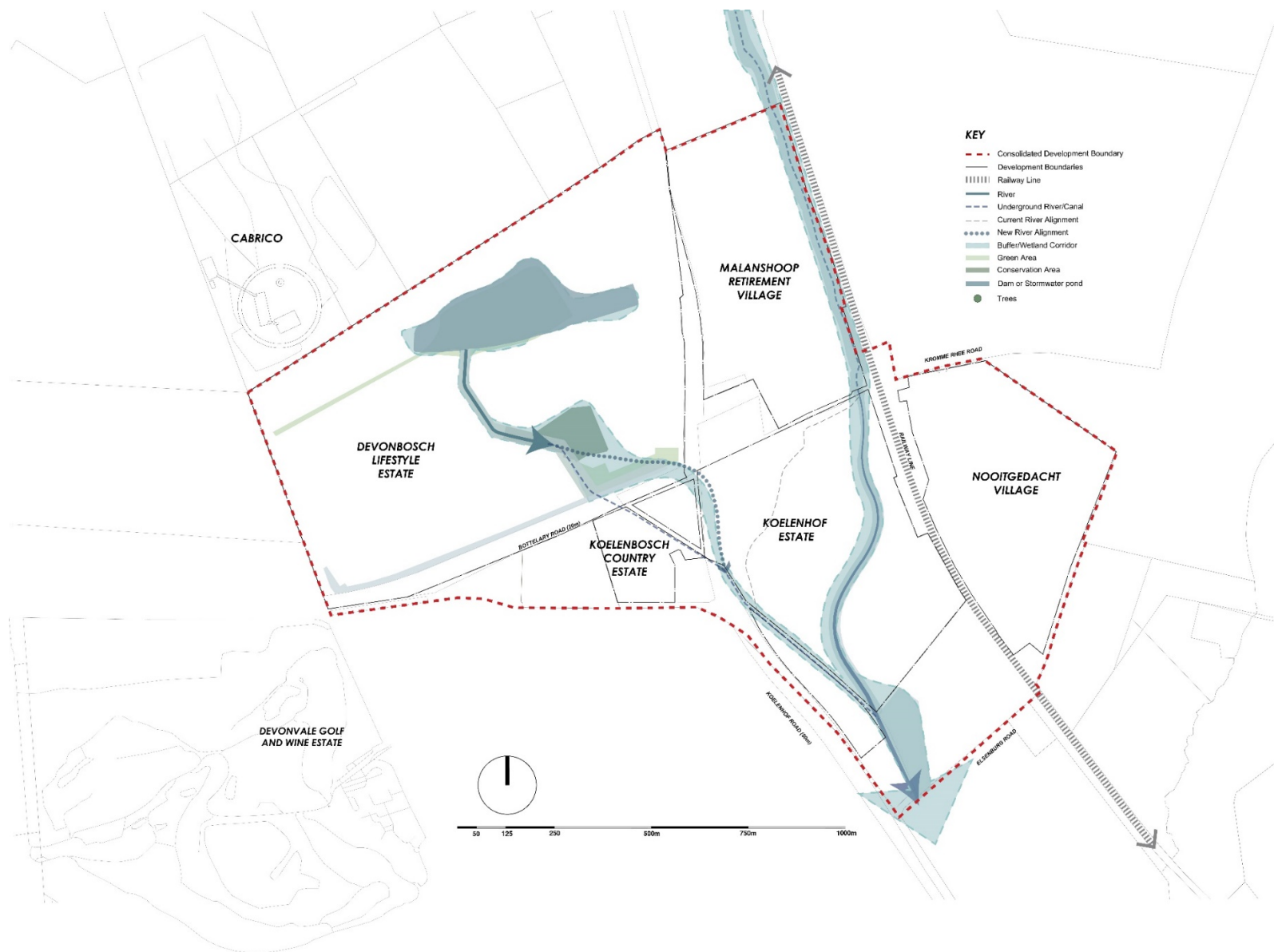


Figure 9: Movement Systems (Source: Jakupa)

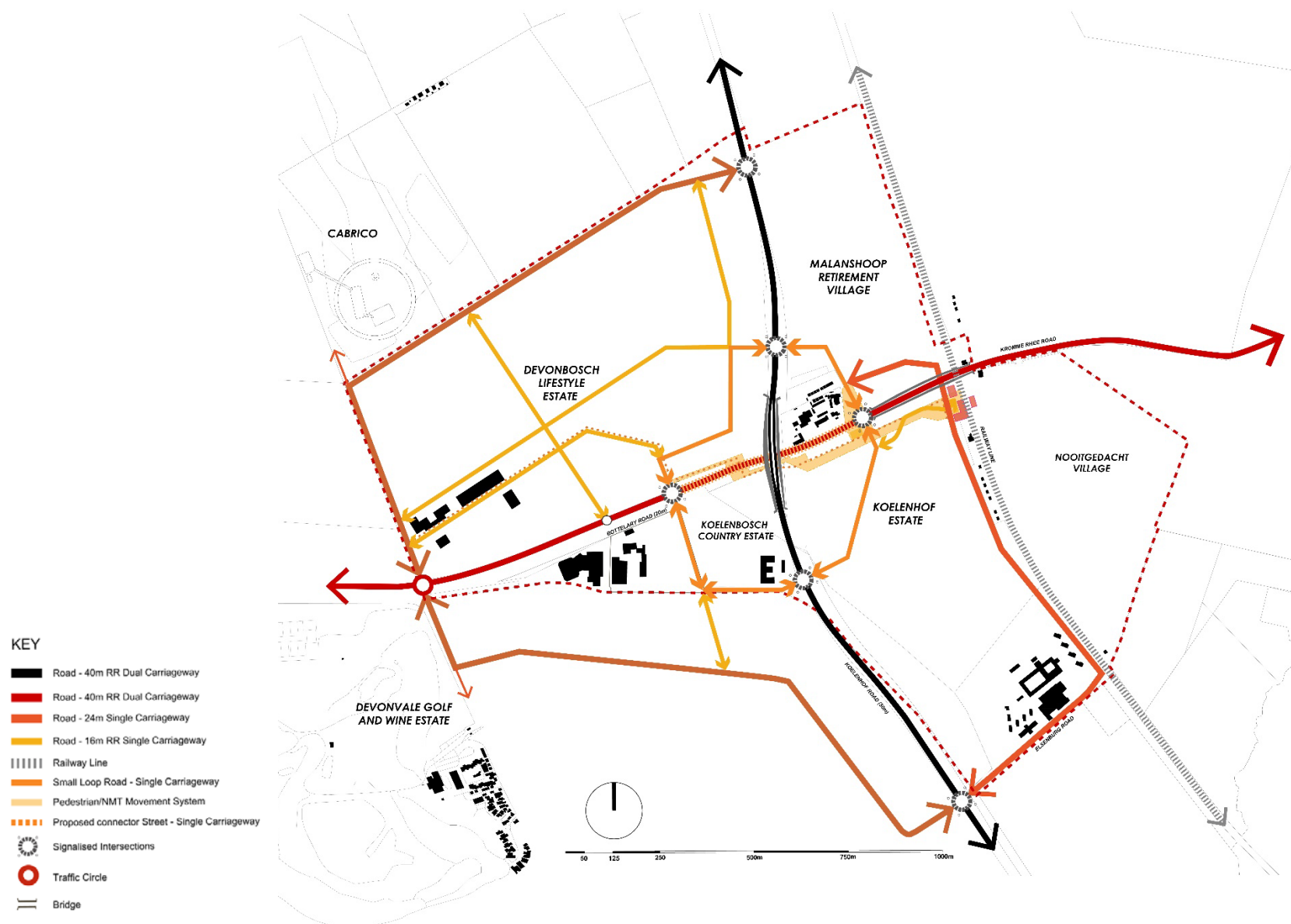
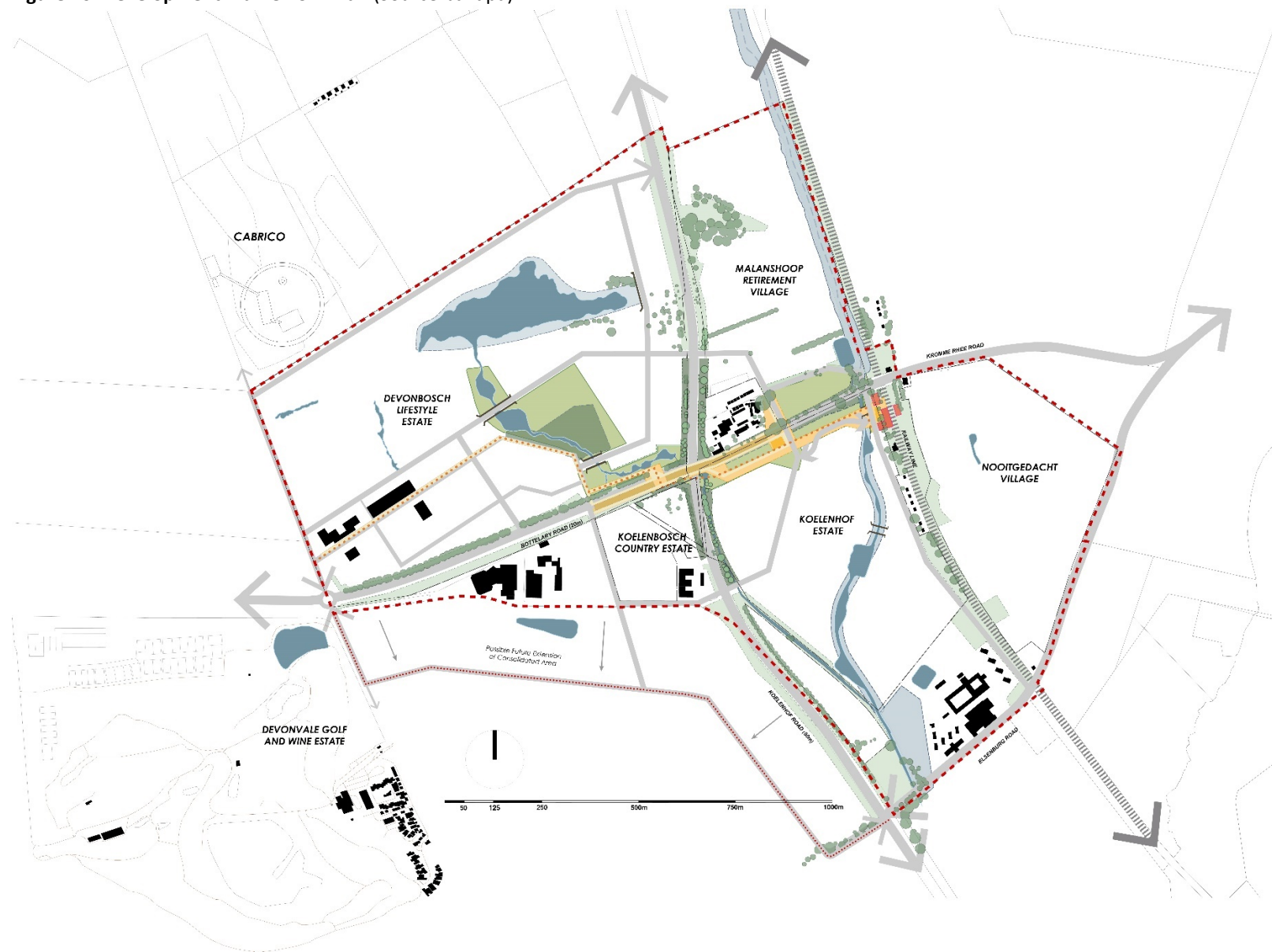


Figure 10: Development Framework Plan (Source: Jakupa)



4.0 DEVELOPMENT FRAMEWORK

The Development Framework Plan (Refer to **Figure 10**) is shaped by three key principles that offer coherence to the development of the Koelenhof node:

- Consolidate scattered and fragmented development into a coherent and compact footprint that supports a collective identity. This is achieved primarily through shared public space systems and must be viewed as a continuum with the adjacent rural landscape. Build continuity in the ecological systems across the site and ensure a positive interface with it through adding people-oriented activities and building positive interfaces between buildings and these systems.
- Connect the developments with the primary public transport system and node, which is the train station. All mobility systems are then shaped to support this connection, including an NMT system. Over and above the need to provide access to the development parcels, the road network is adjusted to support the lower order of movement. Within the node, the function of the roads is downgraded in order to integrate the development parcels and function as the heart of the node.
- The node will be implemented incrementally, and its landscape will transform over time, allowing a high-quality town to emerge. The quality of the environment will be a key driver of the town's success. Quality will emerge when the public realm experience is coherent, contiguous, and supports an experiential place for pedestrians.

4.1 LAND USE

- **Land Uses:** The potential land uses for each of the quadrants can be summarised as follows:
 - **Quadrant 1 – North-East:** The Malanshoop retirement development is the focus with an institutional interface along the northern boundary of Kromme Rhee Road.
 - **Quadrant 2 – South-East:** Koelenhof Estate and Nooitgedacht Village provide a predominant residential focus either side of the Koelenhof Station. Koelenhof Estate includes a retail and institutional interface along the southern boundary of Kromme Rhee Road with the existing Lindelani Youth Care Centre further expanding adjacent to the Elsenburg Road edge.

- **Quadrant 3 – South-West:** In addition to the Koelenbosch residential estate, the area accommodates a variety of retail, service and industrial uses. The area will likely evolve in future with a potential long-term amendment of the urban edge up to the proposed southern bypass road and overall improved access facilitating an expansion of a mix of future uses.
- **Quadrant 4 – North-West:** The Devonbosch mixed-use development will be expanded to incorporate industrial, residential and institutional land use opportunities in support of a growing business area.
- **Zoning:** A variety of zones as set out in the Stellenbosch Land Use Scheme are being utilised to facilitate the land use vision, but it is proposed that a **Koelenhof Overlay Zone** be approved and implemented to facilitate the future role of Koelenhof as a Priority Development Area and through which land use opportunities can be better pursued through a generous set of urban land use parameters.
- **Development Precincts:** Each development project will become a Precinct or be further divided into sub-precincts of homogenous functional development areas.
- The total **basket of rights (floor area and units)** which were projected as long-term potential for all land within the urban edge and on which the services calculations were based, is as follows:

Table 1: Koelenhof Node: Potential Basket of Rights						
ZONE	Res Units	Retail (m ²)	Office (m ²)	Industry (m ²)	Institute (m ²)	Other (m ²)
Quadrant 1: North-East	450	0	0	0	6 000	2 200
Quadrant 2: South-East	1 520	10 605	0	0	20 800	1 000
Quadrant 3: South-West	140	2 280	0	23 920	0	190
Quadrant 4: North-West	3 085	81 950	313 930	71 456	31 520	34 690
TOTAL	5 195	94 835	313 930	95 376	58 320	38 080
GRAND TOTAL	5 195					600 541

4.2 ACCESS & MOVEMENT

The movement systems within the Koelenhof Priority Development Area provide a critical role in structuring the area for future development. Four levels of movement form part of the development framework:

- The **primary movement level** consists of the R304 (north-south) and Bottelary – Kromme Rhee (east-west) movement routes. These roads fulfil an important mobility function, but it is proposed that within the Koelenhof node, both roadways are designed to slow down road speeds in order to balance mobility with safety in the node. Furthermore, it is proposed that the Bottelary-Kromme Rhee Road responsibility be transferred from PGWC to the Stellenbosch Municipality between the eastern and western urban edges to allow a more urban cross-section that would benefit a pedestrian-balanced design for these road reserves.
- The **second movement level** involves the implementation of the northern and southern bypass roads as well as the eastern underpass link along the railway line to reduce the pressure on the R304-Bottelary intersection and provide road capacity to serve the future development of the area.
- The **third movement level** is linked to the grade-separation of the R304-Bottelary intersection (if required) and the creation of quarter links via the development areas to provide alternative routes and help to integrate the various development areas through a system of internal roads. These accesses could function as left-in left-out or unsignalized intersections in the short to medium term, depending on road safety and functionality.
- The **fourth movement level** includes the rehabilitation of the train station and the creation of NMT and pedestrian systems to link the various development quadrants to the station.

4.3 GREEN NETWORK

The green network consists of the following:

- **Water System forms the Backbone:** The water system forms the backbone of the green network with two north-south systems linking the various development areas. The aim is to provide ecological continuity while also supporting the sense of place within the area.

- The western link includes the existing Devonbosch Darm and conservation/recreational area and stormwater dams linked to the existing water course route along the western boundary of the Koelenhof Estate together with the buffer areas integrated with stormwater facilities.
- The eastern system links the water course along the eastern boundary of Malanshoop with a realigned river course and buffer areas through the centre of the Koelenhof Estate site. The two systems connect on the southern boundary of the study area.
- A green landscape system is integrated with the water system by connecting the existing treelines and tree clusters with expanded landscape buffers along the primary routes and which are expanded to the secondary and tertiary road systems to provide ecological corridors and screening of pedestrian movement throughout the node.

4.4 SERVICE NETWORKS

The services reports have confirmed that with strategic network upgrades sufficient service capacity can be created to accommodate the proposed development. Services provision can be summarised as follows:

- **Potable Water:** Water storage is currently provided at the Sonop and Devon Valley Reservoirs, with the water master plan indicating a third reservoir (4 Ml) at Farm Kriekbult to be constructed in future. Physical spare capacity in the storage system is currently 1 224 kl/day
- **Sewerage:** A recent upgrade of the 300mm Ø bulk sewer bulk sewer to the Stellenbosch Municipality's wastewater treatment works in Devon Valley provides sufficient capacity for the next 10 years.
- **Waste Management:** Sufficient infrastructure exists to provide waste management services for the node.
- **Stormwater:** The stormwater system for each development will be linked to the integrated SUDS-based water system.

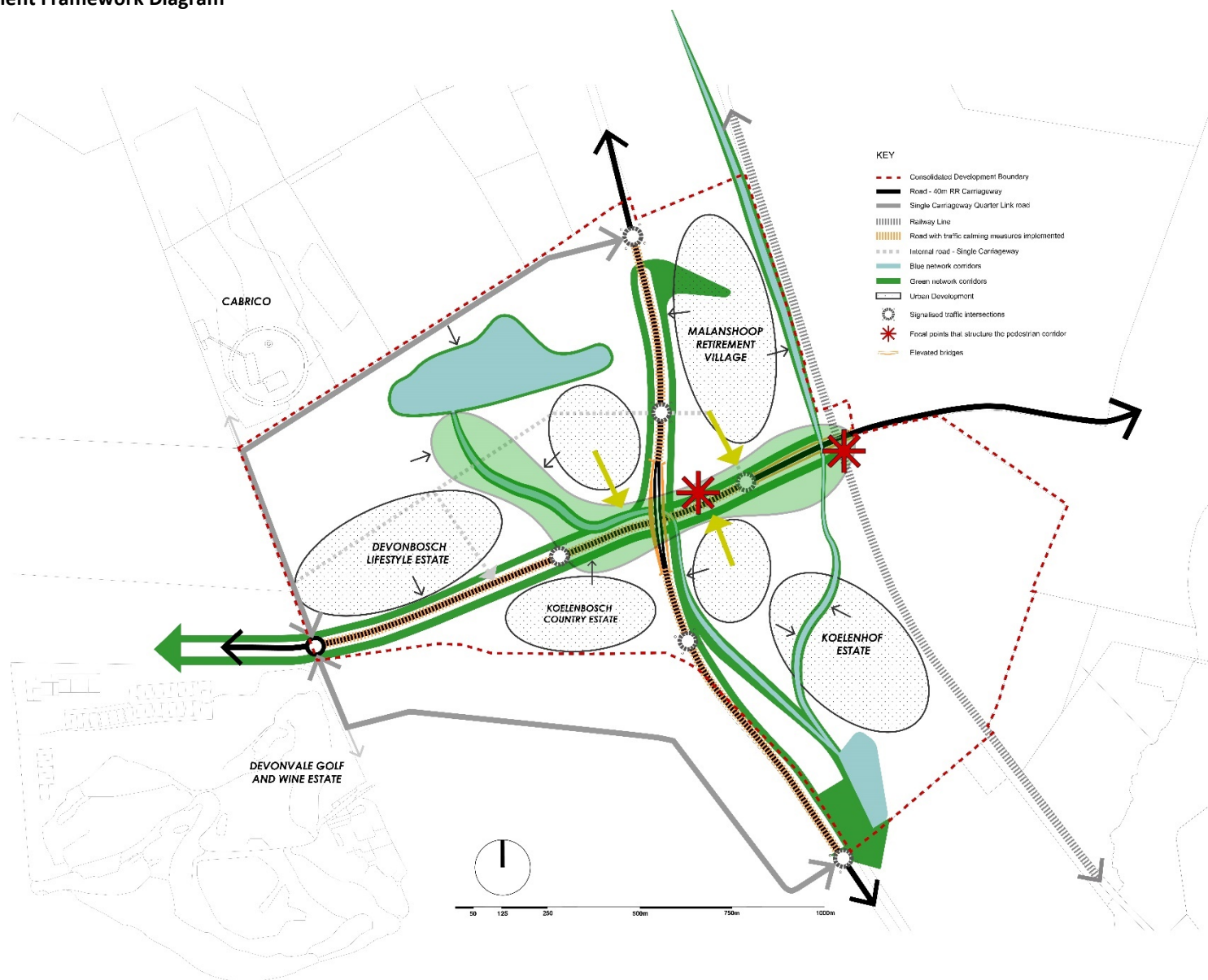
- **Electricity:** A supply of 90MVA will be required to service the total development. Three options exist:
 - o A second step-down substation and several overhead line upgrades linking to the Stellenbosch substation and a portion of the 66kV-line from Helshoogte to Koelenhof.
 - o A new 132kV-feeder into the Koelenhof area, fed from the existing Muldersvlei transmission substation adjacent to the N1-highway which currently has sufficient capacity at Muldersvlei substation to cater for the total anticipated load of Koelenhof area.
 - o Extension of an existing 132kV-feeder from Elsenburg area to the proposed new stepdown substation in the Koelenhof area.

4.5 SUMMARY

As illustrated by **Figure 11**, translating the key elements of the Development Framework spatially implies the following minimum responses:

- To fix the public realm by making the ecological (green and blue) systems contiguous.
- To transform the east-west Bottelary-Kromme Rhee road system into a pedestrian-oriented heart of the development node with a church complex and rail station at its heart. This system is to be shaped to act and function as a pedestrian-oriented environment with a focus on landscaping elements.
- To shape building interfaces to orientate to the ecological and pedestrian-orientated road systems.
- To limit the extent of the development node and consolidate the development opportunities through density and diversity of uses.
- To grade the scale and intensity of development towards the edges of the node and orient development towards it to create a positive interface with the rural surroundings.

Figure 11 Development Framework Diagram



5.0 IMPLEMENTATION

5.1 10-YEAR ROLL-OUT HORIZON

Anticipating the roll-out framework and planning for the total development vision will prove impossible, but an interim planning horizon allows an implementation strategy to be developed based on which a services needs assessment and high-level cost estimate can be done as per illustration.

Table 2 provides an anticipated scenario should the implementation of the Malanshoop retirement development, Koelenhof Estate residential and retail developments and the mixed-use Precinct A of Devonbosch happen within a 10-year roll-out period.

Table 2: Koelenhof 10-Year Roll-out Potential						
Combined Devonbosch Precinct A, Malanshoop, Koelenhof Estate implementation						
Year of Occupation	Residential (Units)	Retail (Floor Area - m²)	Office (Floor Area - m²)	Industrial (Floor Area - m²)	Institute (Floor Area - m²)	Other (Floor Area - m²)
2026		128				1 206
2027	17	2 738	18 926		8 750	
2028	226	3 343	11 000			
2029	290	10 605	8 000	1 008	2 500	
2030	310	20 000	10 800			12 334
2031	150	5 000	10 000			2200
2032	250	2 000	10 000			
2035	324	1 736	16 329			
TOTAL	1 567	45 550	85 055	1 008	11 250	15 740
GRAND TOTAL	1 567	158 603				

This allows the high-level cost estimates to be compared with the potentially available Development Charges (DCs) designated for funding of upgrades.

The calculation does not preclude other landowners and developers from implementing rights within the node. The intent is to establish development thresholds for which services upgrades will be required and to identify what services will be triggered at that stage.

5.2 TRANSPORT INFRASTRUCTURE (Source: ITS)

The transport response for Koelenhof must evolve beyond the traditional car-centric solutions of the past to effectively manage the transport pressures of significant future growth. While the historical proposal of dualling the R304 (MR174) and constructing a grade-separated interchange addressed capacity and safety concerns at the critical node, it did not sufficiently consider sustainable mobility principles or the integration of public transport and non-motorised modes. It also did not consider the future urban development in the Koelenhof node.

The alternative approach presented in this report offers a more holistic and forward-looking strategy. By preserving the R304's role as a regional mobility corridor through managed access and bypasses, promoting modal shift through rail station upgrades and shuttle services, and enhancing pedestrian and cycling connectivity, the plan supports a sustainable, transit-oriented development model. Managing vehicle speeds and diverting through traffic via phased infrastructure improvements through the developments further contributes to safer and more efficient road operations.

Importantly, this approach is flexible, allowing for future infrastructure interventions like grade separation only if public transport initiatives do not achieve the intended trip reductions. The integration of land use and transport planning ensures that Koelenhof can grow in a way that balances regional mobility needs with local liveability and accessibility.

In response to the pressures this growth will place on the transport system, a coordinated and holistic transport response is essential and the approach below sets out a strategy aimed at ensuring the long-term sustainability and efficiency of mobility in the Koelenhof area while also allowing the node to develop as an integrated urban area.

The transport response presents a series of strategic interventions to reduce external trip demand, manage congestion, and improve internal connectivity. Central to this approach is the application of realistic trip reduction factors—such as mixed-use integration and public transport availability—based on the unique characteristics of Koelenhof’s land use and transport context.

This section outlines, at a high level, the proposed upgrades to the road network, enhanced public transport integration (including plans for the Koelenhof Station), and non-motorised transport infrastructure. It aims to balance local access needs with regional mobility objectives while preserving the liveability and connectivity of the future Koelenhof urban node. The key objectives for the Koelenhof Transport Master Plan and the transport response for each are summarised below:

- **Objective 1: Preserve the mobility function of the R304** - Ensure that this key regional arterial route continues to serve as a high-capacity mobility corridor by limiting interruptions and managing access appropriately. Several important measures must be implemented to prevent future congestion and maintain its long-term efficiency. Including limiting direct access by restricting the number of intersections. This approach reduces conflict points between vehicles and helps maintain traffic flow.

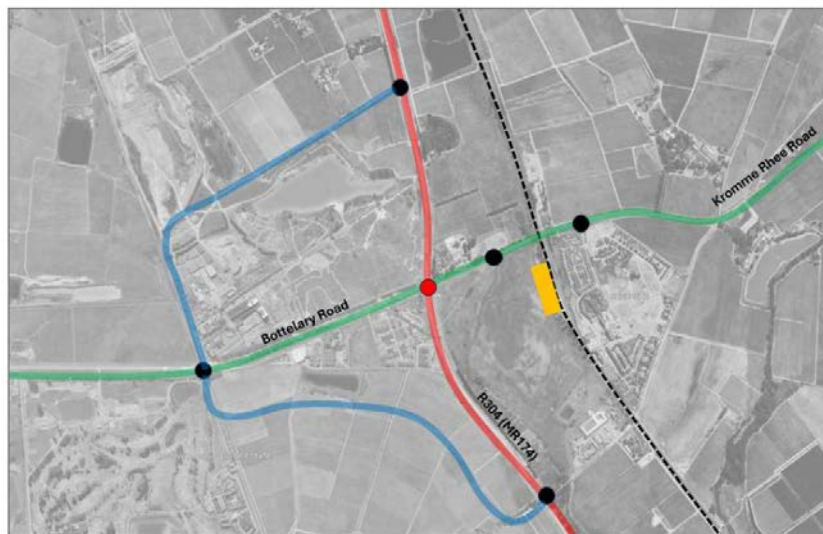


Figure 12a: Bypass Roads

- Another priority is the implementation of bypass roads designed to divert traffic away from the central Koelenhof node. These routes are expected to decrease traffic volumes on the R304 by about 40%. Moreover, they will intercept approximately 30% of the additional traffic generated by new developments. As a result, this intervention is estimated to reduce vehicle volumes at the critical R304 - Bottelary Road intersection by around 5 000 vehicles during peak hours, significantly improving capacity and reducing delays. Refer to **Figure 12a** for the ring roads to be constructed to improve capacity through the critical intersection.
- **Objective 2: Reduce overall trip generation and dependence on arterial roads** - Promote the use of alternative modes of transport, particularly rail, by improving accessibility to public transport facilities, thereby reducing private vehicle usage. This is a key objective and all efforts to implement transport solutions pro-actively to support behavioural change must be prioritized. Reducing trip generation and dependence on private cars is a crucial strategy for alleviating pressure on the regional road network.
- Promotion of public and non-motorised transport options requires integrated planning and targeted investment in infrastructure that supports these modes, making them more attractive and accessible. Upgrading and integrating the Koelenhof rail station is a key component of this strategy. By transforming the station into a multimodal hub, it can be better connected to nearby residential, commercial, and institutional areas, facilitating smooth and convenient transfers between different transport modes. Investing in station accessibility and improving last-mile connectivity is equally important. Enhancements should include better non-motorised transport infrastructure and feeder routes that improve access to both the Koelenhof and Stellenbosch rail stations. Introducing a shuttle service within the Koelenhof area developments will further increase convenience and reliability for rail users.
- Given that over 40% of the development-related traffic is destined to or originate from Stellenbosch, improving rail services and accessibility has the potential to significantly reduce road traffic. If only half of these trips were to shift to rail, it could result in a reduction of approximately 2 500 vehicles per hour at the critical R304-Bottelary intersection during peak periods.

- **Objective 3: Develop safe and continuous non-motorised transport (NMT) infrastructure** - Provide dedicated walking and cycling facilities throughout the Koelenhof area to support sustainable and inclusive mobility options. This intervention must be prioritised to improve the integration between land uses and reduce external trips. Prioritising pedestrian infrastructure and internal mobility is essential to promote a walkable and transit-oriented development in Koelenhof.
- Seamless pedestrian access between land uses must be ensured by providing continuous, safe, and direct routes connecting land uses and transport nodes within and across precincts. Such connectivity encourages walking for short trips within the community. Improving pedestrian connectivity to the Koelenhof rail station is also a key priority. This involves creating well-designed pedestrian pathways and safe crossings that allow commuters to access the station comfortably and directly, promoting the use of public transport.
- Implementing a grade separation along the R304 where possible reduces conflicts between pedestrians, vehicles, and trains, thereby preserving the corridor's role as a key regional arterial route. The proposal is to reduce the cross-section of Bottelary to create a walkable environment, should the R304 be grade-separated over Bottelary Road.
- Introducing a local shuttle service will further support last-mile connectivity. This shuttle can link residents and visitors to the rail station and other important nodes, reducing reliance on cars for short trips and improving overall transit convenience. The development extent of the node would justify a full public transport system that can serve local trips and trips to external nodes. Encouraging modal shifts, traffic volumes on arterial roads will decrease significantly. This reduction will delay the need to dual Bottelary Road.
- **Objective 4: Divert through-traffic away from the Koelenhof centre** - Alleviate congestion within the core development area by re-routing regional and non-local traffic via alternative alignments or bypasses. To protect the mobility function of the R304 and accommodate future traffic demand, a phased approach is proposed to divert through-traffic and upgrade intersections. This strategy balances immediate needs with long-term infrastructure planning to maintain efficient traffic flow.
- Grade separation is planned as a final phase of this approach. Such infrastructure will only be necessary if improvements in public transport—such as enhanced rail and shuttle services—do not sufficiently shift travel demand away from private vehicles. The phasing plan must be designed in such a way that it does not preclude or restrict the implementation of any future transport solutions. This ensures that interim interventions remain flexible and adaptable, allowing for the integration of long-term infrastructure upgrades—such as grade separation, public transport enhancements, or additional capacity improvements—should they become necessary over time
- By implementing grade separation of the R304 over Bottelary Road, the option to introduce two additional traffic signals is created. The completion of a double ring road network system of bypass routes, will reduce traffic volumes on both the R304 and Bottelary Road by about 1,000 vehicles per hour. This reduction will mitigate congestion at the critical intersection and throughout the Koelenhof area, contributing to safer traffic conditions and less delays along the R304. It is recommended that these new intersections be either priority controlled or left-in/left-out to sustain the mobility of the R304.



Figure 12b: Internal Ring road system

- Objective 5: Implement a practical funding and phased expenditure approach** - Prioritise spending of Development Contributions (DCs) on municipal and public transport infrastructure first, thereby enhancing sustainable transport options early. Delay capacity upgrades on provincial roads where possible and encourage developers to contribute by creating integrated road networks and offering an alternative strategic and phased approach to funding is crucial to optimising the use of available resources and achieving long-term transport goals. Prioritising Development Charges (DCs) for investment in Municipal and public transport infrastructure, such as upgrading local roads, enhancing the Koelenhof rail station, improving non-motorised transport (NMT) facilities, and implementing shuttle services ensures that initial funds deliver immediate benefits within the local transport network.
- This approach encourages a modal shift away from private vehicles towards more sustainable travel options. This is an essential approach to achieve the objectives of the transport master plan. Delaying major capacity upgrades on provincial roads, such as widening arterials, prevents premature expenditure on costly infrastructure that may induce additional traffic demand. Instead, focusing first on enhancing public transport and active travel infrastructure makes transport investments more cost-effective and sustainable. In addition, requiring developers to contribute to the creation of an integrated internal road network, designed to support diverse and alternative travel modes, further strengthens connectivity and accessibility within Koelenhof. This coordinated investment and planning framework reduces traffic travel choices that align with sustainable transport objectives
- Phasing Recommendations** - The implementation of transport infrastructure in the Koelenhof area is structured into 11 phases, each linked to cumulative trip thresholds. This phased approach ensures that capacity upgrades and modal interventions are aligned with actual development-generated demand. The phasing is selected with the following objectives in mind:
 - Invest in NMT and integration between land uses to reduce overall external travel demands.
 - Start to plan, design and implement the by-pass routes as soon as possible to limit any abortive upgrades of the R304-Bottelary intersection.
 - Upgrade the R304-Bottelary intersection with upgrades that will not be abortive once the by-pass routes are constructed.
 - Monitor the trip generation of the node to confirm assumptions of integration and external reductions.
- The total expected construction values were divided by the total expected peak hour trips for the full development to calculate a unit rate (R/trip). The cost of each transport project was divided by the unit rate to determine the number of trips to be generated to establish triggers. Refer to **Table 3** below for the proposed upgrades/phasing along with the proposed construction costs and total trips that will trigger the upgrades.

Table 3: Potential Road Upgrades (Aug 2025) – Source ITS

Trigger	Upgrade	Authority	Construction Cost (R)	Trips	Cumulative Trips
1	EA LT & RT lanes (included in Devonbosch approval)	PGWC	2 350 000	200	200
2	NA through & acceptance lanes (included in Devonbosch approval)	PGWC	4 380 000	300	500
3	Upgrade rail station (Koelenhof & Stellenbosch)	PRASA PPP	10 000 000	250	750
4	NMT Network	SM	4 400 000	300	1 050
5	Implement Southern Bypass	SM	66 734 728	4 500	5 550
6	Implement Northern Bypass	SM	111 168 574	7 450	13 000
7	Dedicated RT lane EA	PGWC	2 000 000	150	13 150
8	Dedicated RT lane SA	PGWC	2 000 000	150	13 300
9	Roundabout on Kromme Rhee Rd	Developers	10 000 000	700	14 000
10	Traffic Signal at Nooitgedacht	Developers	5 000 000	350	14 350
11	Traffic Signal at Devonvale Roundabout	PGWC	5 000 000	350	14 700
			223 633 303		

- Not all projects are within the jurisdiction of the Stellenbosch Municipality. **Table 4** summarises the apportionment of transport project costs for various authorities. It is clear from the table that more than 80% of the transport-related projects are municipal and can be constructed from Development Charge funding.

Table 4: Apportionment of Transport Costs (Aug 2025) – Source ITS

Authority	Estimated Costs	%
Developers	R 15 000 000	7
PRASA PPP	R10 000 000	4
Stellenbosch Municipality (SM)	R182 903 303	82
Provincial Government Western Cape	R15 730 000	7
Grand Total	R223 633 303	100

- **Proposed 10-year roll-out** - The first 10-year development programme for Koelenhof (2026–2035) is expected to generate approximately 5 600 peak-hour trips, representing around 38% of the ultimate build-out demand. It is recommended that the TIA be updated regularly to confirm the next roll-out of infrastructure. The transport triggers outlined in Table 3 are aligned with trip thresholds to ensure capacity and accessibility are provided as required:
 - o **2026 – 2027** ($\pm 1\,130$ trips): Development is minimal, with only limited retail and other uses. No major road upgrades are required at this stage, and the existing network can accommodate the demand. Implement **Triggers 1 and 2**, which are already conditions of approval of the current phases of Devonbosch.
 - o **2028–2029** ($\pm 2\,600$ cumulative trips): Residential and office development continues, with further increases in trip generation. At this stage, the demand approaches the threshold for **Trigger 3**, which includes upgrades to the Koelenhof and Stellenbosch rail stations (PRASA), and **Trigger 4**, which involves the roll-out of a local NMT network by SM. These interventions encourage modal shift, reduce private vehicle reliance, and support sustainable travel patterns.
 - o **2030** ($\pm 4\,000$ cumulative trips): Significant residential, retail, and office development occurs, driving an increase in traffic volumes. At this point, the combined demand exceeds 4 000 trips, meaning both the rail and NMT interventions must already be in place. Planning should also commence for the Trigger 5 Southern Bypass, as it is triggered at $\pm 5\,500$ trips, which is expected within the following five years.
 - o **2031–2032** ($\pm 5\,000$ cumulative trips): Moderate growth continues, reinforcing the need for operational improvements already delivered in Phases 1–4. The network remains functional but under

increasing strain, confirming the importance of proceeding with bypass planning.

- o **2035** ($\pm 5\,600$ cumulative trips): The cumulative trips surpass the 5 500 threshold, triggering the implementation of the Southern Bypass (**Trigger 5**) by SM. This marks the first major reconfiguration of the road network, diverting through-traffic from the Koelenhof node and preserving local accessibility.
 - o The northern by-pass (**Trigger 6**) and Triggers 7 - 11 will be constructed after the first 10 year period with the implementation of the remainder of Devonbosch and other development rights.
 - o The order of the transport projects can and should be changed in accordance with actual development applications.
- The transport response for Koelenhof must evolve beyond the traditional car-centric solutions of the past to effectively manage the transport pressures of significant future growth. While the historical proposal of dualling the R304 (MR174) and constructing a grade-separated interchange addressed capacity and safety concerns at the critical node, it did not sufficiently consider sustainable mobility principles or the integration of public transport and non-motorised modes. It also did not consider the future urban development of the Koelenhof node.
 - The alternative approach presented in this framework offers a more holistic and forward-looking strategy. By preserving the R304's role as a regional mobility corridor through managed access and bypasses, promoting modal shift through rail station upgrades and shuttle services, and enhancing pedestrian and cycling connectivity, the plan supports a sustainable, transit-oriented development model. Managing vehicle speeds and diverting through traffic via phased infrastructure improvements through the developments further contributes to safer and more efficient road operations.
 - This approach is flexible, allowing for future infrastructure interventions like grade separation only if public transport initiatives do not achieve the intended trip reductions. The integration of land use and transport planning ensures that Koelenhof can grow in a way that balances regional mobility needs with local liveability and accessibility.

5.3 CIVIL AND ELECTRICAL INFRASTRUCTURE (Source: BSI & De Villiers & Moore)

In addition to civil and electrical infrastructure and internal roads that will need to be provided to service individual projects, the following summarise the services requirements and estimated development contributions for the 10-year implementation period (August 2025 estimates).

- **Potable Water:**

- o The demand for potable water for the projected total urban development is estimated at 4 393 kl/day.
- o The demand for potable water for the 10-year development roll-out is estimated at 1 324 kl/day.
- o Based on the water demand from the 10-year roll-out, Water Master Plan Item RKW B6a (4 143m x 560mm Ø bulk watermain) needs to be implemented by 2027 to accommodate the demand from the expected 10-year roll-out. Implementation of Item RKW B6a will add 1267 kl/day for development to the system.
- o The next trigger for bulk water upgrade is at 1 267 kl/day when Water Master Plan Item RKW 2.2 (1201m x 315mm Ø bulk watermain) should be implemented. Implementation of Item RKW 2.2 will add 100 kl/day for development to the system and should happen by 2035.
- o The estimated costs required to implement these two items to accommodate the 10-year roll-out are as follows:
 - R30 000 000 - RKW B6a 4 143m x 560mm Ø bulk watermain
 - R6 000 000 - RKW 2.2 1 201m x 315mm Ø bulk watermain
- o The current water storage at the Sonop and Devon Valley Reservoirs has a physical spare capacity of 1 224 kl/day.
- o The Water Master Plan indicates a third reservoir (4 MI) to be implemented at Farm Kriekbult - Based on the water demand from the projected 10-year development rollout, the trigger for the proposed Kriekbult Reservoir is approximately 2035.
 - R17 000 000 – Reservoir
 - R20 000 000 – Pipelines & Pump stations
- o It is however acknowledged that the theoretical reservoir spare capacity may be significantly less and therefore this master plan item may have to be implemented sooner should some of the allocations be taken up before 2035.

- **Sewerage**

- o Sewage run-off from the projected total urban development is estimated at 4 137 kl/day of Peak Day Dry Weather Flow.
- o Sewage run-off from the 10-year development roll-out is estimated at 1 208 kl/day of Peak Day Dry Weather Flow.
- o Koelenhof drains towards Cloetessville via a 300mm Ø bulk sewer and thereafter via the bulk sewer through the Plankenbrug Industrial Area that has recently been upgraded.
- o GLS confirmed that the 300mm Ø bulk sewer has sufficient spare capacity to accommodate the 10-year development roll-out from Koelenhof (the total development will need to be analysed in future to establish the capacity constraints and upgrades required).
- o Treatment happens at the Municipality's Waste Water Treatment Works in Devon Valley. The treatment capacity of the WWTW has recently been increased through a major upgrade, and it has been confirmed by the Municipality that sufficient spare capacity exists to accommodate the 10-year roll-out.
- o No sewerage upgrades are required for the 10-year roll-out.

- **Solid Waste Removal**

- o Solid waste generated by the projected total urban development is estimated at 320 ton/week
- o Solid waste generated by the 10-year development roll-out is estimated at 90 ton/week.
- o Solid waste will be removed by the Stellenbosch Municipality's waste removal service, alternatively the developments will make use of a private contractor for this basic service.

- **Development Contributions (DCs)**

- o DCs from the projected total urban development are estimated at ±R680m with ±R600m available for bulk services upgrades.
- o DCs from the 10-year development roll-out are estimated at ±R220m with ±R191m available for bulk services upgrades. The development contributions from the 10-year development roll-out related to Water Supply and Sewerage is estimate at ± R73m, which is adequate to fund the minimum water and sewerage master plan items identified for this period.

- **Electrical infrastructure**

- o Capacity is available from Eskom for the projected growth of the Koelenhof development node. The initial developments will be supplied from the upgraded Koelenhof substation (project already in motion by Eskom).
- o The Koelenhof substation will when upgraded, be fitted with 2 x 20MVA transformers, which is sufficient to cater for the developments from 2026 – 2029.
- o The developments planned for 2029 – 2035 can be supplied with electricity capacity from one of the following options:
 - Eskom to allow the operation of Koelenhof substation as a non-firm supply, thus utilising both 20MVA transformers as load supply, instead of one spare for a firm supply (unlikely that Eskom will consider/approve this in the initial design stages).
 - Upgrade of Koelenhof substation again to a 40mVA transformer, subject to line capacity and fault-level control in the substation
 - Start the process of the new 132kV-supply and stepdown substation as soon as possible, to ensure some infrastructure being in place by 2031 to cater for the anticipated additional loads (also beyond 2035).
- o Ultimately a new stepdown substation is required which will require a financial commitment of R120 – R140m (current costs) should the developers work together and implement a self-build agreement. The cost and timing of the project will be higher should Eskom be the implementing authority.
- o Timeous planning (due to long Eskom lead times) and budgeting will be required to get the stepdown approved and constructed in time. The location of the stepdown facility still needs to be identified, agreed and approved.
- o Cabling between the stepdown and individual projects will be an additional cost to be planned for as these services cannot be shared between developments.

5.4 IMPLEMENTATION ACTIONS

The following implementation actions are to be prioritised in pursuit of the implementation of this development framework:

Action	Responsibility
• Designation of Koelenhof as a Priority Development Area .	SM
• Formalisation of the Koelenhof Development Framework as a Local Spatial Development Framework as part of the Stellenbosch Spatial Development Framework.	SM
• Establishment of a Koelenhof Development Association (KDA) as a formal vehicle to jointly plan, design, procure and deliver bulk Infrastructure Upgrades of Civil Engineering Services, Roads and Stormwater within the Koelenhof node —namely water, sewer, roads, stormwater, and communications—to ensure that infrastructure capacity is available in step with development demand and municipal approvals It should be a requirement that all new land owners. All developers must become members of the KDA.	Developers
• Engagement with PRASA on the station upgrade to achieve binding commitments to implement the infrastructure and services and the establishment of a PPP with PRASA and the KDA to implement the station upgrade initiatives.	SM
• Engagement with PRASA on the Kromme Rhee Road over Rail Bridge and facilitation of the approval and implementation as part of the station precinct upgrade.	SM
• Implementing the mechanisms for the utilisation of DCs for Public Transport and NMT improvements .	SM

Action	Responsibility	Action	Responsibility
<ul style="list-style-type: none"> Achieve the Transfer of Road Authority in terms of Section 26 of the Roads Ordinance 19 of 1976 to allow MR187 (Bottelary Road) from the western edge of the circle at Blumberg Road to the intersection with the MR174 (R304) and DR 1085 (Kromme Rhee Road) from its intersection with the MR174 to the eastern edge of the access to Nooitgedacht Estate to be managed by the Municipality of Stellenbosch. 	SM	<ul style="list-style-type: none"> Creation and approval of a Koelenhof Overlay Zone in terms of which the implementation of land uses in the node can be managed and facilitation. 	Developers & SM
<ul style="list-style-type: none"> A City Improvement District (CID) is to be established for the area to allow co-ordination and shared co-operation in the management of the area to the benefit of all roleplayers. The term CID refers to a specific geographical area, approved by Council in terms of the Municipal Property Rates Act, Section 22 (Special Rates Area [SRA]), and the SRA bylaw, in which complementary services are provided in addition to those rendered by the Municipality and the South African Police Services. The areas in which a CID can offer such top-up services are: urban management, safety and security, and social development. A special rates area can be established for the CID. 	Developers, SM & PGWC	<ul style="list-style-type: none"> Undertake the planning for the Southern and Northern Bypass Roads to allow implementation when the capacity is required. 	SM
<p>A CID functions as a non-profit organisation, with its own board of directors and liaises across both the public and private sectors, working together with each to manage the area in an integrated manner. It should be a requirement that all new land owners and owners associations have to become members of the CID. The following areas of co-operation can be addressed by means of the CID (amongst others):</p> <ul style="list-style-type: none"> o Landscaping of public roads o Cleaning and maintenance of public spaces o Safety and security o Stormwater management o River corridor management and coordination o Public transport services 		<ul style="list-style-type: none"> Consider amendment of the Koelenhof urban edge to include Farm 74/35 to facilitate implementation of the green and blue network elements and to consolidate the development area up to Elsenburg Road. Exclude Farm 66/2 east of Nooitgedacht Estate as this is to remain as vineyards. The portions of Farms 74/12 & 74/32 that will be located to the north of the future southern bypass road could with implementation of the roadway be considered for inclusion in future. 	SM

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ANNEXURE A

ENVIRONMENTAL SUMMARY



Environmental Overview of the Koelenhof Area

Compiled for: The Koelenhof Development Forum
Compiled by: Adél Groenewald
Date: 01 October 2025

1. Geology and Topography

The Koelenhof area lies within the Cape Winelands, north of Stellenbosch. The landscape is characterised by gently undulating low hills and flat valley-bottom plains, underlain by:

- Malmesbury Group shales, giving rise to fertile but heavy clay soils.
- Cape Granite intrusions, producing coarse sandy to loamy soils with better drainage.
- Alluvial deposits along the Eerste and Plankenbrug river systems, which have shaped natural wetlands.

This mosaic of parent materials creates diverse soil and habitat conditions. However, duplex soils prone to shallow depth, clay hardpans, and seasonal waterlogging are widespread.

2. Climate

The area has a Mediterranean-type climate, with cool, wet winters and hot, dry summers.

- Mean Annual Precipitation (MAP): ± 430 mm (range 270–670 mm), with 70–80% falling in winter.
- Evapotranspiration: 1200–1800 mm annually, creating summer water deficits.
- Temperature range: Summer maxima often >36 °C; winter minima typically 3–4 °C but frost-free.
- Wind regime: Southeasterly in summer; northwesterly in winter.

The combination of low rainfall, high evaporation, and waterlogged soils strongly influences agricultural viability and freshwater ecosystem dynamics.

3. Vegetation and Terrestrial Biodiversity

3.1. Vegetation Types

Historically, the Koelenhof area supported two nationally threatened ecosystems listed on the SANBI Red List of Ecosystems¹:

- Swartland Shale Renosterveld – Critically Endangered (CR)
- Swartland Granite Renosterveld – Endangered (EN), downgraded from CR in the 2018 National Biodiversity Assessment.

Both ecosystems have been extensively transformed ($>90\%$ loss), largely due to viticulture, pastures, infrastructure development, and quarrying.

¹ SANBI (2021) South Africa's Terrestrial Red List of Ecosystems (RLE): Technical report on the revision of the "List of terrestrial ecosystems that are threatened and in need of protection". Report 7639. South African National Biodiversity Institute, Pretoria, South Africa. <http://hdl.handle.net/20.500.12143/7639>

3.2. Current Condition

- Natural vegetation has been almost entirely lost, with only scattered, degraded fragments remaining.
- The landscape is now dominated by alien invasive trees (Acacia, Eucalyptus, Pine, Hakea) and pasture grasses (kikuyu, ryegrass).
- Remnant patches persist mainly along road verges, riparian corridors, wetland fringes, and ecotonal transitions between shale and granite soils. These remnants are typically degraded and invaded, but still support pioneer indigenous species such as *Elytropappus rhinocerotis*, *Osteospermum moniliferum* and *Searsia tomentosa*. Although ecological integrity is low, these remnants retain conservation and restoration value, contributing to landscape connectivity, indigenous refugia, and rehabilitation potential.

3.3. Conservation Context

- The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) identified extensive Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) within the Koelenhof landscape, particularly linked to river corridors and wetland systems. These areas are critical for species dispersal, ecosystem processes and ecological infrastructure, even where valley-floor habitats are highly degraded.
- The WCBSP was updated in 2023², refining biodiversity priorities. Under the revised plan, Swartland Shale Renosterveld is mapped as a CBA: Terrestrial and a CBA: Threatened Ecosystem, in a natural condition. These CBAs are required to meet provincial biodiversity targets for species, ecosystems, and ecological processes.
- The management objective for these ecosystems is to maintain them in a natural or near-natural state, with no further loss of natural habitat permitted. Where degradation has occurred, rehabilitation is encouraged, and only low-impact, biodiversity-sensitive land uses are considered appropriate in order to safeguard ecological integrity.

4. Aquatic Biodiversity

4.1. Catchment Setting

Koelenhof falls within the Berg–Olifants Water Management Area (WMA 18), specifically the Eerste River catchment. Runoff drains into the Plankenbrug River, which flows into the Eerste River and ultimately into False Bay.

4.2. Rivers and Wetlands

- **Plankenbrug River:** Once a naturally meandering watercourse, the river is now heavily channelised, with riparian zones dominated by alien reeds (e.g. *Phragmites australis*, *Typha capensis*) and invasive trees (Acacia, Eucalyptus).
- **Wetlands:** The area contains seasonal valley-bottom wetlands, as well as artificial dams and quarry seepage wetlands. Although degraded, these systems continue to provide important ecosystem services, including flood attenuation, sediment trapping, nutrient cycling and limited water purification.

² CapeNature (2024). 2023 Western Cape Biodiversity Spatial Plan and Guidelines. Biodiversity Capabilities, CapeNature. Link: <https://www.capenature.co.za/western-cape-biodiversity-spatial-plan>

- **Ecological State:** Rivers and wetlands in the area are assessed as Class C–D under the national Present Ecological State (PES) categories, indicating they are moderately to largely modified. While habitat condition and water quality have been significantly altered by human activity, key ecological processes such as hydrological regulation, sediment trapping, and nutrient cycling remain partially functional. Targeted rehabilitation would enhance both their ecological condition and their ability to provide essential ecosystem services.

4.3. Water Quality

The broader Eerste River system is impacted by wastewater treatment works discharges, urban runoff, and agricultural inputs, resulting in elevated nutrient levels (phosphorus, ammonia), reduced dissolved oxygen concentrations, and generally poor ecological health downstream, particularly closer to its False Bay estuary.

5. Agricultural Potential

5.1. Soils and Land Capability

- Soils are predominantly duplex types with poor drainage and seasonal wetness.
- Suitability ratings show most of the area as “not recommended” or “marginally suitable” for intensive crop production.
- Irrigation potential is limited by absence of water rights and unsuitable groundwater quality.

5.2. Agricultural Viability

- Viticulture dominates the landscape but faces constraints on marginal soils. Productive blocks occur mainly on better-drained granite ridges.
- Dryland cropping (e.g. winter grains) is limited by soil wetness and shallow profiles.
- Grazing potential is very low (± 36 ha per large stock unit), restricting livestock viability.
- Long-term agricultural economics in the valley floor are weak, with many areas converted to alternative land uses.

6. Visual and Cultural Landscape

6.1. Scenic Resources

The Koelenhof landscape is defined by:

- Mountain backdrops (Simonsberg, Bottelary Hills, Hottentots Holland).
- Vineyards and estates, creating a strong sense of place.
- Historic churches, schools, and farm werfs, contributing to cultural identity.

6.2. Visual Quality

- High scenic value from vineyards and mountain views.
- Degrading features include quarries, brickworks, and alien thickets, which contrast with the agricultural setting.
- Tree clusters, dams, and windbreaks enhance the visual absorption capacity of the landscape.

6.3. Cultural Landscape

- Koelenhof forms part of the Cape Winelands cultural landscape, recognised as a continuing vernacular landscape with medium–high heritage significance.
- Centuries of viticulture and associated built fabric (farmsteads, wine cellars, avenues, churches) underpin this heritage value.
- The South African Heritage Resources Agency (SAHRA) has highlighted its vulnerability to cumulative transformation from new developments.

7. Heritage and Archaeology

7.1. Historical Evolution

- Area originally used by Khoekhoen pastoralists, later transformed during colonial farming expansion.
- Farms such as Nooitgedacht and Koelenhof were established in the 17th–18th centuries.
- The area was used as a remount camp during the Anglo-Boer War, adding military historical significance.

7.2. Built Heritage

- Wine estate werfs and the Catholic church and school precinct are key landmarks.
- Many structures older than 60 years qualify under Section 34 of the National Heritage Resources Act, 1999 (Act No. 25 of 1999).

7.3. Archaeological Resources

- Artefacts (stone tools, early ceramics, historical material) have been recorded in the wider area, but extensive agricultural disturbance has reduced site integrity.
- Surveys classify most finds as Not Conservation Worthy, though monitoring during earthworks is recommended.

8. Key Environmental Sensitivities

- **Critically Endangered Renosterveld:** Largely lost, but regional remnants require strict conservation.
- **Aquatic ecosystems:** Degraded but ecologically functional; key for flood regulation and biodiversity support.
- **Agricultural soils:** Generally low potential; viticulture remains viable only on selected ridges.
- **Cultural landscape:** High heritage significance as part of the Cape Winelands, but vulnerable to incremental urbanisation.
- **Visual sensitivity:** Views from wine estates towards Table Mountain and Simonsberg are highly sensitive.

9. Overall Summary

The Koelenhof area is an ecologically and culturally significant part of the Cape Winelands landscape, combining:

- A rich geological and soil mosaic, though with limited modern agricultural potential.
- Highly transformed vegetation, with remnants of Critically Endangered Renosterveld ecosystems.
- Degraded but important freshwater ecosystems, contributing to hydrological services.
- A scenic and historic cultural landscape, shaped by centuries of viticulture and now under pressure from peri-urban expansion.

Future planning in the Koelenhof area must therefore balance heritage conservation, biodiversity restoration, water resource management, and landscape character with the realities of agricultural decline and development pressures.

Environmental Baseline Map

Legend

Urban Edge

Wetlands (NFEPA)

Natural

Artificial

Dam / Quarry

SANBI Red List of Ecosystems:
Remnants

Critically Endangered (CR)

Endangered (EN)

Koelenhof Node

ANNEXURE B

HERITAGE SUMMARY



DRAFT FOR COMMENT

KOELENHOF URBAN DEVELOPMENT FRAMEWORK HERITAGE CONSIDERATIONS



Prepared by Lize Malan

January 2025

1. INTRODUCTION

The Stellenbosch Municipality has required that landowners in the Koelenhof development node prepare a combined framework for development, that will inter alia guide development proposals and assist the Municipality in assessing development applications. The framework should consider all aspects that could be material to the formulation of the framework, such as ecological resources, traffic and transport planning as well as heritage considerations. This report sets out the heritage considerations that will inform the framework.

2. STUDY AREA

The study area is defined by the urban edge delineated in the Stellenbosch SDF and includes properties around the intersection of the R304 and the Bottelary/Kromme Rhee Roads. It includes:

- The clay quarry/brick making site and the Devonbosch mixed-use development to the north-west.
- The Nooitgedacht Village development to the east (including an existing vineyard on the eastern edge).
- The Holy Spirit Catholic Church and schools complex to the north-east of the intersection.
- The vacant land to the north and south of the Kromme Rhee Road, to the east of the R304.
- The Lindelani & Siyakathala Child and Youth Care Centre to the south-east.
- The disfunctional Koelenhof railway station to the west of Nooitgedacht Village, with several houses related to the station.
- The service station and retail outlets to the south-west of the intersection, with the Koelenbosch development “behind” and industrial sites to the west of Koelenbosch.
- A mix of residential and semi-industrial buildings to the immediate south-west of the intersection – commonly referred to as the Basil Williams site.



Figure 1: Study area



Photograph 1: **Bird's Eye view of the Devonbosch Estate and brickmaking plant** – the line of Eucalyptus tree on the southern boundary of the site is visible to the right (Source: Google Streetview, 2025)



Photograph 2: Nooitgedacht village seen from the Kromme Rhee Road with the vacant land to the south-east of the intersection in the foreground.



Photograph 3: The Holy Spirit Church precinct including the schools, seen from “behind” – from the R304. The church is located to the left.



Photograph 4: The Holy Spirit Church at Koelenhof



Photograph 5: The St Vincent Primary School – part of the RC Church precinct



Photograph 6: St Vincent Convent adjacent to the primary school



Photograph 7: Pre-school at the intersection of the R304 and the Kromme Rhee Road



Photograph 8: The Lindelani & Siyakathala Child and Youth Care Centre



Photograph 9: The Koelenhof station as viewed from the Kromme Rhee Road railway crossing



Photograph 10: The service station and commercial development to the south-west of the intersection (Sonop farm is visible against the hill behind)



Photograph 11: The Koelenbosch development situated "behind" the fuel station, as viewed from the Bottelary Road – Simonsberg is visible in the background to the left.



Photograph 12: Industrial development, to the west of Koelenbosch, as viewed from the Bottelary Road



Photograph 13: the Basil Williams site at the intersection of the R304 and Bottelary Road
(Source: Google Streetview)

3. PREVIOUS STUDIES

As alluded to above, there are a number of proposed developments in the pipeline for the Koelenhof node, for which applications for environmental and planning approval have already been prepared and/or submitted. The following heritage studies, done for sites in the node were reviewed as part of the site:

- A heritage impact assessment prepared by Arcon Architectural and Heritage Consultants, for the site known as Malanshoop (Farm 1060, Stellenbosch) dated March 2023.
- A heritage impact assessment prepared by Kathy Dumbrell, for a portion of the Killarney Brickfields, now known as Devonbosch (Portions 9 and 20 of Farm Nooitgedacht No. 65, Portion 3 of Farm 66 and Remainder of Farm 1095, Stellenbosch) dated October 2014.
- A heritage impact assessment for Portion 23 of the Farm Nooitgedacht No. 74, Stellenbosch, prepared by Claire Abrahamse for CTS Heritage dated April 2023.
- A notification of intent to development for the Lindelani & Siyakathala Child and Youth Care Centre (Portion 29 of Farm Nooitgedacht No. 74, Stellenbosch), prepared by CTS Heritage dated November 2022.

4. HISTORICAL BACKGROUND

Evidence of the first inhabitants of the broader Stellenbosch landscape date to the early stone age, between 700 000 and 300 000 years ago. Artefacts such as hand axes, cleavers and choppers dating to this time, have been found in various locations in the landscape, where they have been brought to the surface by disturbances of the soil. About 2000 years ago, the subsistence strategy, mostly based on marine resources, changed with the arrival of the herders in the area. As the name suggests, these inhabitants kept livestock and moved around in pursuit of grazing for their animals. This nomadic lifestyle was dictated by the seasons and involved groups or clans regularly moving between the same sites during the course of a year. Europeans started arriving at the Cape regularly from the late fifteenth century onwards, but it was only when the Dutch East India Company set up a refreshment station at the Cape in 1652, that the process of displacement of the inhabitants, known as the Khoe, was started. The Dutch needed meat and wood to supply their ships and settlement and this led to conflicts regarding land in particular, which was exacerbated when the Dutch started granting land to free burghers to farm. The colonial footprint gradually started spreading outward from the settlement at the Cape, and by 1657 an outpost was established at Clapmuts, that included grazing of livestock and grain farming (Malan, 2016: 7-18).

In 1692, a number of farms were granted to free burghers along the Plankenbrug River, including Nooitgedacht to Matthijs Greeff (later owned by the Cloete family, also owners of Constantia at one time). In 1694, Koelenhof to the north of Nooitgedacht was granted to Simon de Groot. Most of the properties in the study area have their origins in these two farms, that were later enlarged with quitrent grants (Guelke, 1987).



Figure 2: The early freehold grants of Nooitgedacht and Koelenhof – extract from the map produced by Guelke, 1987.

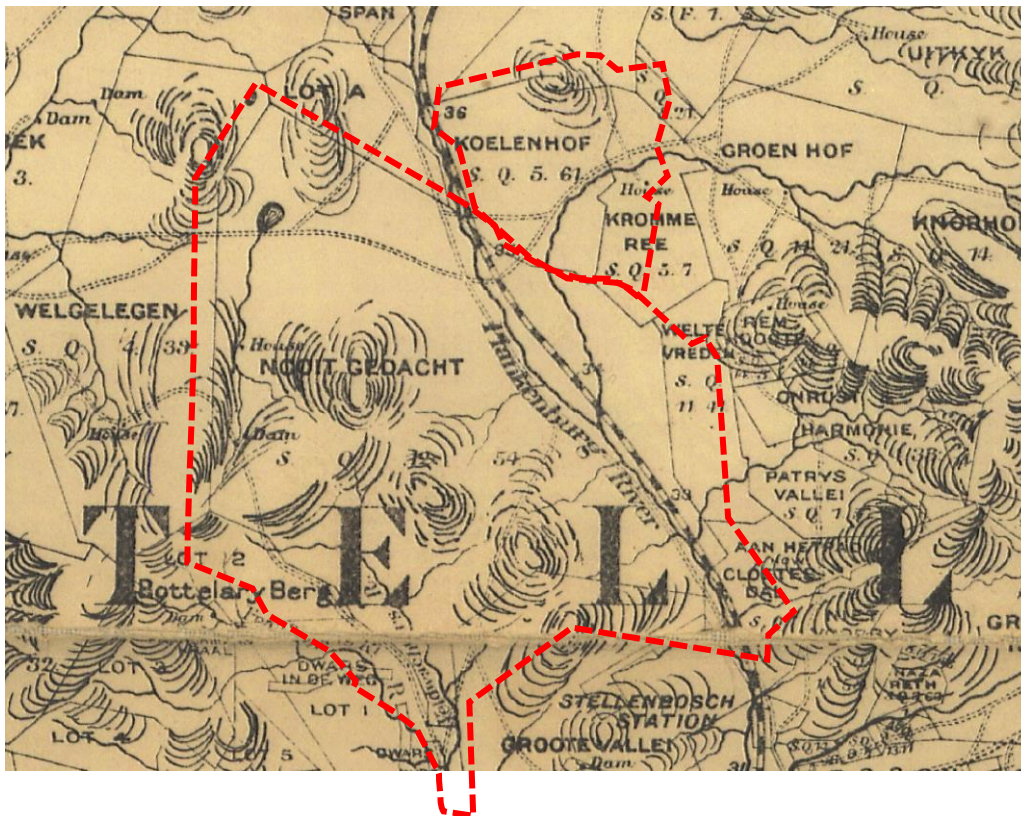


Figure 3: The extent of Nooitgedacht and Koelenhof, circa 1900 (Surveys and Mapping)

These farms were eventually acquired by the Rhodes Trust in 1899, in the wake of the phylloxera plague in the late 19th Century. Rhodes leased these farms to the British Army during the Anglo-Boer War as a remounting base camp and thousands of horses passed through these farms, as well as the farm Sonop, to the south-west of the study area (Abrahamse, 2023: 5).

After the war the properties were farmed again. The Holy Spirit Catholic Church founded by the Catholic Order of the Oblate Sisters of St Frances de Sales was blessed and opened 1935, and by 1938 the school and some other buildings were constructed.

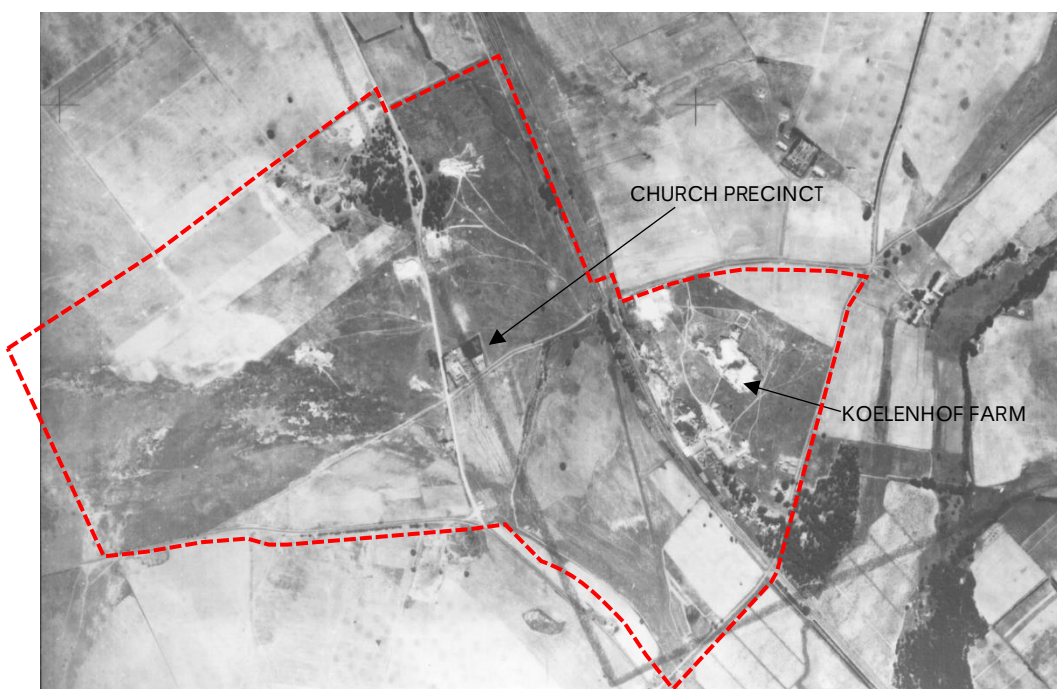


Figure 4: Extract from the 1938 aerial photograph (Photo 12200, Strip 079, Job 126) (Source: National Geospatial Information)

There is some evidence that clay quarrying was already happening in the study area by 1938 on the Malanshoop site and the Koelenhof farm to the east of the railway line (i.e. site of current Nooitgedacht Village). Mining of the current Devonbosch site was initiated by 1944, and a first building to the immediate south-west of the intersection is visible.



Figure 5: Extract from the 1944 aerial photograph (Photo 00807, Strip 015, Job 61) (Source: National Geospatial Information)

By 1959 a prison was built on the site that is now known as the Lindelani & Siyakathala Child and Youth Care Centre. Quarrying is still evident on the Koelenhof farm (now Nooitgedacht Village), on the Devonbosch site and also Malanshoop. Larger buildings are visible to the immediate south-west of the intersection is visible (now referred to as the ')



Figure 6: Extract from the 1959 aerial photograph (Photo 07637, Strip 017, Job 454) (Source: National Geospatial Information)

By 1972, the Devonvale Golf course was constructed, and the brickfields had expanded substantially in the north-west (Devonbosch site) and east (Koelenhof farm) of the study area. In the late 1990s and early 2000s, urban development started to emerge in the node, with the industrial buildings to the south-west being constructed and the expansion of buildings on the BL Williams site noted.



Figure 7: Extract from the 1983 aerial photograph (Photo 00319, Strip 188, Job 498) (Source: National Geospatial Information)

By 2009 the first incarnation of the fuel station was constructed and in the 2010 SDF for Stellenbosch, Koelenhof is identified as urban node. By 2013, construction of Nooitgedacht Village had started. By 2016, Koelenbosch village was under construction and by 2019, the first new building on the Devonbosch site was being built.



Figure 8: Extract from 2016 aerial photograph, with Nooitgedacht Village partially developed and Koelebosch initiated (Source: National Geospatial Information

5. HERITAGE RESOURCES

The Stellenbosch Heritage Survey of 2016 has not only mapped resources/sites of heritage significance in the municipality but has also classified the rural landscapes that constitute the bulk of the municipal area according to heritage value.

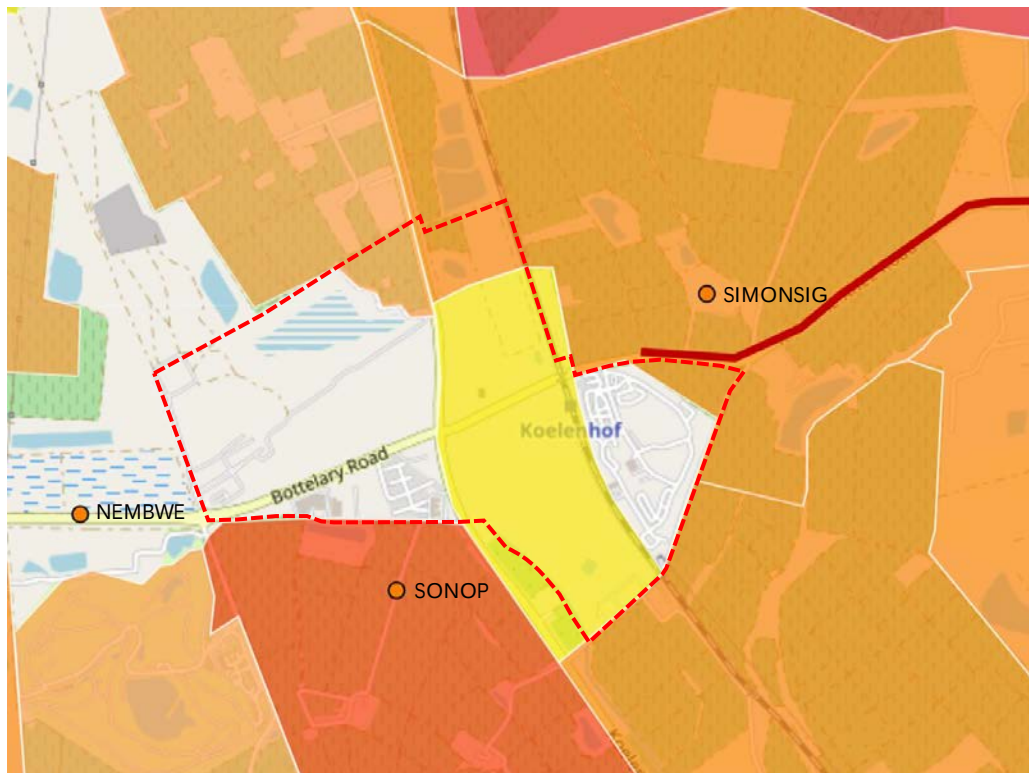


Figure 9: Extract from the online Stellenbosch Heritage Survey (2016) showing heritage resources and landscape units.

As a result of the historic mining and subsequent degradation of the landscape around the Koelenhof node, almost half of the node is not graded (i.e. not worthy of grading). Only the strip of land to the east of the R304 is graded. This landscape unit (A08) has a grade IIIC grading, and its main value is noted as being social due to *the strong association and relationship that local communities have with places such as Koelenhof Catholic Church and the two schools*. The survey notes the landmark quality of the Catholic Church, the historic significance of the site especially related to the British remounting camp and ecological role of the wetland in the node. The landscape itself is described as largely fallow fields with a few breaks. Guidelines for future development are fairly generic, but in essence the survey calls for the retention of the rural character of the area, and views towards to the mountains and across open green spaces. Despite the inclusion in the urban edge, the guidelines note various urban uses as inappropriate such as suburban development and gated residential estates.

The areas around the site have IIIB gradings and the scenic route which borders the eastern portion of the site has a grade IIIA grading. No resources have been identified in the node itself. Despite the importance of the Catholic Church, it is not graded. The following resources have been identified in the immediate vicinity of the site:

- Simonsig werf to the north-east of the node – grade IIIC. The site is described as a modest early 20th werf, with magnificent views onto Simonsberg (i.e. away from the Koelenhof node).

- Sonop werf to the south-west of the node – grade IIIC. This site described as representative of the early-20th century building in the area and its historical significance as the site of an acclimatisation camp for English troops during the South African (Anglo-Boer) War is also noted.
- Nembwe Fish Farm to the west of the node – grade IIIC. The historic wetland is described as having landscape and scenic, as well as ecological significance.

Other resources such as the historic Kromme Rhee, Elsenburg and Nooitgedacht werfs further from the node, are of high significance but not visible from the node and too far away to be a consideration in the proposals for the node.

As noted, a number of heritage studies have been undertaken for various sites in the node. Below follows a short summary of the resources and their significance identified by the authors of these reports:

Malanshoop (Arcon, 2023):

- Low to moderate scenic significance, with a cluster of tall pine trees on the western boundary of moderate to high significance that should be retained.
- Low historical significance (despite the interesting early 20th century history of the area the connection to this site is tenuous).
- No other aspects of heritage significance of consequence were identified.
- Note that the lines of beefwoods on the site, are not considered of high importance and could be replaced by similar planting on the site of other species.

Devonbosch (Kathy Dumbrell, 2014):

- Contextual significance as being located in the Winelands cultural landscape (graded IIIC)
- Views from the Simonsberg werf towards Table Mountain (graded IIIB). NOTE: this view is not identified in the Malanshoop HIA, which borders on Simonsig. Also, as the name implies Simonsig faces the Simonsberg.
- Trees along the site boundary to the south (graded IIIB).

Portion 23 of the Farm Nooitgedacht No. 74, Koelenhof, Stellenbosch (Claire Abrahamse, 2023):

- The site plays a gateway role along the R304.
- The site offers vistas towards Simonsberg and Jonkershoek with a secondary vista towards Bottelary (it is assumed the reference is to the Bottelary hills).
- Trees on the RC Church site and tree lines in the surrounding area (i.e. not on the site).
- The desire line that cuts across the north-western corner of the site.



Figure 10: Identified heritage resources

This study as well as the Malanshoop study also recognizes the importance of RC Church and its tree setting as an important landmark for the node. No heritage resources were identified for the Lindelani & Siyakathala Child and Youth Care Centre (CTS Heritage, 2022).

Following on the above it is clear that, apart from the importance of the RC Church site as a landmark in the node and the social significance of this precinct, there are no particular heritage resources both within the node and the broader context that would be of major consequence to the urban framework. The insistence of the Stellenbosch Heritage Survey guidelines that the node should retain a rural character, seems to be debatable as the node has been earmarked for urban development and one could argue that it would be more important to ensure the optimal use of the land for development. Low density development is inefficient and in fact a threat to the cultural landscape.

Figure 10 above illustrates the heritage resources in the node and its immediate surrounds.

6. HERITAGE INDICATORS

Despite the relatively low heritage significance of the node itself and its components, the HIAs did include extensive heritage indicators to guide development of the individual sites. Below follows a summary of these indicators. The contextual indicators and the response to the context is clearly of more relevance to this development framework than the architectural and landscaping indicators, which are normally relevant at the individual site scale.

6.1 Contextual indicators

- The landmark nature of the church complex must be enhanced and responded to as a prominent civic node within the wider context (Abrahamse, 2023).
- The railway station is an important potential civic asset and should be acknowledged as a higher-order element in the proposed development of the site (Abrahamse, 2023).
- The mature trees on and around the node are landmark elements within this environment that help to structure the space and provide some visual screening and should be retained (Abrahamse, 2023).
- The proposed development must not disrupt signature backdrops including landmarks characterising scenic outlooks– this includes for instance vistas from within the node onto the RC Church, and from the R304 onto the mountains to the east (Jacobs, 2023).

6.2 Developmental response to the context

- Development should address the varying edge conditions of the sites within the node, e.g. for the Malanshoop site, development along the northern and eastern edges should consider that interface with vineyards in terms of scale – this includes restricting building heights to single storey along the edges of the development (Jacobs, 2023) whereas as Abrahamse allows for double storey buildings across the site (2023).
- The site to the south of the RC Church precinct should remain an open green space, that should protect the foreground of vistas from the intersection framed with mixed-use/retail development (Abrahamse, 2023).

- The desire line across the Portion 23 of Farm 74, should be reflected in the structure of the development and the river course should be retained as a natural corridor (Abrahamse, 2023).
- Avoid curvilinear streets that could result in a suburban environment. The street grid should be as efficient and minimal as possible (Abrahamse, 2023).

6.3 Architectural indicators

- Buildings should, wherever possible, be configured with 'double pitch' and 'lean-to' envelopes to break up larger building masses and lower eaves lines, the purpose being to reduce visual impacts wherever possible and break up roof surfaces, particularly for structures adjacent to the boundaries of the property (Jacobs, 2023).
- Architecture that copies an earlier style or introduce a foreign style, such as at Nooitgedacht Village should be avoided. New buildings must be sympathetic to the architectural character of the area but should also be of their own time. New buildings should be of a walled architectural type and rectilinear in form (Abrahamse, 2023).
- Street-facing stoeps are a common feature of the buildings in the area, often with planted gardens in front. New residential development must include these elements (Abrahamse, 2023).
- Building materials should be compatible with traditional materials in terms of scale, colour and texture. New structures should be painted a muted colour. Joinery and woodwork should be painted, preferably using darker shades in combination with white/light walls. Corrugated roofs should be darker colours. Unsuitable materials include decorative thatching, cement tiles, clay tiles, fibre cement roof sheets, IBR sheeting, face brick, unplastered concrete blocks, gum poles, natural or artificial stone, slate, precast concrete fences, exposed concrete of any kind (Abrahamse, 2023).

6.4 Landscaping

- Additional planting should be introduced to provide visual screening and absorption within the foreground environment which will reinforce rural (rather than urban) character even though the property falls within the urban edge. The windbreaks in the wider context set up a landscape structure that can be extended into the node (Jacobs, 2023 & Abrahamse, 2023).
- Verges and pavements should preferably be grassed, hard-packed soil or brick paving, and planted with fairly mature trees. Brickwork and laterite surfacing should be preferred to tarmac (Abrahamse, 2023).
- High and solid walls should not be permitted, as well as pre-cast concrete fencing, exposed blockwork, and facebrick walling. Historic boundary elements such as fences and hedges must be preferred as far as possible (Abrahamse, 2023).
- Lighting is to be designed, and advertising located in a manner that does not distract from the rural agricultural quality of the surrounding landscape (Jacobs, 2023).

7. HERITAGE CONSIDERATIONS FOR THE KOELENHOF URBAN DEVELOPMENT FRAMEWORK

When considering the HIAs for the individual sites it would seem that the distinction between the management/protection of heritage resources and urban design principles can be somewhat blurry. At the heart of the issue lies the idea that the Koelenhof urban node should have a rural character as per the Stellenbosch Heritage Survey of 2016.

Nooitgedacht Village is often cited as an example of inappropriate urban development within a rural setting. And certainly, the foreign architectural language is unfortunate. The question to pose is, if the architecture was reflective of the Cape vernacular (without being pastiche), would this high-density development have been acceptable?

The sharp contrast between built-up areas and the cultivated landscape of the Nooitgedacht development, that is characteristic of parts of rural Italy for example, has not found a foothold in the Cape Winelands to date. Generally, the interface between urban and rural is more nuanced with screen planting, lower building heights and a more informal/fragmented built footprint at this interface. This is also usually the result of organic development over time.



Photograph 14: The sharp transition between high density housing and agricultural uses on the eastern boundary of Nooitgedacht Village.



Photograph 15: Northern edge of Tulbagh – new development, kept low and screened with planting (Source: Google Streetview)

In the case of the Koelenhof node, we are dealing with the creation of a new settlement that will more or less be completely developed in its first iteration, and that must cater for the needs and demands of the market, which includes for instance security. It is this author's view that it would be difficult to achieve a rural character or village at this node, given the high order of the R304 and Bottelary Roads, that prohibits the functional integration of the four quadrants and the creation of an activity street (with a typical main road character of a town, lined with commercial development) Except, if the R304 is realigned to bypass the node, but it is unlikely that the merit of creating a small town in this already compromised landscape would warrant the cost of such a bypass.

Following on the above, and if we accept that it is imperative to achieve rural character for the node the following is suggested:

- Ensure that edges to the development are planted to soften the transition between urban and rural and, as noted by Jacobs, tree planting within the settlement will be also important to soften the visual impact. In this regard it may be useful to coordinate the landscaping frameworks for the various developments, in order to agree on tree appropriate species, and canopies, as well as succession planting for trees on public land (for instance, the gumtrees along the Devonbosch site). Where possible and practical existing trees should be retained, but plantings could also be replaced in more practical positions and with more appropriate species.
- With regard to built form, the visual impact of sameness should be avoided through varying roof shapes, colours and massing throughout the node (also for each site).
- With regard to building height, it would seem appropriate that more height could be achieved towards the centre of the node (or each site), but in general heights should be restricted to what can be screened effectively with trees and may also require restriction in relation to the RC Church. So in particular in the eastern portions of the node, building heights should be restricted to two to three storeys, with lower heights at the interface with R304 and Kromme Rhee Road.
- It is noted that a more "urban" character has already been established on the Devonbosch site, with relatively large multi-storey buildings. The same lowering of building heights towards the boundaries and screening with planting should however still apply to this site, if the idea of establishing a rural character for the settlement is to be pursued.
- Endeavour to retain and improve access to the RC Church precinct, as a possible social centre to the new settlement.

ANNEXURE C

SERVICES SUMMARY



Our Reference: 9498/ A1
26 July 2025

DRAFT

KOELENHOF HAMLET - URBAN DEVELOPMENT FRAMEWORK

REPORT ON THE PROVISION OF CIVIL ENGINEERING SERVICES

1. INTRODUCTION

The Koelenhof Hamlet outside Stellenbosch is experiencing significant interest from property developers with a number of land use applications in process. Stellenbosch Municipality requested synchronizing of the different development proposals into an Urban Development Framework for the hamlet.

This report focuses on the provision of the basic civil engineering services namely potable water supply, sewerage and solid waste removal for a 10-year development roll-out period, as well as a high-level discussion on the expected ultimate development roll-out.

Stormwater management is not discussed, as it is accepted that each development will be responsible for its own stormwater management in line with Council policy. Traffic engineering is discussed by ITS Traffic Consultants in a separate report.

2. HAMLET LOCATION AND DESCRIPTION

The locality of the Koelenhof Hamlet is approximately 6 km outside Stellenbosch as shown on the Locality Plan, included as Annexure A.

The hamlet is located around the R304 (Koelenhof Road) and the Bottelary / Kromme Rhee Roads. The hamlet is divided by the major roads into four quadrants as indicated on the Urban Development Plan. The current urban edge of the hamlet is included as Annexure B.

The area has a natural slope towards the southeast with the Plankenbrug River the natural drainage channel of the area.

3. PROJECTED URBAN DEVELOPMENT FRAMEWORK

The projected **total urban development** for Koelenhof is set out in the table below:

ZONE	Residential Units	Retail (m ²)	Office (m ²)	Industry (m ²)	Institutional (m ²)	Other (m ²)
Quadrant 1: North-East - Malanshoop Estate	450	0	0	0	6 000	2 200
Quadrant 2: South-East - Koelenhof Estate	1 520	10 605	0	0	20 800	1 000
Quadrant 3: South-West - Koelenbosch Estate	74	9 002	0	23 920	0	190
Quadrant 4: North West - Devonbosch Estate	3 085	81 950	313 930	71 456	31 520	34 690
TOTAL	5 129	101 557	313 930	95 376	58 320	38 080
GRAND TOTAL	5 129					607 264

The projected **10-year development roll-out** is as follows:

Year of Occupation	Residential (Units)	Retail (Floor Hamlet - m ²)	Office (Floor Hamlet - m ²)	Warehouse/ Industrial (Floor Hamlet - m ²)	Institutional (Floor Hamlet - m ²)	Other (Floor Hamlet - m ²)
2026		128				1206
2027	17	2738	18926		8750	
2028	226	3343	11000			
2029	290	10605	8000	1008	2500	
2030	310	20000	10800			12334
2031	150	5000	10000			2200
2032	250	2000	10000			
2035	324	1736	16329			
TOTAL	1567	45550	85055	1008	11250	15740

The Urban Development Framework Plan with the four development quadrants is included as Annexure B.

4. WATER SUPPLY

4.1 Demand:

The demand for potable water for the projected **total urban development** is estimated at 4 393 kl/day.

The demand for potable water for the **10-year development roll-out** is estimated at 1 324 kl/day.

The estimations for the water demand are included as Annexure C.

4.2 Bulk Supply:

The bulk water supply to the Koelenhof Hamlet was evaluated against the current demand on the system and not against the existing water allocations from the historic Koelenhof Rural Water Scheme. Some of these allocations are significant and provides a warped picture of the current state of the bulk water supply. It is however acknowledged that the existing theoretical shortage due to the historic allocations should over time be reduced by the Municipality.

Based on the above and the water demand from the 10-year roll-out, it is evident that **Water Master Plan Item RKW B6a (4143m x 560mm Ø bulk watermain)** needs to be implemented by 2027 to accommodate the demand from the expected 10-year roll-out. Implementation of Item RKW B6a will add 1267 kl/day for development to the system.

The next trigger for bulk water upgrade is at 1 267 kl/day when **Water Master Plan Item RKW 2.2 (1201m x 315mm Ø bulk watermain)** should be implemented. Implementation of Item RKW 2.2 will add 100 kl/day for development to the system.

In summary, the bulk water main upgrades and related estimated costs required to accommodate the 10-year roll-out are as follows:

- RKW B6a 4 143m x 560mm Ø bulk watermain R 30.0m
- RKW 2.2 1 201m x 315mm Ø bulk watermain R 6.0m

4.3 Storage:

The current water storage for the Koelenhof Hamlet is at the Sonop and Devon Valley Reservoirs. The Water Master Plan indicates a third reservoir (4 MI) to be implemented over time at Farm Kriekbult.

Communication with GLS revealed that physical spare capacity of 1224 kl/day for development was still available in the existing reservoirs. Based on the water demand from the projected 10-year development roll-out, the trigger for the proposed Kriekbult Reservoir is approximately 2035. It is however acknowledged that the theoretical reservoir spare capacity due to the historic allocations is significantly less than 1224 kl/day, which will increase the urgency for the said master plan item to be implemented should some of the allocations be taken up before 2035.

5. SEWERAGE

5.1 Run-off :

Sewage run-off from the projected **total urban development** is estimated at 4 137 kl/day of Peak Day Dry Weather Flow.

Sewage run-off from the **10-year development roll-out** is estimated at 1 208 kl/day of Peak Day Dry Weather Flow.

The estimations for the sewage run-off are included as Annexure C.

5.2 Drainage :

Sewage from the Koelenhof Hamlet drains towards Cloeteville, Stellenbosch via the 300mm Ø bulk sewer and thereafter via the bulk sewer through the Plankenbrug Industrial Area that has recently been upgraded. Communication with GLS confirmed that the 300mm Ø bulk sewer has sufficient spare capacity to accommodate the 10-year development roll-out from the Koelenhof Hamlet.

Sewage run-off from the projected total urban development will need to be analysed by GLS through their master planning to establish the capacity constraints and upgrades required. The current Sewer Master Plan is included as Annexure E.

5.3 Treatment :

Sewage from the Koelenhof Hamlet is treated at the Stellenbosch Municipality's Waste Water Treatment Works in Devon Valley. The treatment capacity of the WWTW has recently been increased through a major upgrade, and it has been confirmed by the Municipality that sufficient spare capacity exists to accommodate the 10-year roll-out from the Koelenhof Hamlet.

6. SOLID WASTE REMOVAL

Solid waste generated by the projected **total urban development** is estimated at 320 ton/week.

Solid waste generated by the **10-year development roll-out** is estimated at 90 ton/week.

Solid waste will be removed by the Stellenbosch Municipality's waste removal service, alternatively the developments will make use of a private contractor for this basic service.

7. DEVELOPMENT CONTRIBUTIONS (DCs)

Development contributions from the projected **total urban development** are estimated at ±R680m with ±R600m available for bulk services upgrades.

Development contributions from the **10-year development roll-out** are estimated at ±R220m with ±R191m available for bulk services upgrades. The development contributions from the **10-year development roll-out** related to Water Supply and Sewerage is estimated at ± R73m, which is adequate to fund the minimum water and sewerage master plan items identified for this period.

The estimations for the development contributions are included as Annexure F.

8. CONCLUSION

This report concludes that:

1. The water upgrades identified for the projected 10-year development roll-out can be accommodated within the DCs payable for the same period.
2. The water upgrades required for the projected total Koelenhof urban development should be prioritised with the next updating of the Municipality's Water Master Plan.
3. No bulk sewer upgrade is required for the projected 10-year development roll-out.
4. The bulk sewer upgrades required for the projected total Koelenhof urban development should be identified and prioritised with the next updating of the Municipality's Sewer Master Plan.
5. Solid waste will be removed by the Municipality and any capacity constraints will be similar as for Stellenbosch Town.

On behalf of BSI CONSULT


 L J Louw Pr. Eng.

ANNEXURE A

LOCALITY PLAN



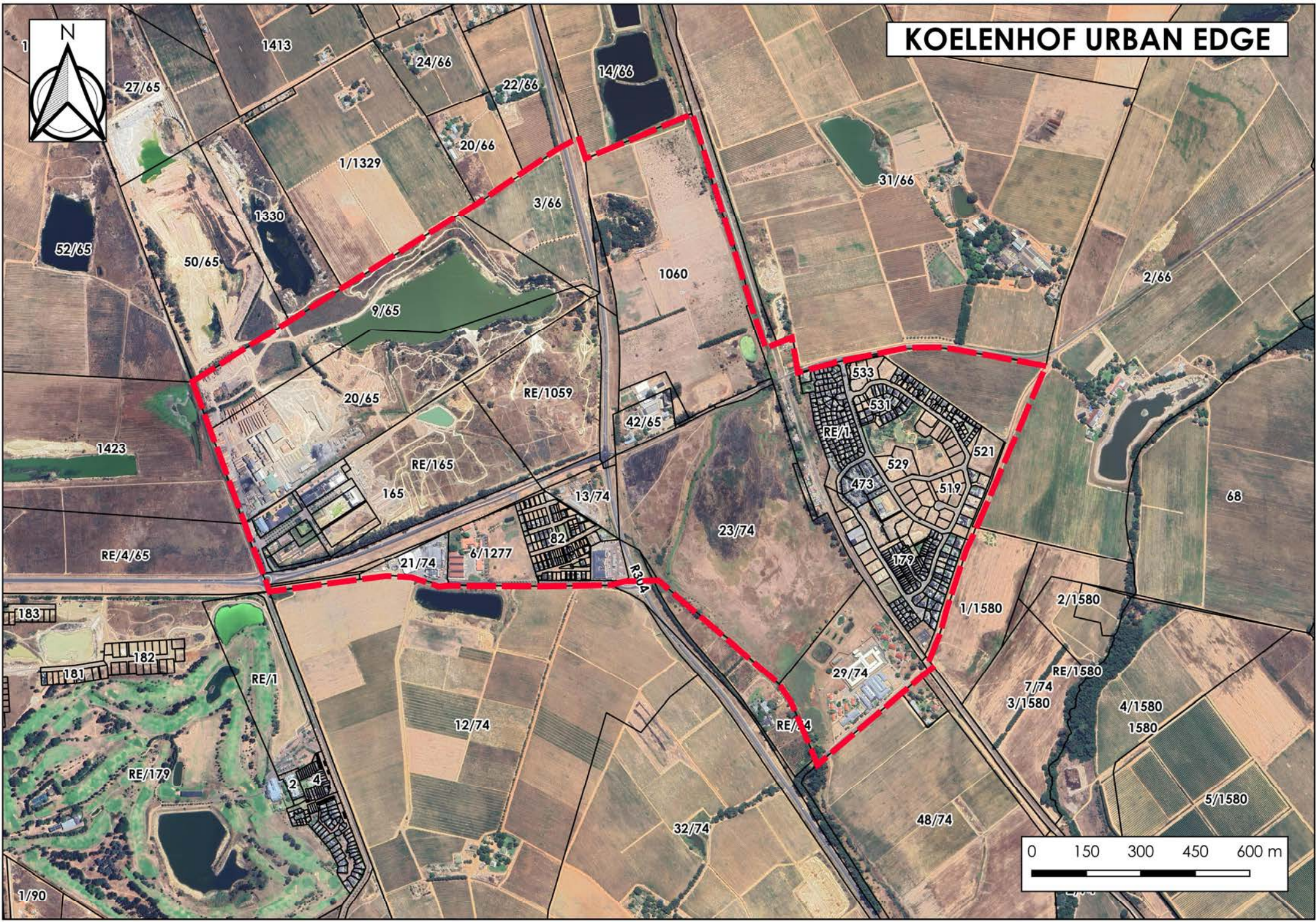
BSi CONSULT	CIVIL & STRUCTURAL ENGINEERS	KOELANHOF AREA - URBAN DEVELOPMENT FRAMEWORK		Scale	Paper Size
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ANNEXURE B

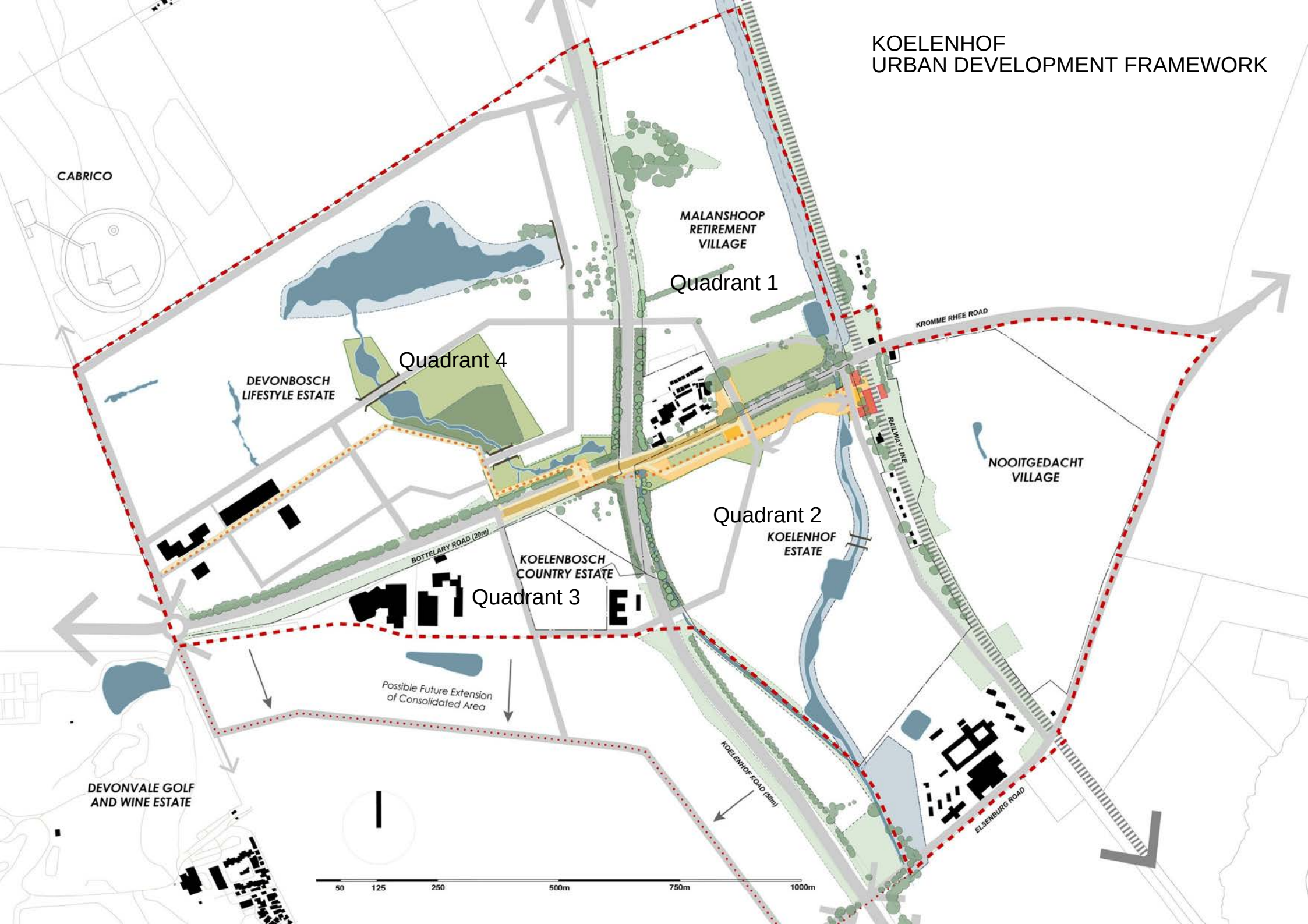
URBAN DEVELOPMENT PLAN



KOELENHOF URBAN EDGE



KOELENHOF
URBAN DEVELOPMENT FRAMEWORK



ANNEXURE C

WATER DEMAND AND SEWAGE RUN-OFF ESTIMATES

KOELENHOF URBAN DEVELOPMENT FRAMEWORK

TOTAL SCENARIO - WATER SUPPLY AND SEWERAGE - HIGH LEVEL ESTIMATE

ZONE	Residential Units	Retail (m²)	Office (m²)	Industry (m²)	Institutional (m²)	Other (m²)
Quadrant 1: North-East - Malanshoop Estate	450	0	0	0	6 000	2 200
Quadrant 2: South-East - Koelenhof Estate	1 520	10 605	0	0	20 800	1 000
Quadrant 3: South-West - Koelenbosch Estate	74	9 002	0	23 920	0	190
Quadrant 4: North West - Devonbosch Estate	3 085	81 950	313 930	71 456	31 520	34 690
TOTAL	5 129	101 557	313 930	95 376	58 320	38 080
Water Unit Rate	0,5	0,32	0,32	0,2	0,32	0,32
Water Demand	2 565	325	1 005	191	187	122
Sewage Unit Rate	0,45	0,32	0,32	0,2	0,32	0,32
Sewage Run-off	2 308	325	1 005	191	187	122

4 393 kl/day

4 137 kl/day

KOELENHOF UDF (10-year horizon)

REVISION

1

DATE

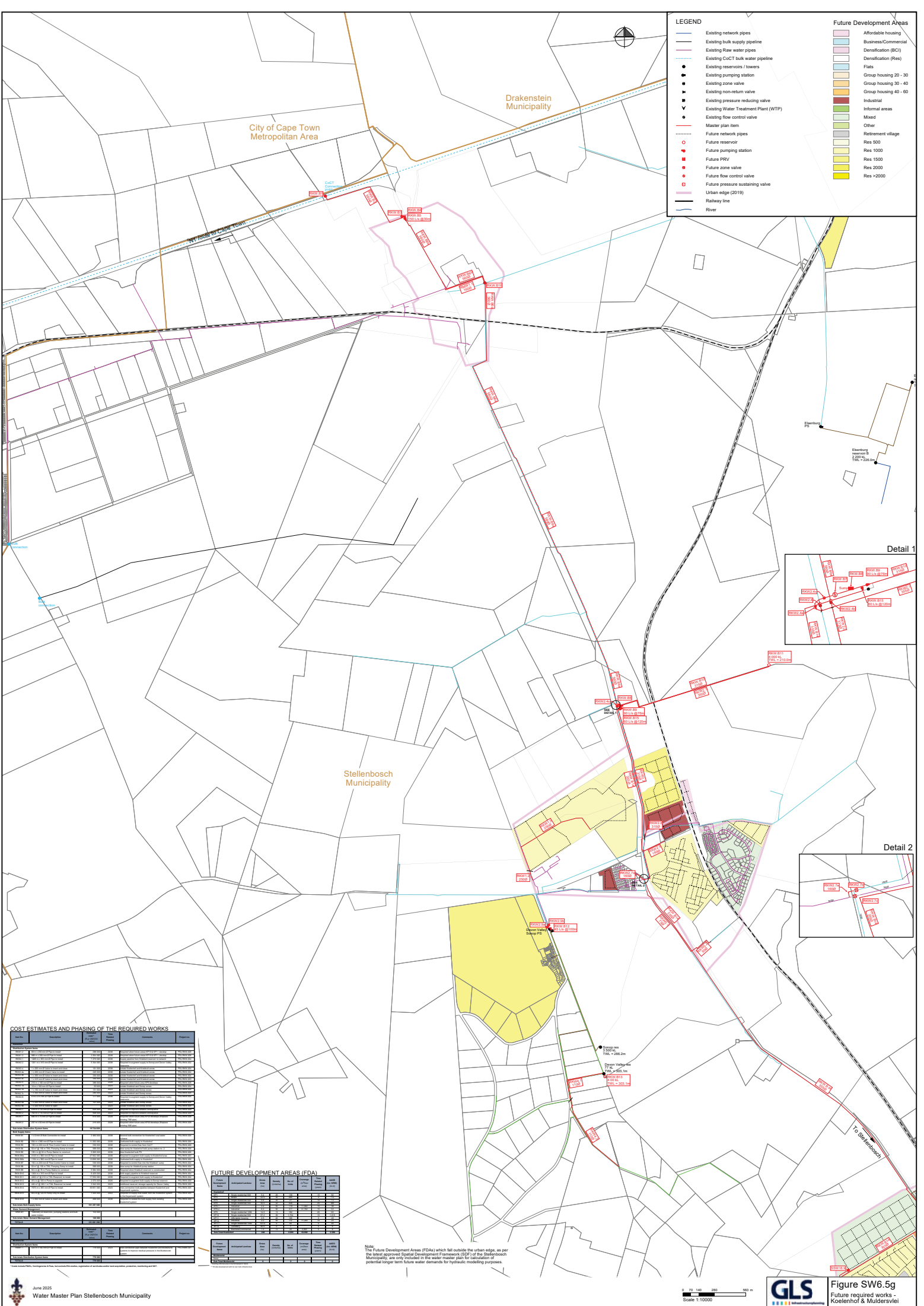
15-Jul-25

Water Supply & Sewage Run-off

YEAR	Land Use	GLA / No	Water Unit rate	Water Demand	Water Cumm.	Bulk Water Triggers	Sewage Unit rate	Sewage Demand	Sewage Cumm.	Bulk Sewer Triggers
2026	Residential Apartments		0,45				0,40			
	Residential Erven		0,60				0,50			
	Retail	128	0,32	0,41			0,32	0,41		
	Office		0,32				0,32			
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other	1 206	0,32	3,86			0,32	3,86		
				4,27	4,27	NONE		4,27	4,27	NONE
2027	Residential Apartments	9	0,45	4,05			0,40	3,60		
	Residential Erven	8	0,60	4,80			0,50	4,00		
	Retail	2 738	0,32	8,76			0,32	8,76		
	Office	18 926	0,32	60,56			0,32	60,56		
	Warehouse / Industrial		0,20				0,20			
	Institutional	8 750	0,32	28,00			0,32	28,00		
	Other		0,32				0,32			
				106,17	110,44	RKW B6a		104,92	109,19	NONE
2028	Residential Apartments	120	0,45	54,00			0,40	48,00		
	Residential Erven	106	0,60	63,60			0,50	53,00		
	Retail	3 343	0,32	10,70			0,32	10,70		
	Office	11 000	0,32	35,20			0,32	35,20		
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other		0,32				0,32			
				163,50	273,94	NONE		146,90	256,09	NONE
2029	Residential Apartments	150	0,45	67,50			0,40	60,00		
	Residential Erven	140	0,60	84,00			0,50	70,00		
	Retail	10 605	0,32	33,94			0,32	33,94		
	Office	8 000	0,32	25,60			0,32	25,60		
	Warehouse / Industrial	1 008	0,20	2,02			0,20	2,02		
	Institutional	2 500	0,32	8,00			0,32	8,00		
	Other		0,32				0,32			
				221,05	494,99	NONE		199,55	455,64	NONE
2030	Residential Apartments	160	0,45	72,00			0,40	64,00		
	Residential Erven	150	0,60	90,00			0,50	75,00		
	Retail	20 000	0,32	64,00			0,32	64,00		
	Office	10 800	0,32	34,56			0,32	34,56		
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other	12 334	0,32	39,47			0,32	39,47		
				300,03	795,02	NONE		277,03	732,67	NONE
2031	Residential Apartments	80	0,45	36,00			0,40	32,00		
	Residential Erven	70	0,60	42,00			0,50	35,00		
	Retail	5 000	0,32	16,00			0,32	16,00		
	Office	10 000	0,32	32,00			0,32	32,00		
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other	2 200	0,32	7,04			0,32	7,04		
				133,04	928,06	NONE		122,04	854,71	NONE
2032	Residential Apartments	130	0,45	58,50			0,40	52,00		
	Residential Erven	120	0,60	72,00			0,50	60,00		
	Retail	2 000	0,32	6,40			0,32	6,40		
	Office	10 000	0,32	32,00			0,32	32,00		
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other		0,32				0,32			
				168,90	1 096,96	NONE		150,40	1 005,11	NONE
2035	Residential Apartments	169	0,45	76,05			0,40	67,60		
	Residential Erven	155	0,60	93,00			0,50	77,50		
	Retail	1 736	0,32	5,56			0,32	5,56		
	Office	16 329	0,32	52,25			0,32	52,25		
	Warehouse / Industrial		0,20				0,20			
	Institutional		0,32				0,32			
	Other		0,32				0,32			
				226,86	1 323,82	RKW 2.2		202,91	1 208,02	NONE
			TOTAL :	1 323,82			TOTAL :	1 208,02		

ANNEXURE D

WATER MASTER PLAN - GLS

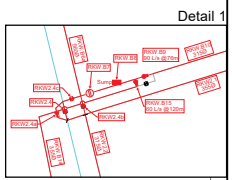
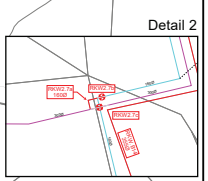


LEGEND

- Existing network pipes
- Existing bulk supply pipeline
- Existing Raw water pipes
- Existing CoCT bulk water pipeline
- Existing reservoirs / towers
- Existing pumping station
- Existing zone valve
- Existing non-return valve
- Existing pressure reducing valve
- Existing Water Treatment Plant (WTP)
- Existing flow control valve
- Master plan item
- Future network pipes
- Future reservoir
- Future pumping station
- Future PRV
- Future zone valve
- Future flow control valve
- Future pressure sustaining valve
- Urban edge (2019)
- Railway line
- River

Future Development Areas

- Affordable housing
- Business/Commercial
- Densification (BCI)
- Densification (Res)
- Flats
- Group housing 20 - 30
- Group housing 30 - 40
- Group housing 40 - 60
- Industrial
- Informal areas
- Mixed
- Other
- Retirement village
- Res 500
- Res 1000
- Res 1500
- Res 2000
- Res >2000



COST ESTIMATES AND PHASING OF THE REQUIRED WORKS

Item	Description	Quantity	Unit	Rate	Total	Phase 1	Phase 2	Phase 3
1	Water supply line	100	m	150	15000	100	0	0
2	Water supply line	200	m	150	30000	200	0	0
3	Water supply line	300	m	150	45000	300	0	0
4	Water supply line	400	m	150	60000	400	0	0
5	Water supply line	500	m	150	75000	500	0	0
6	Water supply line	600	m	150	90000	600	0	0
7	Water supply line	700	m	150	105000	700	0	0
8	Water supply line	800	m	150	120000	800	0	0
9	Water supply line	900	m	150	135000	900	0	0
10	Water supply line	1000	m	150	150000	1000	0	0
11	Water supply line	1100	m	150	165000	1100	0	0
12	Water supply line	1200	m	150	180000	1200	0	0
13	Water supply line	1300	m	150	195000	1300	0	0
14	Water supply line	1400	m	150	210000	1400	0	0
15	Water supply line	1500	m	150	225000	1500	0	0
16	Water supply line	1600	m	150	240000	1600	0	0
17	Water supply line	1700	m	150	255000	1700	0	0
18	Water supply line	1800	m	150	270000	1800	0	0
19	Water supply line	1900	m	150	285000	1900	0	0
20	Water supply line	2000	m	150	300000	2000	0	0
21	Water supply line	2100	m	150	315000	2100	0	0
22	Water supply line	2200	m	150	330000	2200	0	0
23	Water supply line	2300	m	150	345000	2300	0	0
24	Water supply line	2400	m	150	360000	2400	0	0
25	Water supply line	2500	m	150	375000	2500	0	0
26	Water supply line	2600	m	150	390000	2600	0	0
27	Water supply line	2700	m	150	405000	2700	0	0
28	Water supply line	2800	m	150	420000	2800	0	0
29	Water supply line	2900	m	150	435000	2900	0	0
30	Water supply line	3000	m	150	450000	3000	0	0
31	Water supply line	3100	m	150	465000	3100	0	0
32	Water supply line	3200	m	150	480000	3200	0	0
33	Water supply line	3300	m	150	495000	3300	0	0
34	Water supply line	3400	m	150	510000	3400	0	0
35	Water supply line	3500	m	150	525000	3500	0	0
36	Water supply line	3600	m	150	540000	3600	0	0
37	Water supply line	3700	m	150	555000	3700	0	0
38	Water supply line	3800	m	150	570000	3800	0	0
39	Water supply line	3900	m	150	585000	3900	0	0
40	Water supply line	4000	m	150	600000	4000	0	0
41	Water supply line	4100	m	150	615000	4100	0	0
42	Water supply line	4200	m	150	630000	4200	0	0
43	Water supply line	4300	m	150	645000	4300	0	0
44	Water supply line	4400	m	150	660000	4400	0	0
45	Water supply line	4500	m	150	675000	4500	0	0
46	Water supply line	4600	m	150	690000	4600	0	0
47	Water supply line	4700	m	150	705000	4700	0	0
48	Water supply line	4800	m	150	720000	4800	0	0
49	Water supply line	4900	m	150	735000	4900	0	0
50	Water supply line	5000	m	150	750000	5000	0	0
51	Water supply line	5100	m	150	765000	5100	0	0
52	Water supply line	5200	m	150	780000	5200	0	0
53	Water supply line	5300	m	150	795000	5300	0	0
54	Water supply line	5400	m	150	810000	5400	0	0
55	Water supply line	5500	m	150	825000	5500	0	0
56	Water supply line	5600	m	150	840000	5600	0	0
57	Water supply line	5700	m	150	855000	5700	0	0
58	Water supply line	5800	m	150	870000	5800	0	0
59	Water supply line	5900	m	150	885000	5900	0	0
60	Water supply line	6000	m	150	900000	6000	0	0
61	Water supply line	6100	m	150	915000	6100	0	0
62	Water supply line	6200	m	150	930000	6200	0	0
63	Water supply line	6300	m	150	945000	6300	0	0
64	Water supply line	6400	m	150	960000	6400	0	0
65	Water supply line	6500	m	150	975000	6500	0	0
66	Water supply line	6600	m	150	990000	6600	0	0
67	Water supply line	6700	m	150	1005000	6700	0	0
68	Water supply line	6800	m	150	1020000	6800	0	0
69	Water supply line	6900	m	150	1035000	6900	0	0
70	Water supply line	7000	m	150	1050000	7000	0	0
71	Water supply line	7100	m	150	1065000	7100	0	0
72	Water supply line	7200	m	150	1080000	7200	0	0
73	Water supply line	7300	m	150	1095000	7300	0	0
74	Water supply line	7400	m	150	1110000	7400	0	0
75	Water supply line	7500	m	150	1125000	7500	0	0
76	Water supply line	7600	m	150	1140000	7600	0	0
77	Water supply line	7700	m	150	1155000	7700	0	0
78	Water supply line	7800	m	150	1170000	7800	0	0
79	Water supply line	7900	m	150	1185000	7900	0	0
80	Water supply line	8000	m	150	1200000	8000	0	0
81	Water supply line	8100	m	150	1215000	8100	0	0
82	Water supply line	8200	m	150	1230000	8200	0	0
83	Water supply line	8300	m	150	1245000	8300	0	0
84	Water supply line	8400	m	150	1260000	8400	0	0
85	Water supply line	8500	m	150	1275000	8500	0	0
86	Water supply line	8600	m	150	1290000	8600	0	0
87	Water supply line	8700	m	150	1305000	8700	0	0
88	Water supply line	8800	m	150	1320000	8800	0	0
89	Water supply line	8900	m	150	1335000	8900	0	0
90	Water supply line	9000	m	150	1350000	9000	0	0
91	Water supply line	9100	m	150	1365000	9100	0	0
92	Water supply line	9200	m	150	1380000	9200	0	0
93	Water supply line	9300	m	150	1395000	9300	0	0
94	Water supply line	9400	m	150	1410000	9400	0	0
95	Water supply line	9500	m	150	1425000	9500	0	0
96	Water supply line	9600	m	150	1440000	9600	0	0
97	Water supply line	9700	m	150	1455000	9700	0	0
98	Water supply line	9800	m	150	1470000	9800	0	0
99	Water supply line	9900	m	150	1485000	9900	0	0
100	Water supply line	10000	m	150	1500000	10000	0	0

FUTURE DEVELOPMENT AREAS (FDA)

Area	Area Type	Area Size (ha)	Area Description
1	Residential	100	Residential area
2	Commercial	50	Commercial area
3	Industrial	200	Industrial area
4	Public	300	Public area
5	Green	400	Green area
6	Water	500	Water area
7	Other	600	Other area
8	Residential	700	Residential area
9	Commercial	800	Commercial area
10	Industrial	900	Industrial area
11	Public	1000	Public area
12	Green	1100	Green area
13	Water	1200	Water area
14	Other	1300	Other area
15	Residential	1400	Residential area
16	Commercial	1500	Commercial area
17	Industrial	1600	Industrial area
18	Public	1700	Public area
19	Green	1800	Green area
20	Water	1900	Water area
21	Other	2000	Other area
22	Residential	2100	Residential area
23	Commercial	2200	Commercial area
24	Industrial	2300	Industrial area
25	Public	2400	Public area
26	Green	2500	Green area
27	Water	2600	Water area
28	Other	2700	Other area
29	Residential	2800	Residential area
30	Commercial	2900	Commercial area
31	Industrial	3000	Industrial area
32	Public	3100	Public area
33	Green	3200	Green area
34	Water	3300	Water area
35	Other	3400	Other area
36	Residential	3500	Residential area
37	Commercial	3600	Commercial area
38	Industrial	3700	Industrial area
39	Public	3800	Public area
40	Green	3900	Green area
41	Water	4000	Water area
42	Other	4100	Other area
43	Residential	4200	Residential area
44	Commercial	4300	Commercial area
45	Industrial	4400	Industrial area
46	Public	4500	Public area
47	Green	4600	Green area
48	Water	4700	Water area
49	Other	4800	Other area
50	Residential	4900	Residential area
51	Commercial	5000	Commercial area
52	Industrial	5100	Industrial area
53	Public	5200	Public area
54	Green	5300	Green area
55	Water	5400	Water area
56	Other	5500	Other area
57	Residential	5600	Residential area
58	Commercial	5700	Commercial area
59	Industrial	5800	Industrial area
60	Public	5900	Public area
61	Green	6000	Green area
62	Water	6100	Water area
63	Other	6200	Other area
64	Residential	6300	Residential area
65	Commercial	6400	Commercial area
66	Industrial	6500	Industrial area
67	Public	6600	Public area
68	Green	6700	Green area
69	Water	6800	Water area
70	Other	6900	Other area
71	Residential	7000	Residential area
72	Commercial	7100	Commercial area
73	Industrial	7200	Industrial area
74	Public	7300	Public area
75	Green	7400	Green area
76	Water	7500	Water area
77	Other	7600	Other area
78	Residential	7700	Residential area
79	Commercial	7800	Commercial area
80	Industrial	7900	Industrial area
81	Public	8000	Public area
82	Green	8100	Green area
83	Water	8200	Water area
84	Other	8300	Other area
85	Residential	8400	Residential area
86	Commercial	8500	Commercial area
87	Industrial	8600	Industrial area
88	Public	8700	Public area
89	Green	8800	Green area
90	Water	8900	Water area
91	Other	9000	Other area
92	Residential	9100	Residential area
93	Commercial	9200	Commercial area
94	Industrial	9300	Industrial area
95	Public	9400	Public area
96	Green	9500	Green area
97	Water	9600	Water area
98	Other	9700	Other area
99	Residential	9800	Residential area
100	Commercial	9900	Commercial area

Note: The Future Development Areas (FDAs) which fall outside the urban edge, as per the latest approved Spatial Development Framework (SDF) of the Stellenbosch Municipality, are only included in the water master plan for calculation of potential longer term future water demands for hydraulic modelling purposes.

ANNEXURE E

SEWERAGE MASTER PLAN - GLS

FUTURE DEVELOPMENT AREAS (FDA)

Future Development Name	Anticipated Landuse	Area (ha)	Density (Units/ha)	No. of Units	Coverage (m² floor area)	Time Related Phasing (years)	AADD (inc. UAW) (kld)	PDDWP (kld)
Koelenhof								
KP1	Single residential 500	5.4	25	136		15	82	66
KP4	Mixed	22.9	30	685		2	112	91
KP5	Single residential 500	0.8	25	21		10	6	2
KP6	Single residential 500	30.0	27	815		20	489	389
KP8	Industrial	8.7			43 600	15	139	95
KP9	Single residential 1000	14.5	13	182		20	181	132
KP10	Single residential 500	58.7	29	1704		15	1018	810
KP11	Business/Commercial	16.9			75 900	5	262	216
KP14	Industrial	2.2			11 200	10	23	17
KP15	Single residential 500	4.9	19	74		5	43	35
KP17	Single residential 1000	5.4	8	45		5	0	0
Existing unserviced area - Koelenhof							0	0
Additional infiltration due to Master Plan items							0	0
Sub-Total Koelenhof		12		119	11 200		2 350	1 932
Muldersvlei								
None							0	0
Sub-Total Muldersvlei		0		0	0		0	0

* Areas already included in existing system, but are to be formalised in the future

** Areas only included in sewer model

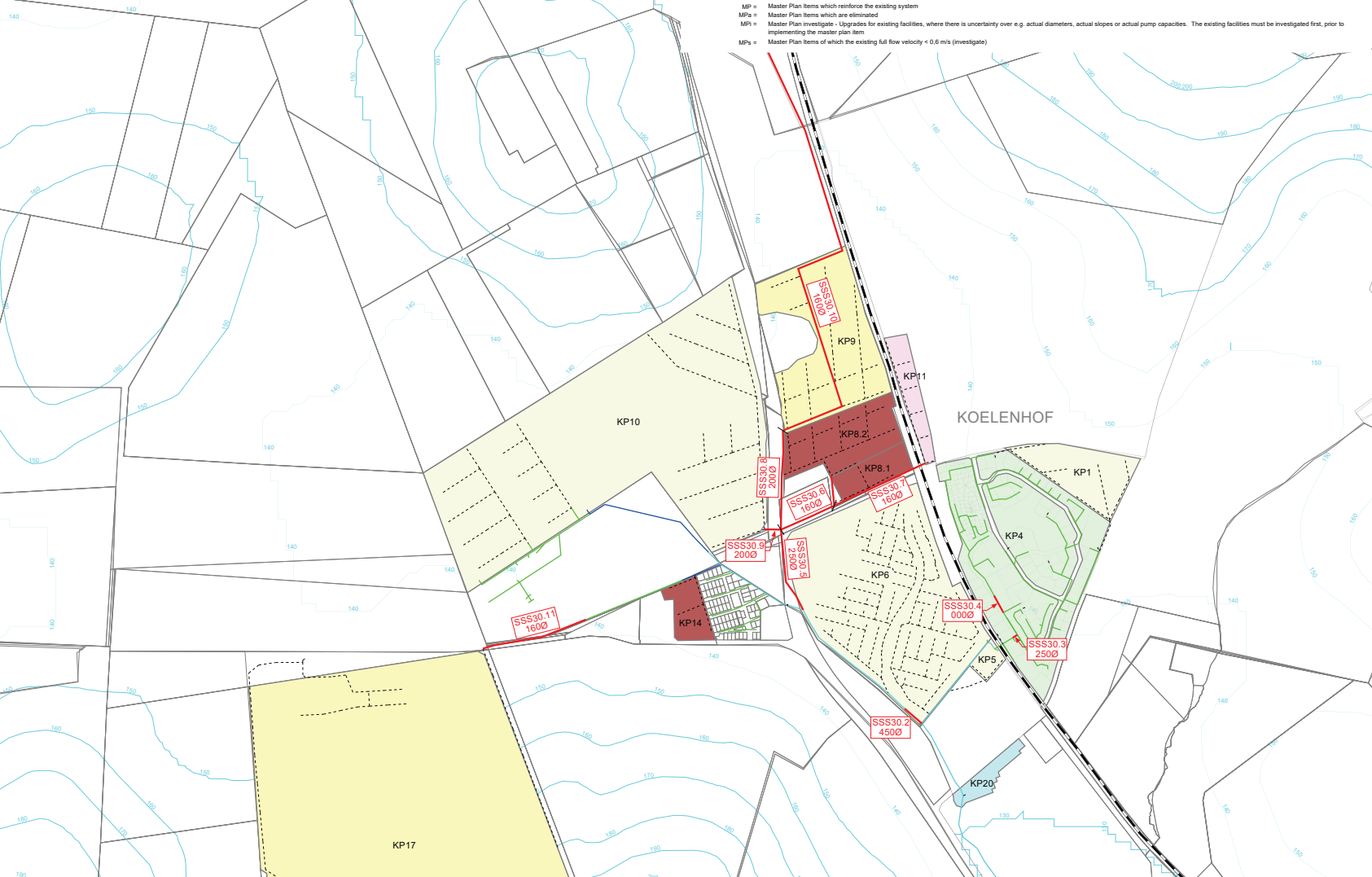
COST ESTIMATES AND PHASING OF THE REQUIRED WORKS

Item No.	MP Item Type	Description	Estimated cost * (R-yr 2018/19 value)	Time Related Phasing	Comments	Project no.
Koelenhof						
Distribution System Items						
SSS4.17	FM	1388 m x 315 mm Ø New Gravity	3 687 302	2021	New outfall sewer to Blaauwklippen PS (including river crossing)	PRJ-SSS-028
SSS4.18	FM	219 m x 250 mm Ø Upgrade existing Gravity	141 524	2023	When future longlands development occurs	PRJ-SSS-029
SSS4.20	FM	1791 m x 160 mm Ø New Gravity	2 765 900	2023	Connect existing Longlands development to sewer network	PRJ-SSS-029
SSS4.21	FM	184 m x 200 mm Ø New Gravity	367 800	2023	When future longlands development occurs	PRJ-SSS-029
SSS4.30	MPa	Abandon existing Pump Station	201 600	2023	Decommission Digbey PS	PRJ-SSS-030
TOTALS			7 879 126			

Item No.	MP Item Type	Description	Estimated cost * (R-yr 2018/19 value)	Time Related Phasing	Comments	Project no.
Muldersvlei						
Distribution System Items						
None			0			
TOTALS			0			

* Costs include P&G's, Contingencies & Fees, but exclude EIA studies, registration of servitudes and/or land acquisition and VAT.

Note :
 FM = Future main - New gravity outfall sewer, rising main, pump station, diversion structure or WWTP
 MP = Master Plan Items which reinforce the existing system
 MPa = Master Plan Items which are eliminated
 MPi = Master Plan investigate - Upgrades for existing facilities, where there is uncertainty over e.g. actual diameters, actual slopes or actual pump capacities. The existing facilities must be investigated first, prior to implementing the master plan item
 MPa = Master Plan Items of which the existing full flow velocity < 0.6 m/s (investigate)



LEGEND

- Existing <= 110mm diameter pipes
- Existing > 110 <= 160mm diameter pipes
- Existing > 160 <= 225mm diameter pipes
- Existing > 225 <= 315mm diameter pipes
- Existing > 315 <= 400mm diameter pipes
- Existing > 400mm diameter pipes
- Existing rising mains
- Existing manholes
- Existing pumping station
- Existing Wastewater Treatment Plant (WWTP)
- Existing diversion structure
- Master plan item
- Future rising mains
- Future pumping station
- Future Wastewater Treatment Plant (WWTP)
- Future diversion structure
- Future network pipes (schematic)
- Abandoned pumping station
- Cadastral boundaries
- Railway line
- River

Future Development Areas

- Affordable housing
- Business/Commercial
- Densification (BCI)
- Densification (Res)
- Flats
- Group housing 20 - 30
- Group housing 30 - 40
- Group housing 40 - 60
- Industrial
- Informal areas
- Mixed
- Other
- Retirement village
- Res 500
- Res 1000
- Res 1500
- Res 2000
- Res >2000



June 2024 (DRAFT)

Sewer Master Plan Stellenbosch

0 70 140 280 560 m
 Scale 1:10000



Figure SS6.4g
 Future required works -
 Koelenhof & Muldersvlei

ANNEXURE F

DEVELOPMENT CONTRIBUTIONS (DCs) ESTIMATES

TOTAL SCENARIO - DCs HIGH LEVEL ESTIMATE

DC Rate	R62 000	R1 137	R634	R432	R650	R600	
DC Total	R282 410 000	R112 866 533	R199 050 456	R41 249 340	R22 113 000	R22 848 000	R680 537 329

KOELLENHOF UDF

REVISION 1
DATE 15-Jul-25

Development Contributions - Annually for 10-year horizon

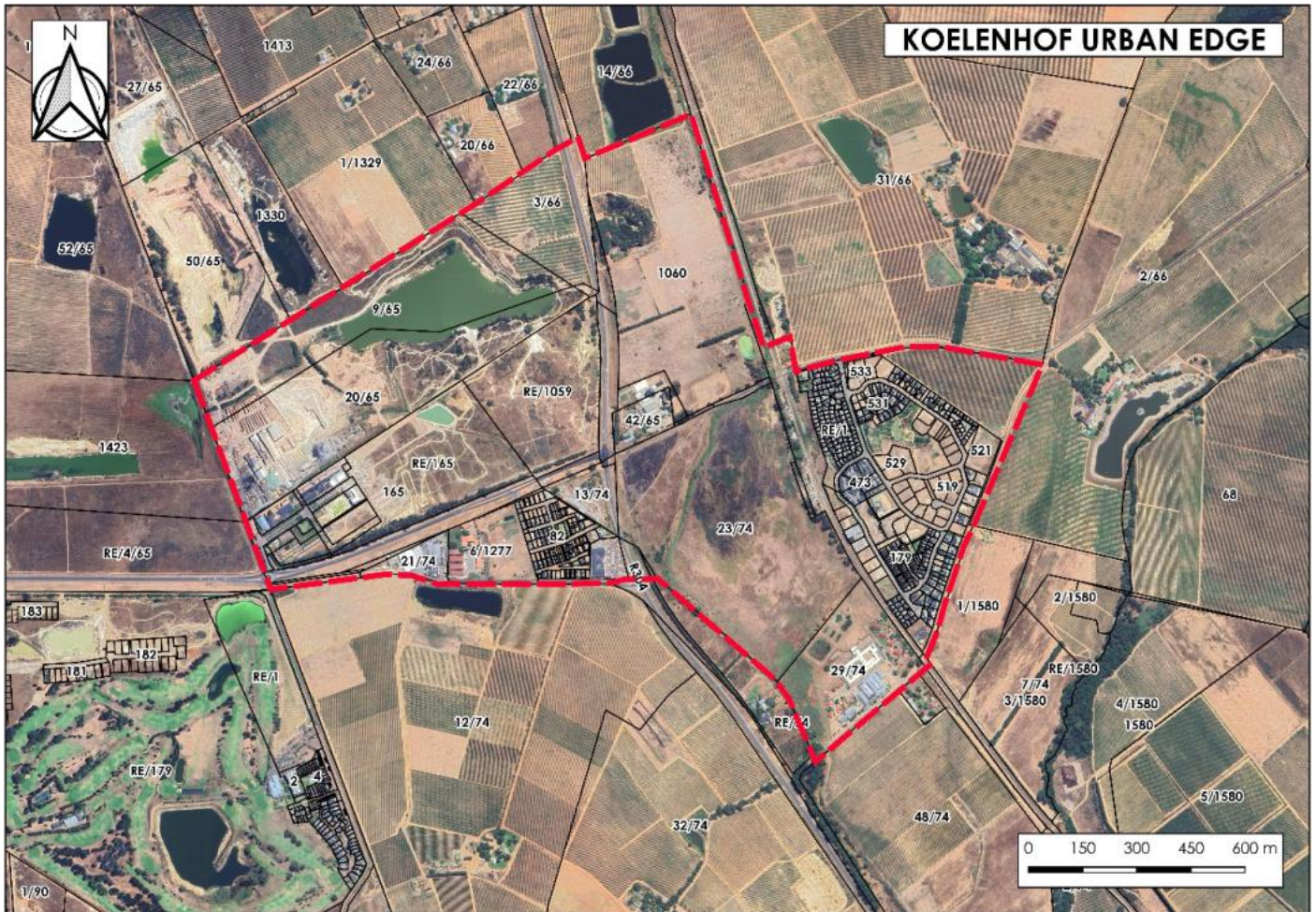
2025/2026 financial year																	
YEAR	Land Use	GLA / No	UNIT DC	TOTAL DC	DCs FOR UPGRADES	UNIT WATER	DCs WATER	UNIT SEWER	DCs SEWER	UNIT STORMWATER	DCs STORMWATER	UNIT SOLID WASTE	DCs SOLID WASTE	UNIT ADS & TRANSPORT	DCs ROADS	UNIT COMMUNITY	DCs COMMUNITY
2026	Residential Apartments		R55 868,00			R12 001,00		R11 093,00		R1 010,00		R4 236,00		R10 822,00		R16 706,00	
	Residential Erven		R68 823,00			R16 002,00		R13 866,00		R2 273,00		R4 236,00		R15 740,00		R16 706,00	
	Retail	128	R113 688,00	R145 521	R143 145	R10 668,00	R13 655	R9 706,00	R12 424	R1 894,00	R2 424	R2 118,00	R2 711	R87 447,00	R111 932	R1 856,00	R2 376
	Office		R63 406,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other	1 206	R60 000,00	R723 600	R701 217	R10 668,00	R128 897	R9 706,00	R117 054	R1 894,00	R22 842	R2 118,00	R25 543	R37 165,00	R448 210	R1 856,00	R22 383
					R869 121	R844 362		R142 552		R129 478		R25 266		R28 254		R560 142	R24 759
2027	Residential Apartments	9	R55 868,00	R502 812	R352 458	R12 001,00		R11 093,00	R99 837	R1 010,00	R9 090	R4 236,00	R38 124	R10 822,00	R97 398	R16 706,00	R150 354
	Residential Erven	8	R68 823,00	R550 584	R416 936	R16 002,00	R128 016	R13 866,00	R110 928	R2 273,00	R18 184	R4 236,00	R33 888	R15 740,00	R125 920	R16 706,00	R133 648
	Retail	2 738	R113 688,00	R3 112 777	R3 061 960	R10 668,00	R292 090	R9 706,00	R265 750	R1 894,00	R51 858	R2 118,00	R57 991	R87 447,00	R2 394 299	R1 856,00	R50 817
	Office	18 926	R63 406,00	R12 000 220	R11 648 953	R10 668,00	R2 019 026	R9 706,00	R1 836 958	R1 894,00	R358 458	R2 118,00	R400 853	R37 165,00	R7 033 848	R1 856,00	R351 267
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional	8 750	R65 000,00	R5 687 500	R5 525 100	R10 668,00	R933 450	R9 706,00	R849 275	R1 894,00	R165 725	R2 118,00	R185 325	R37 165,00	R3 251 938	R1 856,00	R162 400
	Other		R60 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
					R21 853 893	R21 005 407		R3 372 582		R3 162 748		R603 315		R716 181		R12 903 402	R848 486
2028	Residential Apartments	120	R55 868,00	R6 704 160	R4 699 440	R12 001,00	R1 440 120	R11 093,00	R1 331 160	R1 010,00	R121 200	R4 236,00	R508 320	R10 822,00	R1 298 640	R16 706,00	R2 004 720
	Residential Erven	106	R68 823,00	R7 295 238	R5 524 402	R16 002,00	R1 696 212	R13 866,00	R1 469 796	R2 273,00	R240 938	R4 236,00	R449 016	R15 740,00	R1 668 440	R16 706,00	R1 770 836
	Retail	3 343	R113 688,00	R3 800 590	R3 738 544	R10 668,00	R356 631	R9 706,00	R324 472	R1 894,00	R63 316	R2 118,00	R70 805	R87 447,00	R2 923 353	R1 856,00	R62 046
	Office	11 000	R63 406,00	R6 974 660	R6 770 500	R10 668,00	R1 173 480	R9 706,00	R1 067 660	R1 894,00	R208 340	R2 118,00	R232 980	R37 165,00	R4 088 150	R1 856,00	R204 160
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other		R60 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
					R24 774 648	R20 732 886		R4 666 443		R4 193 088		R633 794		R1 261 121		R9 978 583	R4 041 762
2029	Residential Apartments	150	R55 868,00	R8 380 200	R5 874 300	R12 001,00	R1 800 150	R11 093,00	R1 663 950	R1 010,00	R151 500	R4 236,00	R635 400	R10 822,00	R1 623 300	R16 706,00	R2 505 900
	Residential Erven	140	R68 823,00	R9 635 220	R7 296 380	R16 002,00	R2 240 280	R13 866,00	R1 941 240	R2 273,00	R318 220	R4 236,00	R593 040	R15 740,00	R2 203 600	R16 706,00	R2 338 840
	Retail	10 605	R113 688,00	R12 056 612	R11 859 784	R10 668,00	R1 131 341	R9 706,00	R1 029 321	R1 894,00	R200 859	R2 118,00	R224 614	R87 447,00	R9 273 754	R1 856,00	R196 829
	Office	8 000	R63 406,00	R5 072 480	R4 924 000	R10 668,00	R853 440	R9 706,00	R776 480	R1 894,00	R151 520	R2 118,00	R169 440	R37 165,00	R2 973 200	R1 856,00	R148 480
	Warehouse / Industrial	1 008	R43 294,00	R436 404	R417 695	R10 668,00	R107 533	R9 706,00	R97 836	R1 894,00	R19 092	R2 118,00	R21 349	R17 052,00	R171 884	R1 856,00	R18 708
	Institutional	2 500	R65 000,00	R1 625 000	R1 578 600	R10 668,00	R266 700	R9 706,00	R242 650	R1 894,00	R47 350	R2 118,00	R52 950	R37 165,00	R929 125	R1 856,00	R46 400
	Other		R60 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
					R37 205 916	R31 950 755		R6 399 445		R5 751 478		R888 540		R1 696 793		R17 174 864	R5 255 157
2030	Residential Apartments	160	R55 868,00	R8 938 880	R6 265 920	R12 001,00	R1 920 160	R11 093,00	R1 774 880	R1 010,00	R161 600	R4 236,00	R677 760	R10 822,00	R1 731 520	R16 706,00	R2 672 960
	Residential Erven	150	R68 823,00	R10 323 450	R7 817 550	R16 002,00	R2 400 300	R13 866,00	R2 079 900	R2 273,00	R340 950	R4 236,00	R635 400	R15 740,00	R2 361 000	R16 706,00	R2 505 900
	Retail	20 000	R113 688,00	R22 737 600	R22 366 400	R10 668,00	R2 133 600	R9 706,00	R1 941 200	R1 894,00	R378 800	R2 118,00	R423 600	R87 447,00	R17 489 400	R1 856,00	R371 200
	Office	10 800	R63 406,00	R6 847 848	R6 647 400	R10 668,00	R1 152 144	R9 706,00	R1 048 248	R1 894,00	R204 552	R2 118,00	R228 744	R37 165,00	R4 013 820	R1 856,00	R200 448
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other	12 334	R60 000,00	R7 400 400	R7 171 481	R10 668,00	R1 318 258	R9 706,00	R1 197 138	R1 894,00	R233 608	R2 118,00	R261 234	R37 165,00	R4 583 931	R1 856,00	R228 919
					R56 248 178	R50 268 751		R8 924 462		R8 041 366		R1 319 508		R2 226 738		R30 179 671	R5 979 427
2031	Residential Apartments	80	R55 868,00	R4 469 440	R3 132 960	R12 001,00	R960 080	R11 093,00	R887 440	R1 010,00	R80 800	R4 236,00	R338 880	R10 822,00	R865 760	R16 706,00	R1 336 480
	Residential Erven	70	R68 823,00	R4 817 610	R3 648 190	R16 002,00	R1 120 140	R13 866,00	R970 620	R2 273,00	R159 110	R4 236,00	R296 520	R15 740,00	R1 101 800	R16 706,00	R1 169 420
	Retail	5 000	R113 688,00	R5 684 400	R5 591 600	R10 668,00	R533 400	R9 706,00	R485 300	R1 894,00	R94 700	R2 118,00	R105 900	R87 447,00	R4 372 350	R1 856,00	R92 800
	Office	10 000	R63 406,00	R6 340 600	R6 155 000	R10 668,00	R1 066 800	R9 706,00	R970 600	R1 894,00	R189 400	R2 118,00	R211 800	R37 165,00	R3 716 500	R1 856,00	R185 600
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other	2 200	R60 000,00	R1 320 000	R1 279 168	R10 668,00	R235 136	R9 706,00	R213 532	R1 894,00	R41 668	R2 118,00	R46 596	R37 165,00	R817 630	R1 856,00	R40 832
					R22 632 050	R19 806 918		R3 915 556		R3 527 492		R565 678		R999 696		R10 874 040	R2 825 132
2032	Residential Apartments	130	R55 868,00	R7 262 840	R5 091 060	R12 001,00	R1 560 130	R11 093,00	R1 442 090	R1 010,00	R131 300	R4 236,00	R550 680	R10 822,00	R1 406 860	R16 706,00	R2 171 780
	Residential Erven	120	R68 823,00	R8 258 760	R6 254 040	R16 002,00	R1 920 240	R13 866,00	R1 663 920	R2 273,00	R272 760	R4 236,00	R508 320	R15 740,00	R1 888 800	R16 706,00	R2 004 720
	Retail	2 000	R113 688,00	R2 273 760	R2 236 640	R10 668,00	R213 360	R9 706,00	R194 120	R1 894,00	R37 880	R2 118,00	R42 360	R87 447,00	R1 748 940	R1 856,00	R37 120
	Office	10 000	R63 406,00	R6 340 600	R6 155 000	R10 668,00	R1 066 800	R9 706,00	R970 600	R1 894,00	R189 400	R2 118,00	R211 800	R37 165,00	R3 716 500	R1 856,00	R185 600
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other		R60 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
					R24 135 960	R19 736 740		R4 760 530		R4 270 730		R631 340		R1 313 160		R8 761 100	R4 399 220
2035	Residential Apartments	169	R55 868,00	R9 441 692	R6 618 378	R12 001,00	R2 028 169	R11 093,00	R1 874 717	R1 010,00	R170 690	R4 236,00	R715 884	R10 822,00	R1 828 918	R16 706,00	R2 823 314
	Residential Erven	155	R68 823,00	R10 667 565	R8 078 135	R16 002,00	R2 480 310	R13 866,00	R2 149 230	R2 273,00	R352 315	R4 236,00	R656 580	R15 740,00	R2 439 700	R16 706,00	R2 589 430
	Retail	1 736	R113 688,00	R1 973 624	R1 941 404	R10 668,00	R185 196	R9 706,00	R168 496	R1 894,00	R32 880	R2 118,00	R36 768	R87 447,00	R1 518 080	R1 856,00	R32 220
	Office	16 329	R63 406,00	R10 353 566	R10 050 500	R10 668,00	R1 741 978	R9 706,00	R1 584 893	R1 894,00	R309 271	R2 118,00	R345 848	R37 165,00	R6 068 673	R1 856,00	R303 066
	Warehouse / Industrial		R43 294,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R17 052,00		R1 856,00	
	Institutional		R65 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	
	Other		R60 000,00			R10 668,00		R9 706,00		R1 894,00		R2 118,00		R37 165,00		R1 856,00	

ANNEXURE D

ELECTRICAL SUMMARY



ELECTRICAL SERVICES REPORT FOR KOELENHOF URBAN MASTERPLAN



AUGUST 2025 : REVISION 0

Submitted By: **Wessel Badenhorst**
De Villiers & Moore (Pty) Ltd
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Project No: R5290Z
Reference No. : 0868



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Consulting Engineers
Electrical, Mechanical, Fire

ELECTRICAL SERVICES REPORT FOR KOELENHOF URBAN MASTERPLAN

1. SERVICES REPORT

This report must be read in conjunction with the proposed developments for the Koelenhof node (see figure 1). The properties are situated in Stellenbosch municipal area.

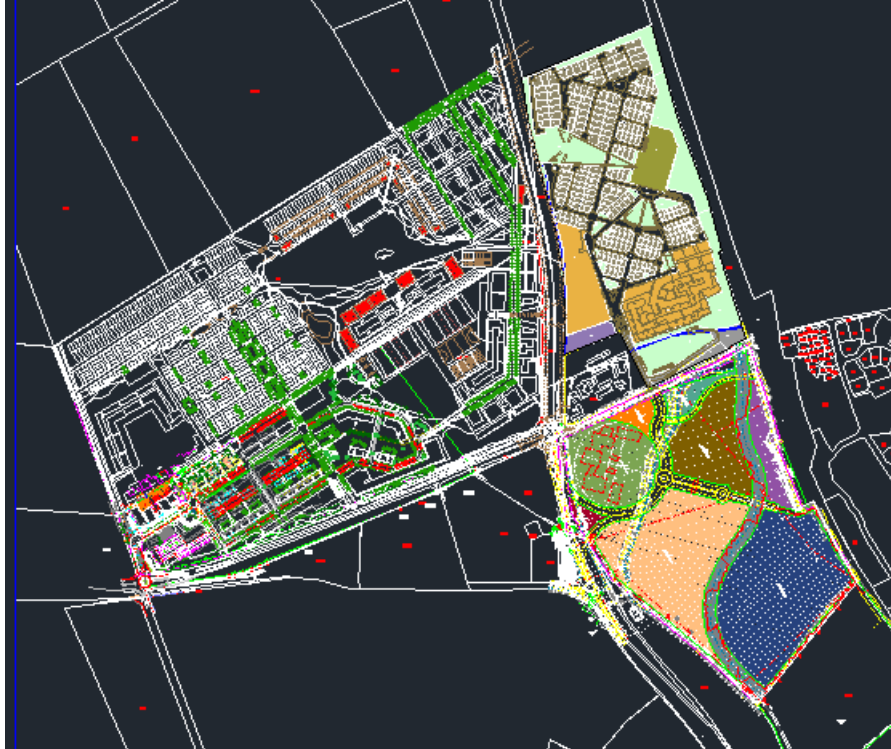


Figure 1: Proposed Development

1.1 Purpose of this report

- Consolidate the principles, concepts and specific requirements of the client
- Provide the basic information parameters of existing electrical services
- Confirm availability of services for the proposed developments

2. AREA ELECTRICAL SUPPLY

The Electrical Supply Authority for the area is Eskom.

The area is fed via various farm-feeders from the existing Koelenhof substation, along Elsenburg road. This substation is on the edge of the Koelenhof Urban node.



We met with Eskom re the existing capacity of the Koelenhof substation. It is fitted with a 12,5MVA 66/11kV transformer, that peaked on a load of 7,4MVA in 2024.

3. PRESENT UPGRADES

Due to several projects that will commence in the near future (all included in this masterplan report), Eskom noted the anticipated shortage and limitations in the supply for this area.

Eskom confirmed that they already started a project to upgrade the Koelenhof substation to a 20MVA capacity, with spare space for a second 20MVA transformer, which will ensure a firm 20MVA distribution substation. This project is in the design and design-approval stages, and construction on site will commence early 2026.

The existing 66kV-overhead lines feeding the Koelenhof substation, is sufficient in size to cater for this planned upgrade.

4. KOELENHOF URBAN MASTERPLAN – ELECTRICAL REQUIREMENT

As contained in this masterplan for the Koelenhof development node, several new areas are being developed, and will require substantial electricity infrastructure to be provided.

The anticipated electricity requirement for the areas in the four quadrants, are as follows :

QUADRANT 1: MALANSHOOP									TOTAL (kVA)
Project Name	Erf Area - m ²	Potential Land use	Residential Units	Retail (m ²)	Office (m ²)	Industrial (m ²)	Institutional (m ²)	Other (m ²)	
Malanshoop	256753	Retirement	450					2200	1 818,00
	28851	Church & Primary School					6000		720,00
	285604		450	0	0	0	6000	2200	2 538,00

QUADRANT 2: KOELENHOF ESTATE - NOOITGEDACHT									TOTAL (kVA)
Project Name	Erf Area - m ²	Potential Land use	Residential Units	Retail (m ²)	Office (m ²)	Industrial (m ²)	Institutional (m ²)	Other (m ²)	
Koelenhof Estate	313251	Residential, Retail, ECD	508	10605			2500		3 624,92
	100612	Youth care facility	10				18300		2 236,40
	31466	station						1000	75,00
	887	?	1						4,04
Nooitgedacht	248752	Residential with facilities	1000						4 040,00
	53944	No additions for this study							-
	3580	?	1						4,04
	752492		1520	10605	0	0	20800	1000	9 984,40

QUADRANT 3 - KOELENBOSCH									TOTAL (kVA)
Project Name	Erf Area - m ²	Potential Land use	Residential Units	Retail (m ²)	Office (m ²)	Industrial (m ²)	Institutional (m ²)	Other (m ²)	
	17575	Retail		6722					
Koelenbosch	39853	Residential Estate	74						298,96
	979	Fibre Exchange						190	14,25
	10218	Retail		2280					273,60
	41997	Industrial				16064			1 204,79
	20540	Industrial				7857			589,24
	131162		74	9002	0	23920	0	190	2 380,84

QUADRANT 4 - DEVONBOSCH									TOTAL (kVA)
Project Name	Erf Area - m ²	Potential Land use	Residential Units	Retail (m ²)	Office (m ²)	Industrial/ Warehouse (m ²)	Institutional (m ²)	Other (m ²)	
Devonbosch	186148	Mixed-use	610	35000	85100	1010	8750	13540	19 017,65
	115310	Mixed-use	2475	46950	228830	70446	22770	21150	
	214935								
	184741								52 694,70
	1240								
	82415								
	784789		3085	81950	313930	71456	31520	34690	71 712,35

If all this development-rights are obtained and developed, the electrical infrastructure needs to provide approximately 90MVA for the Koelenhof node.

5. PROPOSED ELECTRICAL INFRASTRUCTURE UPGRADES

Discussions with Eskom confirmed that this total electricity requirement can not be supplied with the existing infrastructure at Koelenhof substation. The total future load for Koelenhof will require a 2nd step-down substation to be planned and commissioned. The exact position needs to be determined after a network and load analysis of the surrounding Eskom networks.

The existing 66kV-line from Stellenbosch to Koelenhof substation is constraint with capacity due to the tap-off towards Helshoogte and Elsenburg. If the 90MVA is to be supplied from this existing line, several overhead line upgrades will be required in Stellenbosch (at Stellenbosch substation), and a portion of the line from Helshoogte to Koelenhof.



Stellenbosch Substation, Vredenburg road, Stellenbosch.

Due to logistical and practical limitations on this 66kV-line of Eskom, they proposed to also consider a new 132kV-feeder into the Koelenhof area, fed from the existing Muldersvlei transmission substation adjacent to the N1-highway. At present, there is sufficient capacity at Muldersvlei substation to cater for the total anticipated load of Koelenhof area.



Muldersvlei Substation adjacent to the N1, in Klapmuts.

An existing 132kV-overhead line from Muldersvlei towards Stikland substation is located to the west of the Koelenhof area. This line became semi-redundant recently when Eskom completed other upgrades and new substations in their distribution area towards Cape Town.

Eskom also mentioned that an option will be to tee-off from this line with a new 132kV-overhead feeder into the Koelenhof area, where a new stepdown substation will be located. The process to determine this line route and design of the line and stepdown substation, is lengthy and very Eskom process-driven, and will take between 6 and 10 years to implement up to commissioning. This process will only start once the existing capacity in the area is nearing depletion and additional capacity is required.

A third option is to extend an existing 132kV-feeder from Elsenburg area to the proposed new stepdown substation in the Koelenhof area. Due to several route constraints and loads anticipated in the Klapmuts development area, this option appears to be the least favoured one by Eskom.

6. LOAD-GROWTH

The initial developments moving forward, will be supplied from the upgraded Koelenhof substation (project already in motion by Eskom).

Since a new stepdown substation require huge financial commitment, and timeous planning due to the Eskom processes, this will be planned according to the anticipated load-growth as more developments are approved and constructed.

The anticipated load growth for the first 10 years is shown in the table below :

Combined Devonbosch, Malanshoop, Koelenhof Estate - Loads in kVA							
Year of Occupation	Residential (Units)	Retail (Floor Area - m ²)	Office (Floor Area - m ²)	Warehouse/ Industrial (Floor Area - m ²)	Institutional (Floor Area - m ²)	Other (Floor Area - m ²)	TOTAL kVA
2026		128				1206	105,81
2027	17	2738	18926		8750		3 718,36
2028	226	3343	11000				2 634,20
2029	290	10605	8000	1008	2500		3 779,80
2030	310	20000	10800			12334	5 873,45
2031	150	5000	10000			2200	2 571,00
2032	250	2000	10000				2 450,00
2035	324	1736	16329				3 476,76
TOTAL kVA	1567	45550	85055	1008	11250	15740	24 609,38

Since Koelenhof substation is upgraded at present, to be fitted with 2 x 20MVA transformers, it will be sufficient to cater for the developments from 2026 – 2029.

The developments planned for 2029 – 2035 can be supplied with electricity capacity from :

- Eskom to allow the operation of Koelenhof substation as a non-firm supply, thus utilising both 20MVA transformers as load supply, instead of one spare for a firm supply (unlikely that Eskom will consider/approve this in the initial design stages).

or

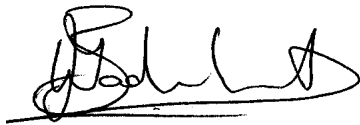
- Upgrade Koelenhof substation again to a 40mVA transformer, subject to line capacity and fault-level control in the substation

or

- Start the process of the new 132kV-supply and stepdown substation as soon as possible, to ensure some infrastructure being in place by 2031 to cater for the anticipated additional loads (also beyond 2035).

7. CONCLUSION

Evident from the above, it is clear that capacity is available from Eskom for the projected growth of the Koelenhof development node.



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ANNEXURE E

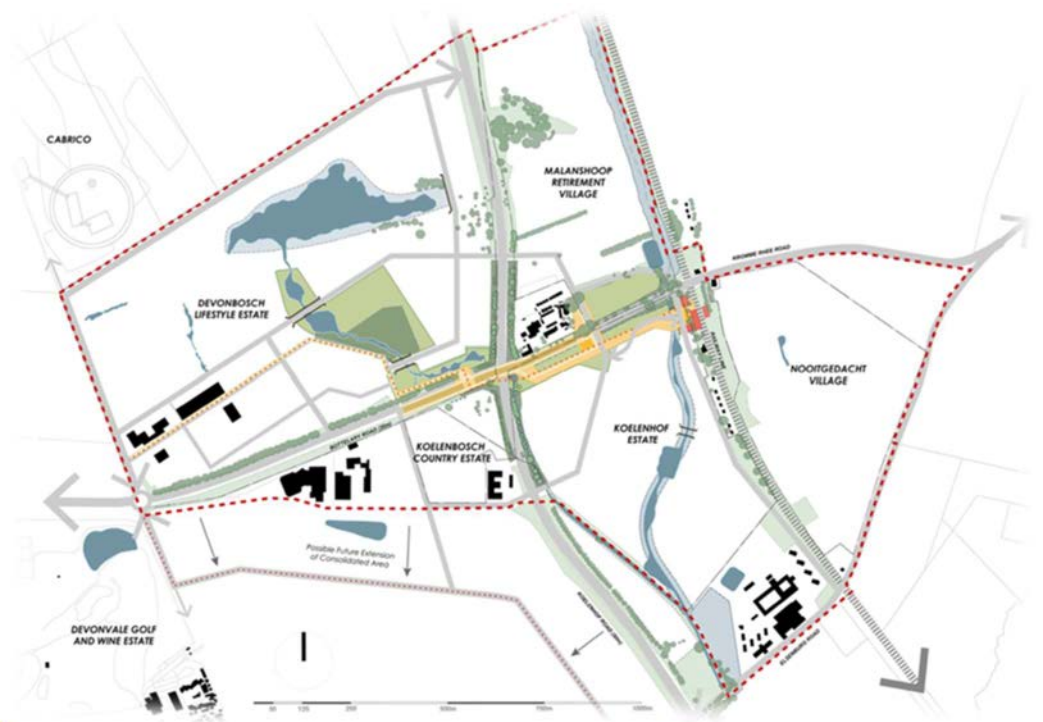
TRANSPORT MASTER PLAN



Transport Impact Assessment Koelenhof Transport Master Plan

Koelenhof

***First Draft
01 September 2025***



SUMMARY SHEET

Report Type	Transport Impact Assessment
Title	Koelenhof Transport Master Plan
Location	Koelenhof
Client	Koelenhof Development Forum
Reference Number	ITS 4677
Project Team	Johan Brink Inge van Tonder
Contact Details	Tel: 021 914 6211
Date	01 September 2025
Report Status	First Draft
File Name	G:\4677 Koelenhof Roads Master Plan\12 Reports\Issued\4677 Koelenhof Roads Master Plan Draft Report_lvt_2025-09-01.docx

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1 INTRODUCTION

Innovative Transport Solutions (Pty) Ltd (ITS) was appointed to do a transport master plan for the Koelenhof area. This document reports the outcomes of the transport approach for the Koelenhof area.

1.1 Locality

Koelenhof is situated about 4 km north of Stellenbosch, at the intersection of the R304 (MR174), Bottelary Road (MR187) and Kromme Rhee Road (DR1085). The R304 connects the area to the N1 freeway, while Bottelary Road links it to Kuilsrivier and the R300 to the west, and to the R44 towards Klapmuts in the east. A railway line, which runs parallel to the R304, also passes through the area. Refer to **Figure 1** for the locality plan of the study area.

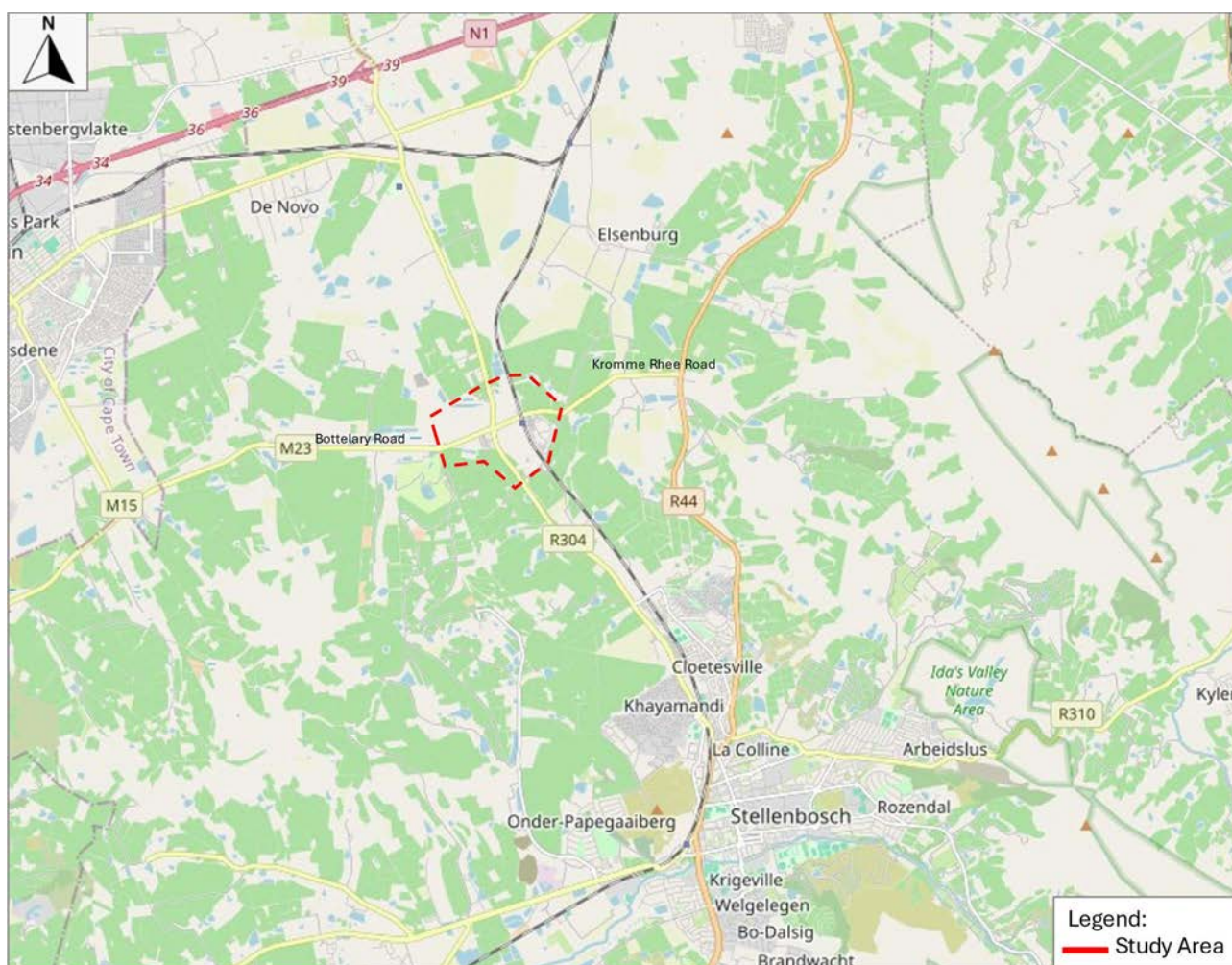


Figure 1: Locality Plan

1.2 Problem Statement

Numerous development applications have been submitted to the Stellenbosch Municipality, highlighting the Koelenhof node as an area undergoing rapid urban expansion. While individual transport impact assessments (TIAs) have been prepared for each development, these assessments have been conducted to some extent, in isolation, without consideration of the cumulative impacts on the broader transport network. This conventional approach to traffic analysis risks producing an uncoordinated assessment of the total transport impact. In response, the proposed Transport Master Plan will adopt a holistic and integrated planning framework, evaluating all developments within the Koelenhof area. This

approach aims to inform the design of a future-proof transport system that supports coordinated growth with the Koelenhof node and efficient regional connectivity.

1.3 Objectives

The following objectives have been identified for the Koelenhof Roads Master Plan:

- **Objective 1:** Preserve the mobility function of the R304 (MR174)
- **Objective 2:** Reduce overall trip generation and dependence on arterial roads
- **Objective 3:** Develop safe and continuous walking and cycling infrastructure
- **Objective 4:** Divert through traffic away from the Koelenhof centre
- **Objective 5:** Implement a practical funding and phased expenditure approach

2 STATUS QUO

2.1 Roadways

The Koelenhof node consists of four roads connecting at the R304 (MR174) / Bottelary Road (MR187) / Kromme Rhee Road (DR1085) intersection. Refer to **Figure 2** for a zoomed-in view of these roads within the study area.

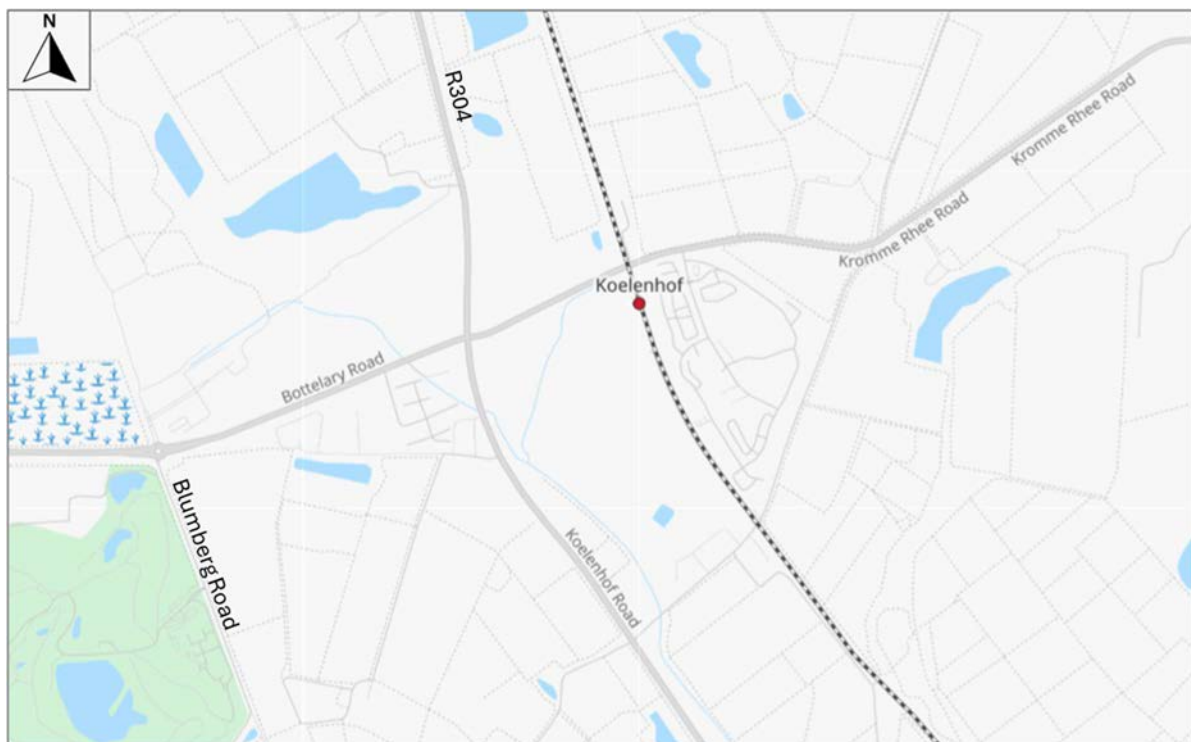


Figure 2: Zoomed-in view of the Koelenhof node and the study roads

The following roadways are within the vicinity of the Koelenhof area:

- **Koelenhof Road or MR174 (R304)** – This is a Class 2 Main Road within the Western Cape Government Road network. It has single lanes in each direction, with paved shoulders and no sidewalks. The speed limit is 100km/h and reduces to 80km/h closer to intersections. Refer to **Figure 3** for the existing cross-section of the R304.



Figure 3: R304 Northbound

- **Bottelary Road (MR187)** – This is a Class 2 Main Road of the Western Cape Government Road network. It's a single lane in each direction, with paved shoulders and no sidewalks. The speed limit is 80km/h. Refer to **Figure 4** for the existing cross-section of Bottelary Road.



Figure 4: Bottelary Road Eastbound

- **Kromme Rhee Road (DR1085)** - This is a Class 4 Divisional Road on the Western Cape Government Road network. It has a single lane per direction with a narrow gravel shoulder on the southern side of the road and a raised paved sidewalk on the northern side. The speed limit is 80 km/h. Current planning includes the possibility of reclassifying this road to Class 3. However, the reasoning for this could be reconsidered given the nature of this road through the winelands and rural character of its surroundings. The required capacity in future must be evaluated with the proposed capacity improvements along the R304 and whether this road will attract significant high traffic volumes in future that would warrant the reclassification. Refer to **Figure 5** for the existing cross-section of Kromme Rhee Road.



Figure 5: Kromme Rhee Road Eastbound

- **Blumberg Drive** - This is a Class 5 Local street with a speed limit of 60 km/h. There are no walking or cycling transport facilities along this road. This road provides mainly access to farms and the Devonvale Golf course. Refer to **Figure 6** for the existing cross-section of Blumberg Drive.



Figure 6: Blumberg Drive Northbound

2.2 Traffic Volumes

2.2.1 Daily Traffic Volumes

The available daily volumes on the RNIS for the counting stations provided in **Figure 7** were obtained and represent 2022 two-way traffic volumes. The hourly volumes for north and south of the R304/Bottelary Road intersection are provided in **Figure 8** and **Figure 9**, respectively.

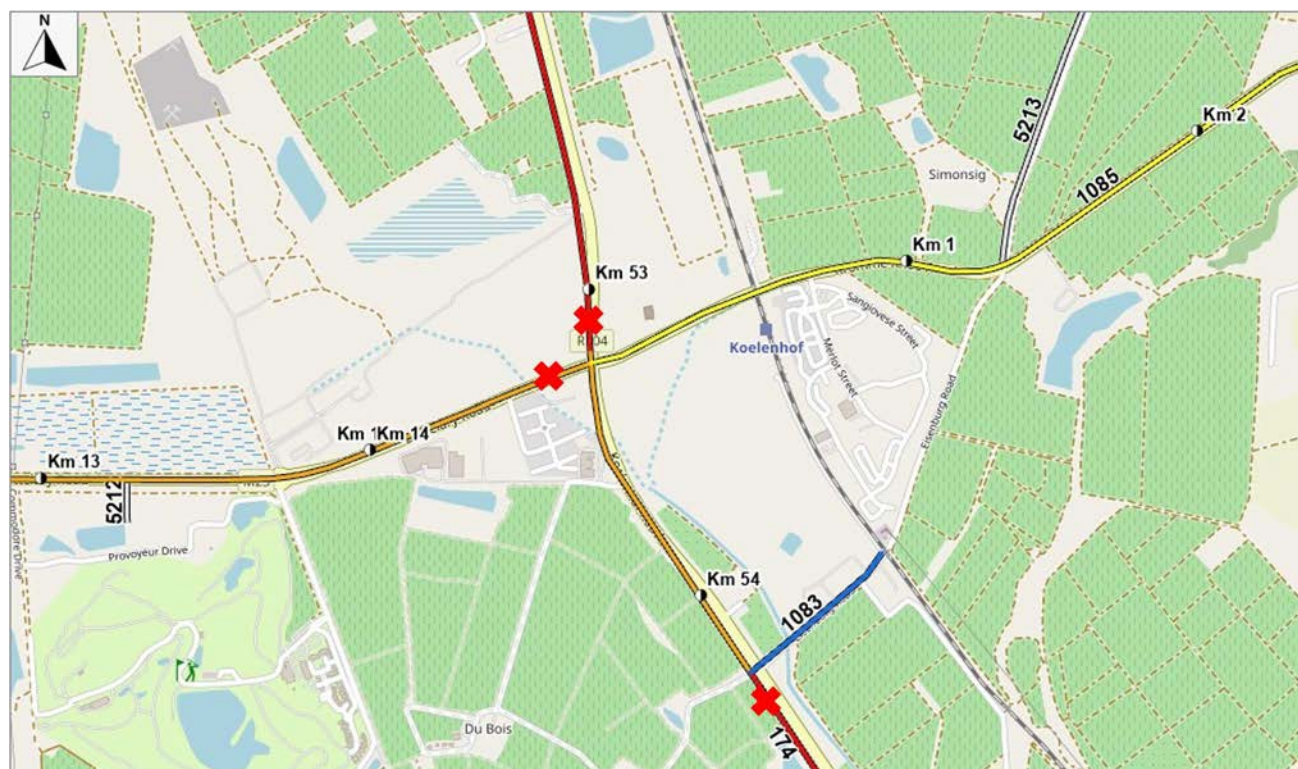


Figure 7: RNIS Count Stations Location

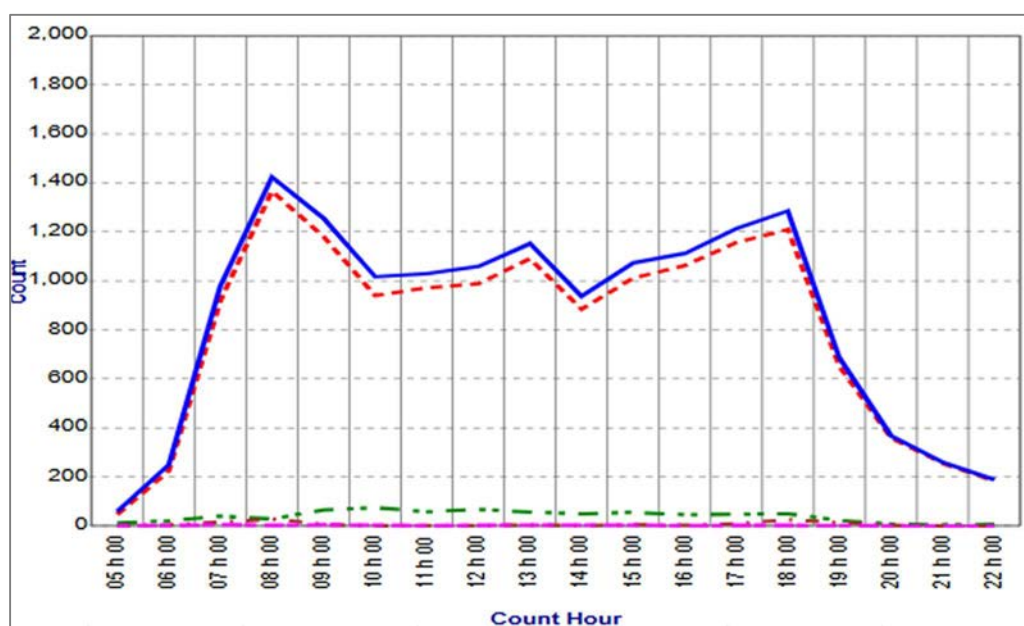


Figure 8: Hourly volumes along R304 north of the R304/Bottelary Road Intersection

The daily traffic pattern provided in **Figure 8** represents the typical morning and afternoon peaks, with the typical off-peak period presenting lower volumes.

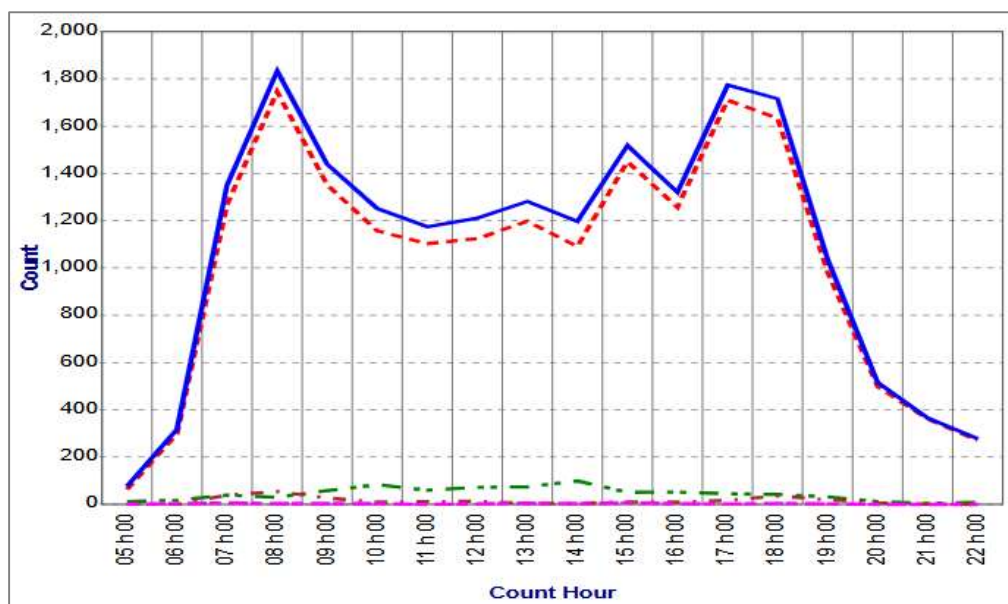


Figure 9: Hourly volumes along the R304 south of the R304/Elsenburg Road intersection

Comparing the daily traffic pattern in **Figure 8** and **Figure 9**, the morning peak south of the R304/Elsenburg Road intersection is ~200 veh/h higher than north of the R304/Bottelary Road intersection. The difference in the morning peak hour volumes for the above graphs indicates that ~10% of vehicles travelling north of the R304 from Stellenbosch turn either onto Bottelary Road or Kromme Rhee Road. These vehicles most likely travel towards Kuilsrivier, as there are not many attractions along Kromme Rhee Road and it is mostly residential developments.

The hourly two-way volumes for 2022 along Bottelary Road are provided in **Figure 10**. The morning peak period shows significantly higher volumes compared to the afternoon peak period.

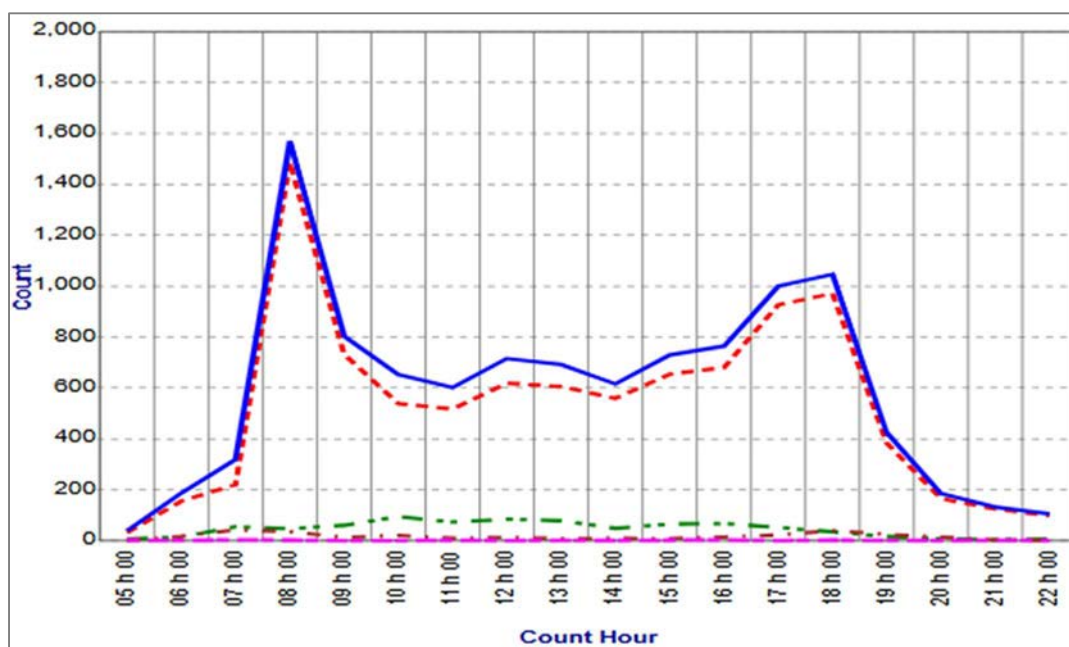


Figure 10: Hourly volumes along Bottelary Road west of the R304/Bottelary Road intersection

The hourly two-way volumes for 2022 along Kromme Rhee Road are provided in **Figure 11**. The volumes along Kromme Rhee Road are ~50% less than the typical hourly volumes along the R304 and Bottelary Road during the morning peak hour.

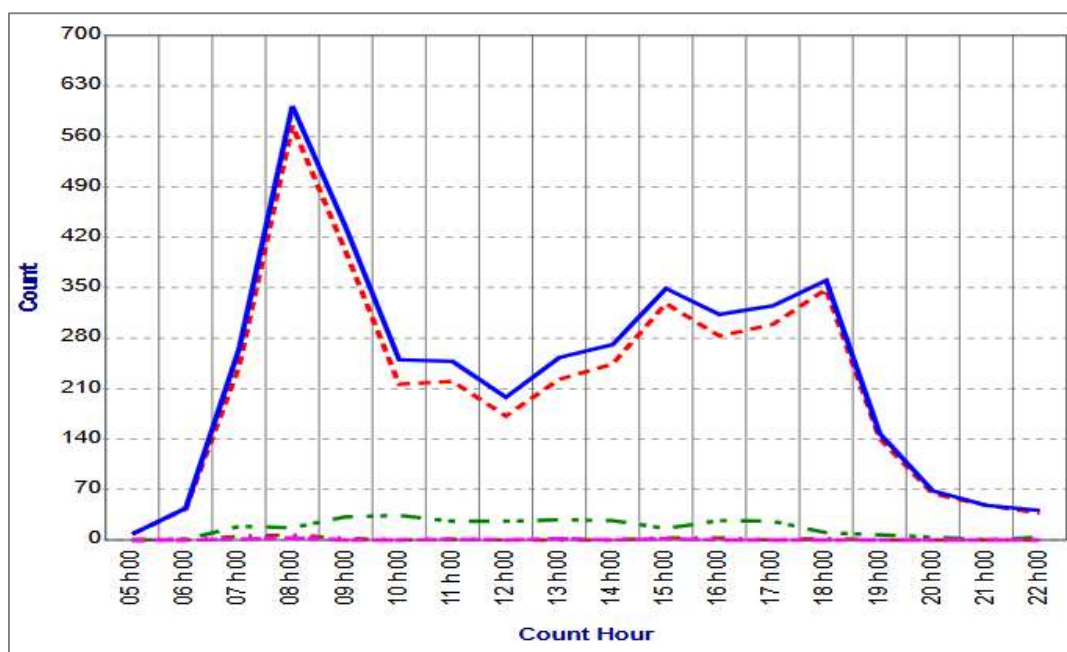


Figure 11: Hourly volumes along Kromme Rhee Road west of the R304/Bottelary Road intersection

The 2022 RNIS data shows typical morning and afternoon traffic peaks along the R304, Bottelary Road, and Kromme Rhee Road, with lower volumes during off-peak periods. Morning peak volumes south of the R304/Elsenburg Road intersection are about 200 veh/h higher than those north of the R304/Bottelary Road intersection, suggesting that around 10% of northbound vehicles from Stellenbosch divert via Bottelary or Kromme Rhee Road—likely towards Kuilsrivier. Bottelary Road have a higher morning peak than afternoon peak, while Kromme Rhee Road carries roughly 50% lower peak-hour volumes compared to the R304 and Bottelary Road during the morning peak.

2.2.2 Annual Average Daily Traffic and Growth

Historical traffic data along the R304 and Bottelary Road were obtained from the RNIS to further understand the traffic growth over the years. The location where the station data was collected is at km distance of 53.19 km along the R304 and km distance of 14.71 km along Bottelary Road. Refer to **Figure 7** for the location of the count stations along the R304 and Bottelary Road.

The Annual Average Daily Traffic (AADT) data for the latest 3 years were obtained from the RNIS website, and the growth rate for each road was determined based on the years 2016, 2018 and 2022. Refer to **Table 1** for these growth rates. The growth rates below will be applied in the transport model to represent the growth in regional traffic through the study area.

Table 1: Regional traffic growth rate along the study section

Road Name	2022 AADT	AADT Growth Rate
R304 (MR174)	14 725 (north of MR174/Bottelary Road)	1.64%
	10 359 (north of MR174/Bottelary Road)	

Bottelary Road (M23)	9 839	1.00%
-----------------------------	-------	-------



Figure 12: Regional Growth along R304 and Bottelary Road

Based on RNIS data, an average annual growth rate of 1.64% was determined for the R304 and 1.00% for Bottelary Road. These rates will be applied in the transport model to represent regional traffic growth through the study area.

2.2.3 Intersections Counts

Traffic counts were conducted on 31 January 2024 during the morning and afternoon peak periods. The following peak periods were surveyed:

- morning peak period: 06:00-09:00
- afternoon peak period: 16:00-19:00

The study intersections and controls are provided in **Table 2** below, and the locations of the intersections are provided in **Figure 13**.

Table 2: Study Intersections

Number	Street names	Configuration
1	Bottelary Road/Blumberg Drive	Roundabout
2	R304/Bottelary Road/Kromme Rhee Road	Traffic Signal
3	Kromme Rhee Road/Merlot Street	Priority Control

4	R304/Caltex Access	Priority Control
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Note: All roadways provided above are undivided with one lane per direction with no on-street parking. Some intersections have local widening to accommodate turning lanes and/or additional through lanes.

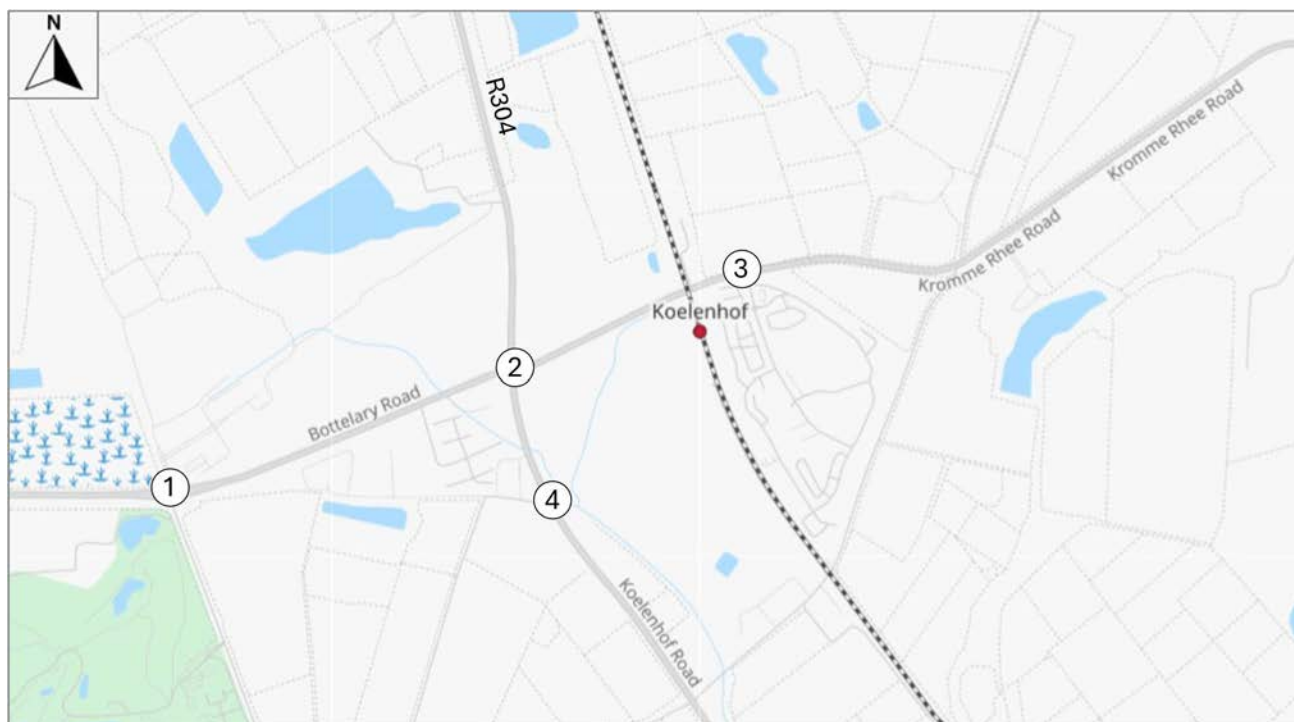


Figure 13: Traffic Count Locations

The peak hours that were analysed included the following:

- morning peak hour: 06:30-07:30
- afternoon peak hour: 16:15-17:15

The existing lane configurations for the study intersections are provided in **Figure 14**. The existing morning and afternoon peak hour volumes and operations for the study intersections are also provided in **Figure 15**.

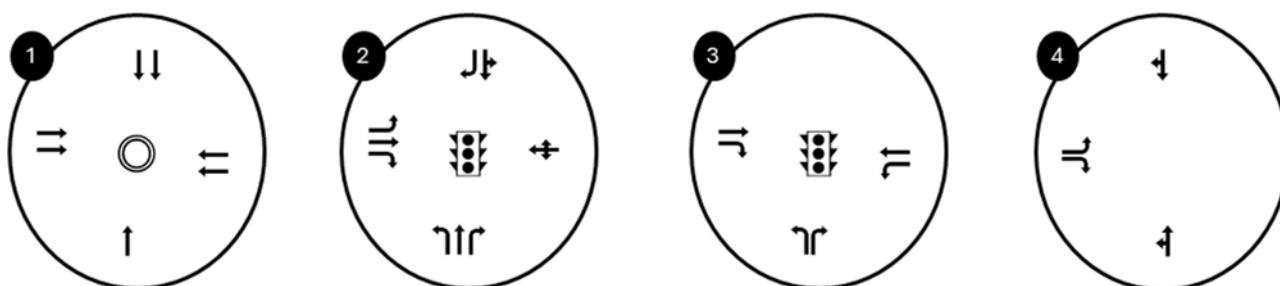


Figure 14: Existing Intersection Configurations and Controls

The critical intersection (R304/Bottelary Road) is experiencing delays during both peak periods, as observed during site visits. The dominant movement for this intersection is the eastbound right turn during the morning peak period and the northbound left turn during the afternoon peak period. Approximately 50% of the traffic travelling eastbound along Bottelary Road during the morning peak hour

turns right towards Stellenbosch, and 25% towards the N1 and the R44 respectively. During the afternoon peak hour, approximately 40% of the traffic travelling from Stellenbosch turns left onto Bottelary Road.

Overall, most of the intersections are currently operating at acceptable conditions except for the R304/Bottelary Road intersection during the morning peak hour.

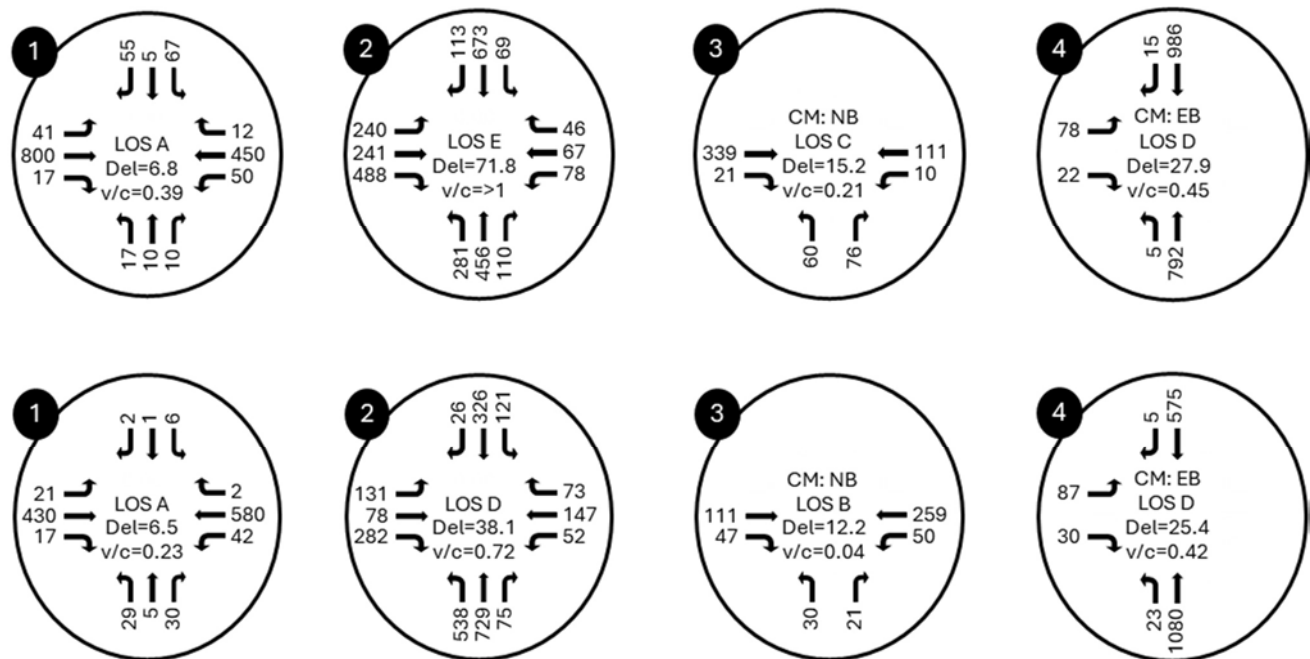


Figure 15: Existing morning and afternoon peak hour volumes and operations

It is noted that the total two-way traffic along the R304 to the north and south of Bottelary Road is approximately 1500 and 2100 vph respectively, and 1 500 vph along Bottelary. This is verified by the RNIS hourly volumes provided in **Figure 8** to **Figure 11**.

2.2.4 Public Transport

The Passenger Rail Agency of South Africa (PRASA) provides Metrorail services within the Cape Metropolitan area, including Stellenbosch Municipality (SM), which is served by a branch of the Northern Line. This line includes seven stations within the Stellenbosch Municipality: Lynedoch, Vlottenburg, Stellenbosch (CBD), Du Toit, Koelenhof, Muldersvlei, and Klappmuts, spanning approximately 18 km. Refer to **Figure 16** for the Cape Metro rail map showing this section.

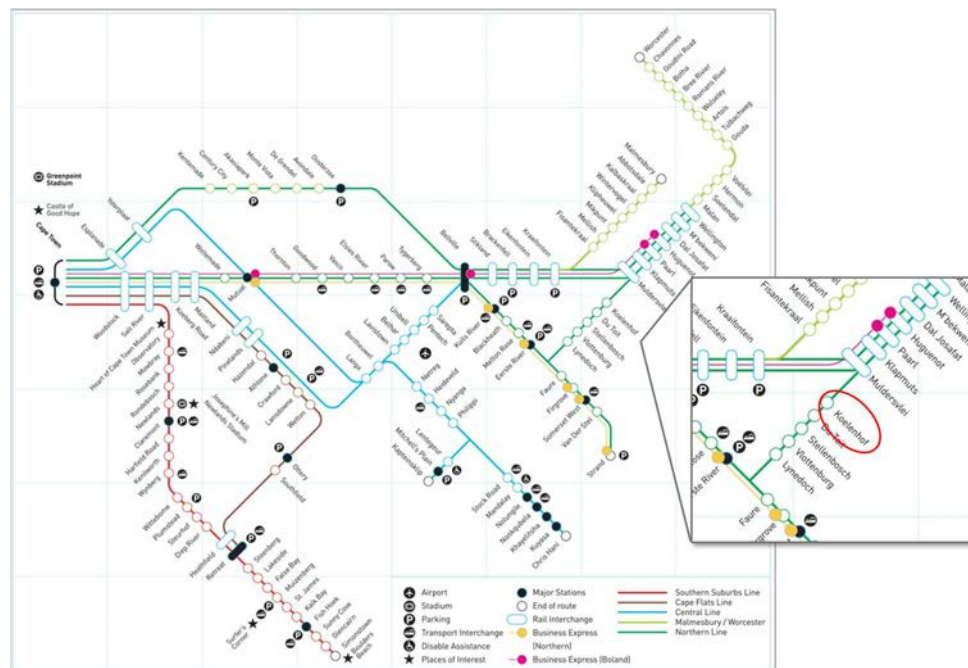


Figure 16: Cape Town Metro Rail Network (Source: PRASA, 2025)

The Koelenhof rail station is located to the west of the Nootgedacht Village development and east of the future Koelenhof Estate. All the future developments within the Koelenhof node are located within a 1.4 km radius of the station.

PRASA classifies its rail lines into three categories—A, B, and C—based on strategic importance and passenger volumes, with Category A lines receiving the highest priority. The Stellenbosch branch is classified as Category C (Stellenbosch Municipality, 2022).

It should be noted that no recent data is available on rail operations or ridership for Stellenbosch. The most recent rail census dates to 2012 and is considered outdated due to the significant decline in Metrorail services in the region. The dualling of the Northern Line through Stellenbosch remains a priority project in PRASA's planning agenda (Stellenbosch Municipality, 2022).

Minibus-taxi (MBT) movements were also surveyed along the study roads. The MBT volumes for the surveyed peak periods for both morning and afternoon peak periods are provided in **Figure 17**. High volumes of MBTs were observed along Bottellary Road and R304 for the eastbound right turn movement and northbound left-turn and through movements.

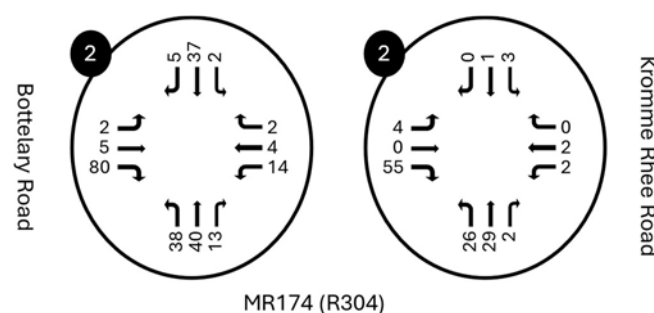


Figure 17: MBT volumes during the morning (left) and afternoon (right) peak hours at the intersection of R304/Bottellary Road/Kromme Rhee Road

2.3 Traffic Distribution

The existing developments in the Koelenhof area (Devonbosch and Nooitgedacht Village) are two primary land uses that have developed over time. Devonbosch consists mainly of offices (at this stage), and Nooitgedacht Village mainly of residential. The current travel patterns of these land uses provide a better understanding of the future travel patterns and how they can change over time if this node develops.

Probe data was utilised to determine the existing traffic distribution within the study area. This data, derived from anonymised GPS and mobile device tracking, provides detailed insights into actual travel patterns and directional flows. By analysing probe data, a more accurate representation of current traffic behaviour across the network was obtained, which forms a critical input for calibrating the base-year transport model.

2.3.1 Koelenhof Area

Probe data was obtained for the larger Koelenhof area as well as the existing Devonbosch and Nooitgedacht Village development. The Devonbosch probe data represents office trips (attraction trips), and the Nooitgedacht Village probe data represents residential trips (production trips). Refer to **Figure 18** for these development areas and the larger Koelenhof area that was used to obtain probe data.

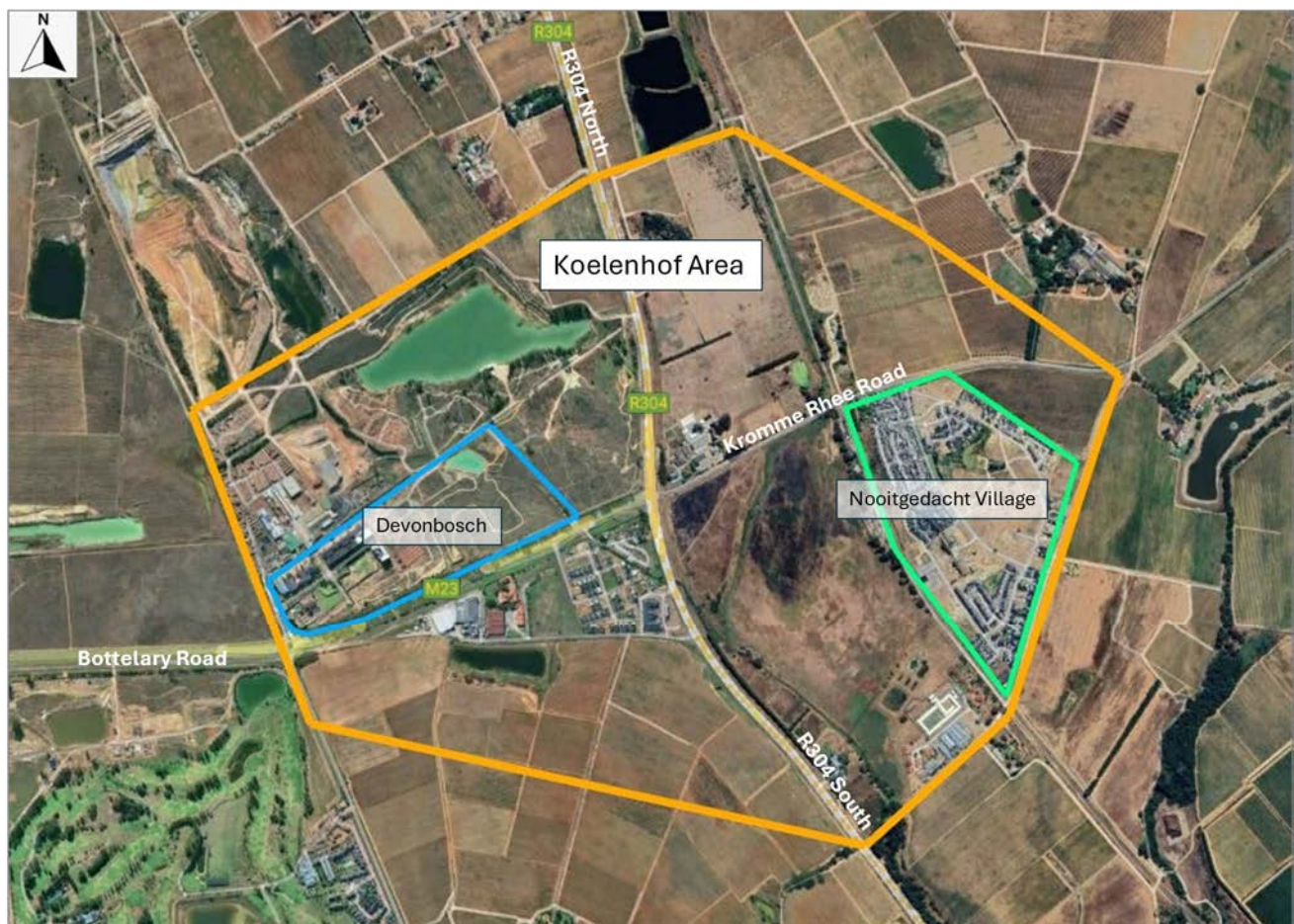


Figure 18: Koelenhof Probe Data Areas

The samples that were obtained from the probe data are provided in **Table 3** and **Table 4**. The data in these tables represent the number of vehicles that were departing and arriving from the identified area. The data was obtained for a whole month and represents all the trips to and from the area during the day.

Table 3: Probe Data for Nooitgedacht Village (February 2024)

To/From	Departing from Nooitgedacht Village	Arriving at Nooitgedacht Village	Total	%
Bottelary	100	125	225	11%
R304 (north)	199	126	325	16%
Kromme Rhee	505 (402*)	504 (389*)	1 009 (791*)	49% (39%*)
R304 (south)	235	252	487	24%
Total	1 039	1 007	2 046	100%

* Number of trips to/from Stellenbosch via R44

From the above table, it is evident that the majority of residents use the R44 to travel to/from Stellenbosch. It must be noted that the congestion of the R304 at Kayamandi and Adam Tas Road increases the demand along the R44. Refer to **Figure 19** for the distribution of residential land uses represented on a map.

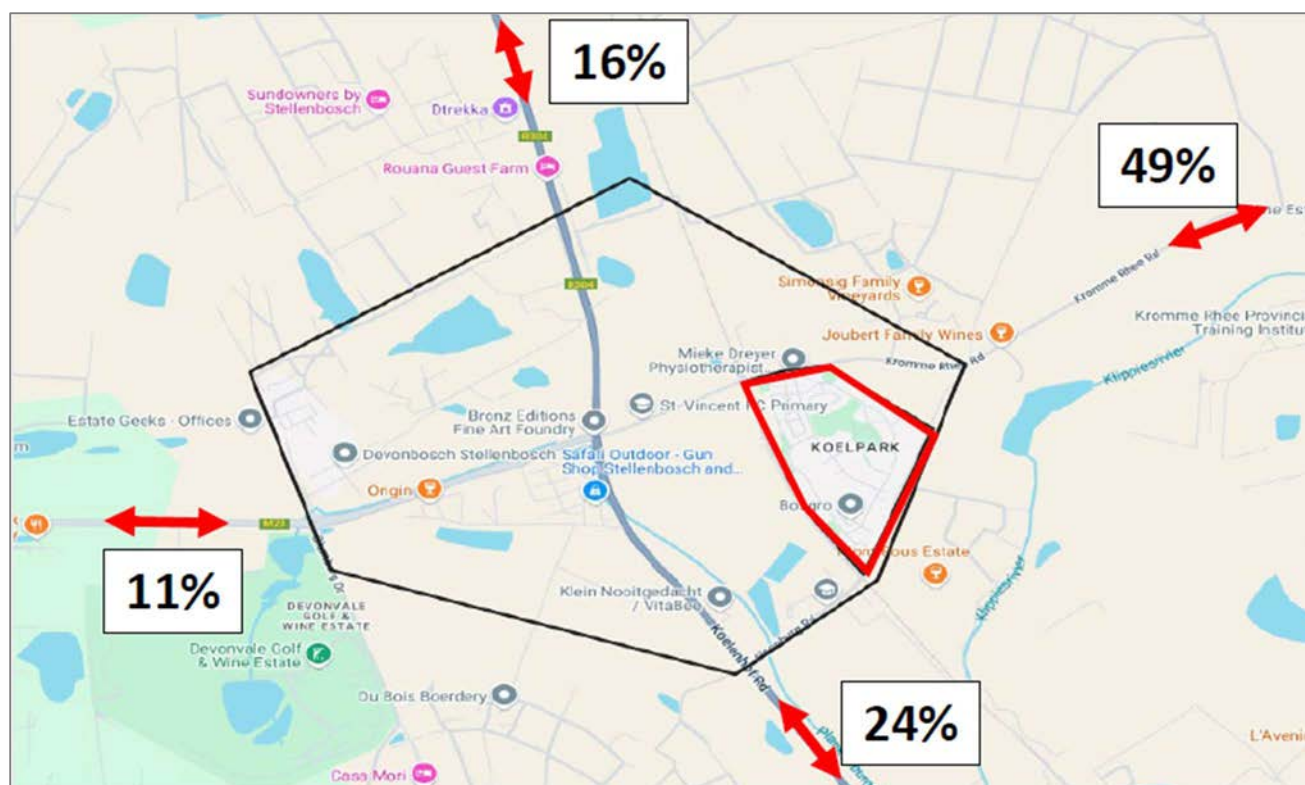


Figure 19: Existing trip distribution for residential land use

The probe data for Devonbosch is provided in **Table 4** and provides the traffic distributions for trips to and from Devonbosch.

Table 4: Probe Data for Devonbosch (February 2020)

To/From	Departing from Devonbosch	Arriving at Devonbosch	Total	%
Bottelary	289	298	587	46%
R304 (north)	148	116	264	21%
Kromme Rhee	23 (6*)	30 (7*)	53 (13*)	4% (1%*)
R304 (south)	168	191	359	28%
Total	628	635	1 263	100%

* Number of trips to/from Stellenbosch via R44

The majority of workers travel from/to Kuilsriver along Bottelary Road. Approximately 1% of trips to/from Devonbosch travel along Kromme Rhee Road towards Stellenbosch. Approximately 28% travel to/from Stellenbosch using the R304. Refer to **Figure 20** for the trip distribution of office land uses represented on a map.

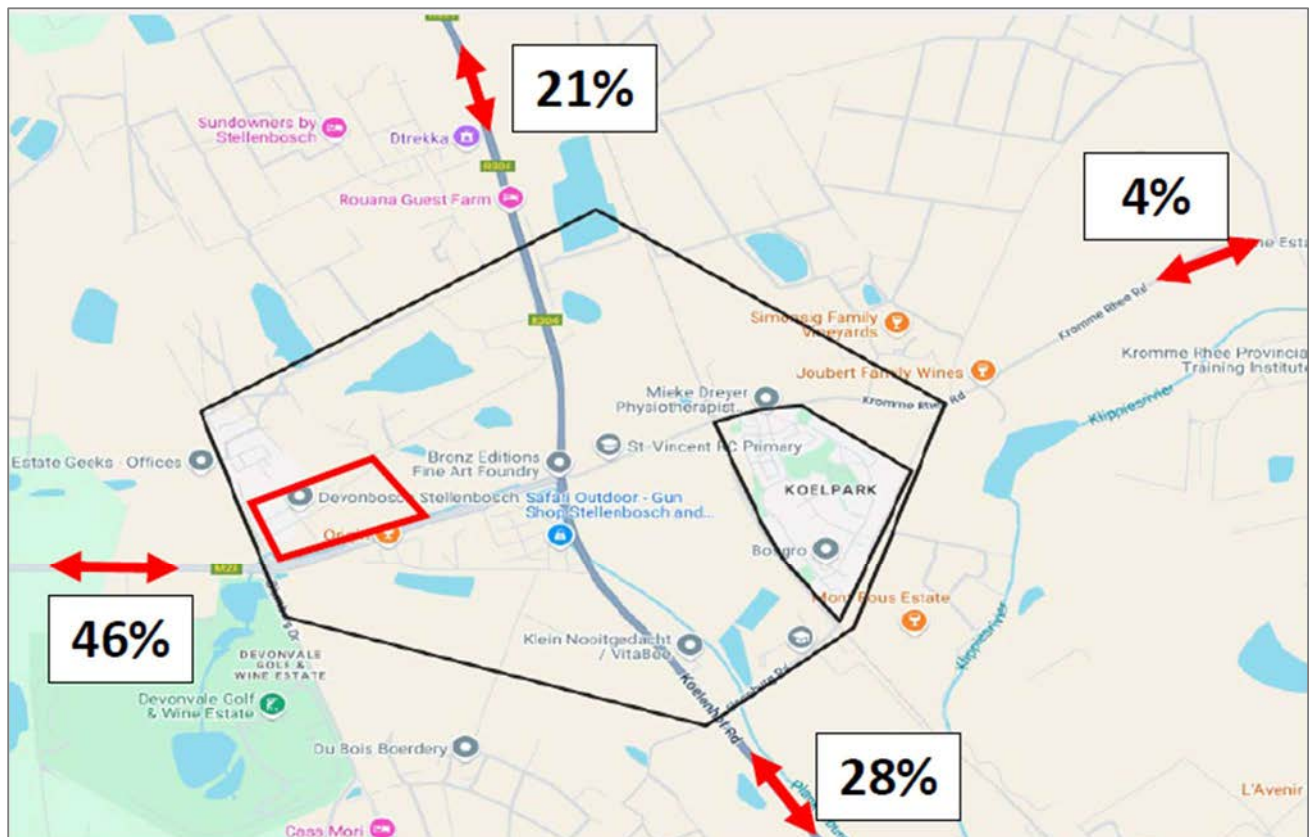


Figure 20: Existing trip distribution for commercial land use

The probe data for the wider Koelenhof area are provided in **Table 5** and provides the traffic distributions for trips to and from the Koelenhof area. This distribution considers a combination of all the different land uses in the Koelenhof area.

Table 5: Probe Data for Koelenhof Area (February 2024)

To/From	Departing from Koelenhof Area	Arriving at Koelenhof Area	Total	%
Bottelary	1 068	1 120	2 188	21%
R304 (north)	1 604	1 117	2 721	27%
Kromme Rhee	771 (511*)	844 (510*)	1 615 (1 021*)	16% (10%*)
R304 (south)	1 633	2 062	3 695	36%
Total	5 076	5 143	10 219	100%

* Number of trips to/from Stellenbosch via R44

Refer to **Figure 21** for the trip distribution of existing land uses in the larger Koelenhof area. Approximately 48% of trips to/from the Koelenhof area are split between Kuilsriver and the N1 freeway direction.

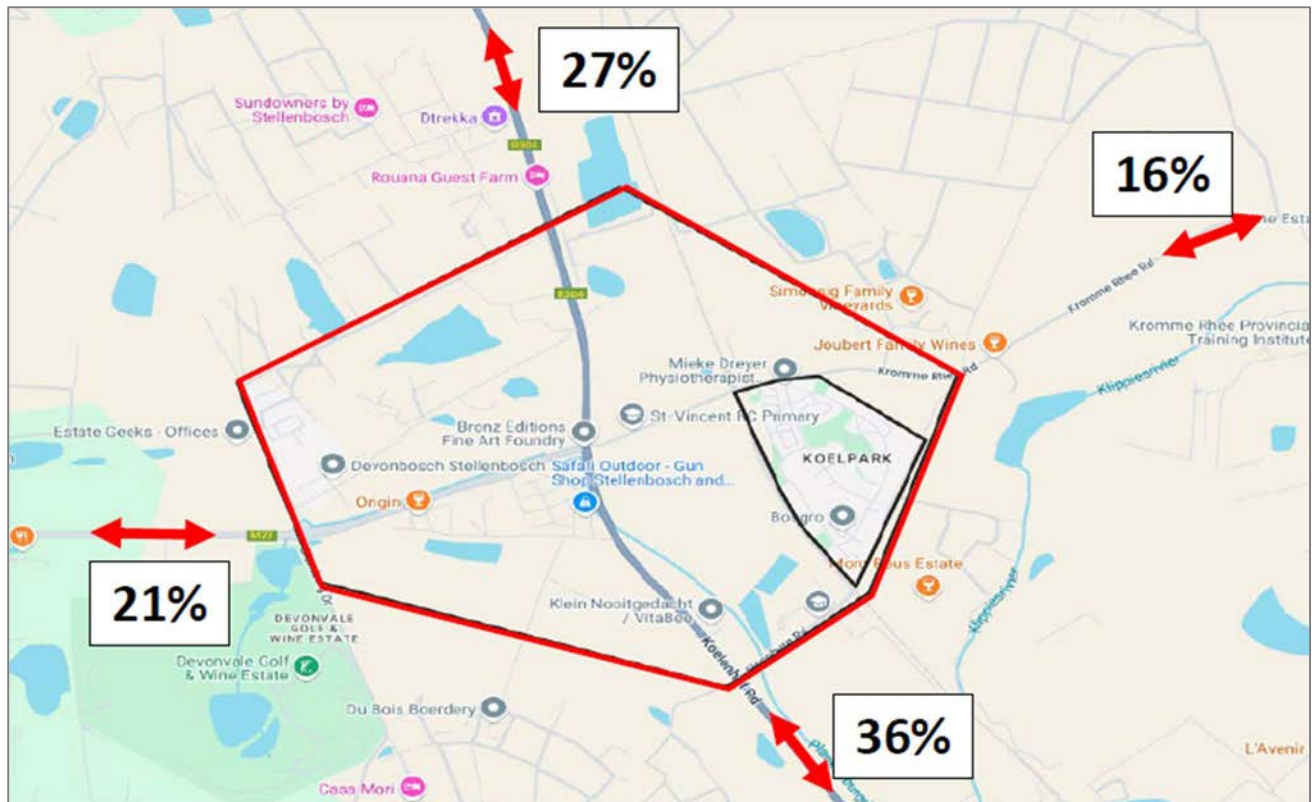


Figure 21: Existing trip distribution for the larger Koelenhof area

3 FUTURE DEVELOPMENTS

3.1 Future Road Network

All the study roads are currently one lane per direction. It is planned to dual MR174 (R304) and is currently in the concept design phase, which is undertaken by SMEC. It is ideal that the outcome of this transport master plan study will provide insight into the future cross-section for the MR174 going through the Koelenhof area.

The WCG also indicated the upgrade of Kromme Rhee Road in the near future. It is also suggested to reclassify Kromme Rhee Road to a Class 3. However, this decision should be reconsidered given the assessment of the road network and development proposals presented in this master plan.

3.2 Future Land Uses

The Koelenhof area has experienced significant development activity in recent years, contributing to increased pressure on the surrounding transport network, and Koelenhof was identified by the Stellenbosch Municipality as a high development node. The following key developments include:

- Devonbosch, a large-scale mixed-use precinct comprising residential, commercial, and light industrial components, is positioned to become a major node in the region.
- Koelenbosch is an established residential development offering a mix of housing typologies.
- Koelenhof Estate is a mixed-use development comprising residential, retail and institutional developments.
- Malanshoop, located to the north, will develop into a retirement village.
- Nooitgedacht, located closer to Stellenbosch, is a well-established residential and lifestyle estate that continues to expand with new phases.

Collectively, these developments reflect the transition of the Koelenhof area from predominantly rural land uses to urbanised land use. Refer to **Figure 22** for future developments in the Koelenhof area and the land use extents expected for each precinct of the Koelenhof area. These land uses include the existing school adjacent to Malanshoop and the existing residential/retail adjacent to the Koelenbosch residential development.

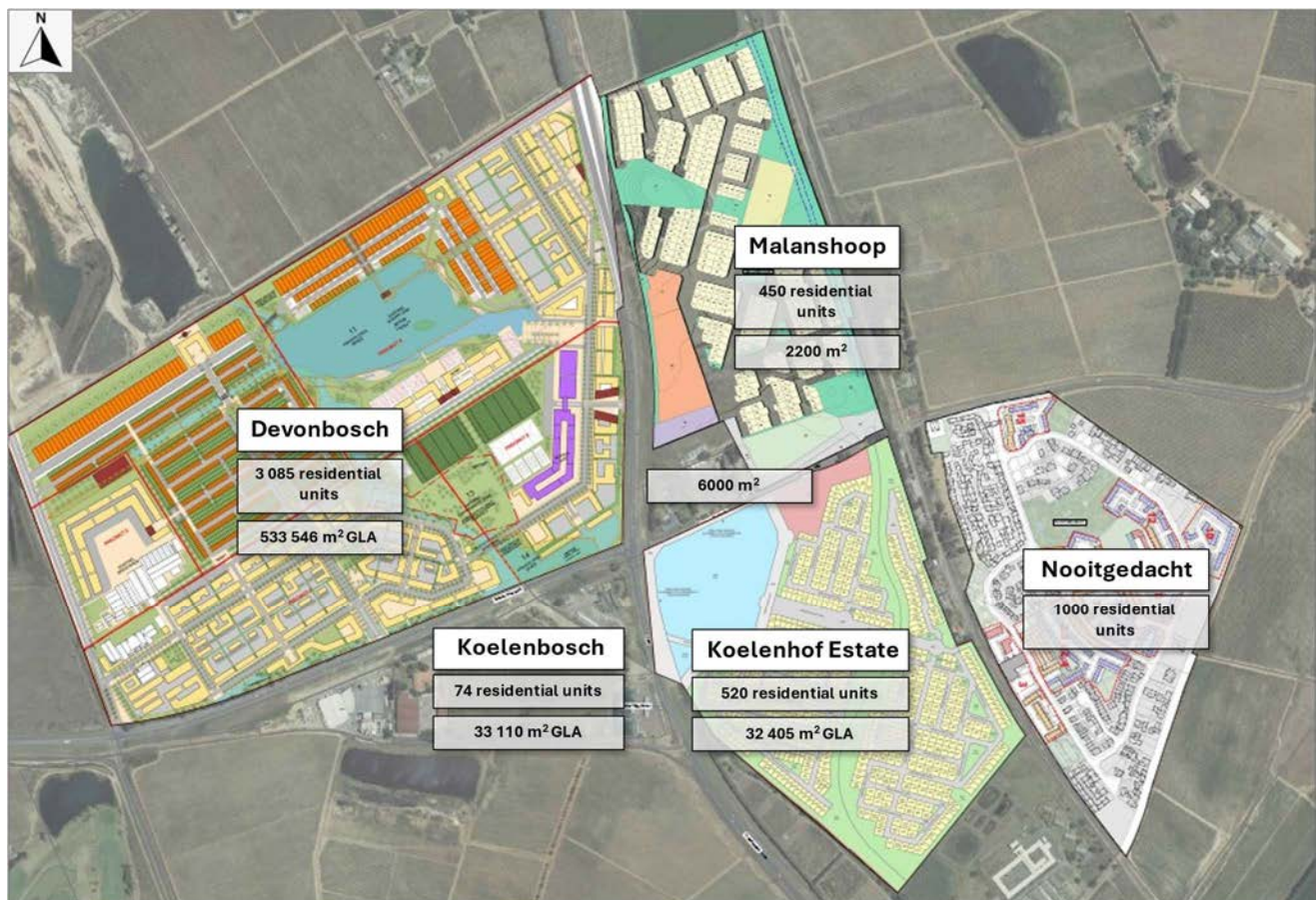


Figure 22: Future Land Uses (including existing)

Each development was assessed individually in previous traffic impact assessments, with little consideration given to the potential interaction between land uses across the different quadrants/precincts. The previous assessments assumed that each development would generate internal traffic travelling out of the Koelenhof area and attract traffic from outside the Koelenhof area.

Once the individual assessments were submitted to the Stellenbosch municipality, it was decided that greater integration between land uses could improve overall efficiency and reduce the expected trips that can be generated. For example, if residents could walk to nearby shops or work within the same area, the need for external trips would be reduced. The previous assessments did not account for the various land uses to complement each other. Therefore, the need for a transport master plan was identified.

To further illustrate the need for the various quadrants to complement each other, the attractions and productions per land use and quadrant are summarised in **Figure 23**.

This figure illustrates that quadrants 1 and 2 will generate trips, and quadrants 3 and 4 will attract more trips during the peak hours. This will create the need for travel between the quadrants across the R304, Bottelary Road and Kromme Rhee Road.

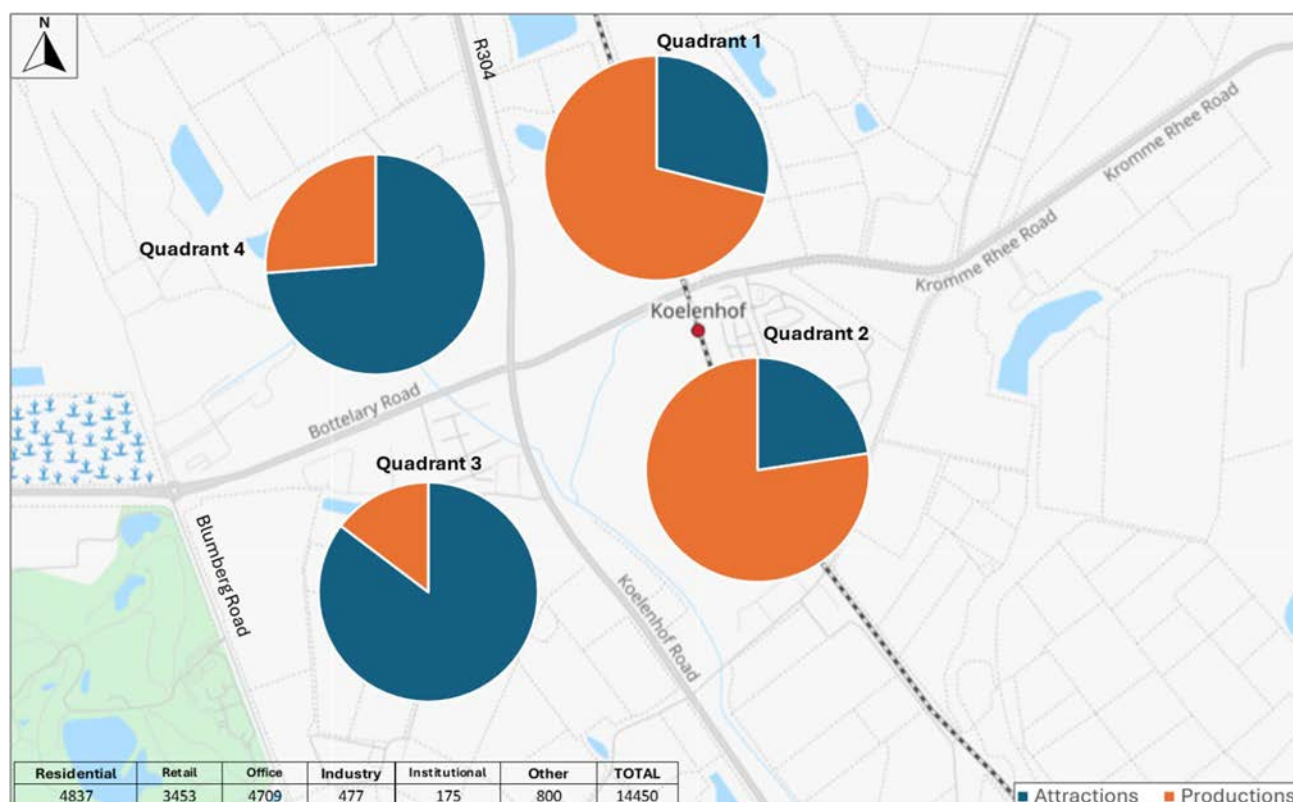


Figure 23: Trip attractions and productions per quadrant for the future Koelenhof Area

3.3 Trip Generation

Taking the total land uses per quadrant (provided in **Figure 22**) into account and applying the trip rates as indicated for each land use in the TMH 17, the following trips are expected to be generated by each land use and quadrant for a typical afternoon peak hour:

Table 6: Expected Total Trips for Future Koelenhof Area

Land Use	Extent	Unit	Typical Trip Rate	Unit	Expected Trips
Residential (units)	5 129	Units	0.85-1.00	per unit	4 837
Retail (m ²)	101 557	m ²	3.40	100 m ² /GLA	3 453
Office (m ²)	313 930	m ²	1.50	100 m ² /GLA	4 709
Industry (m ²)	95 376	m ²	0.5	100 m ² /GLA	477
Institutional (m ²)	58 320	m ²	0.3	100 m ² /GLA	175
Other (m ²)	38 080	m ²	2.10	100 m ² /GLA	800
TOTAL TRIPS					14 450

The total conventional trips expected for the future Koelenhof Area are 14 450 afternoon peak hour trips. Applying the trip distribution, for the existing land uses as discussed in Section 2.3, it is expected that the total trips distributed along the existing road network will be the following:

Table 7: Expected Trip Distribution with Conventional Methods

	% Distribution for Residential	Total Residential Peak Hour Trips	% Distribution for Commercial/ Other	Total Commercial/ Other Peak Hour Trips	TOTAL
R304 (Towards N1)	16%	774	21%	2 019	2 793
R304 (towards Stellenbosch)	24%	1 161	28%	2 692	3 853
Kromme Rhee	49%	2 370	5%	481	2 851
Bottelary Road	11%	532	46%	4 422	4 954

The total future trips provided in **Table 7** represent the existing travel patterns for the Koelenhof area, along with the expected future trips that will be distributed along the study roads. It is important to note that the above table represents only the additional trips and doesn't account for the existing trips or regional growth.

According to the FHWA (2017), the typical capacity of a single carriageway is approximately 1,200 vehicles per hour per lane. When placing the projected additional trips into context, it becomes evident that accommodating future demand would require 3 to 4 lanes per direction along the study roads. This is not only impractical from an infrastructure and land-use perspective, but it would also effectively divide the future town into four disconnected quadrants, significantly limiting integration and connectivity between them.

The Koelenhof node will accommodate various land uses in the future and should therefore be analysed as an integrated urban node, rather than as isolated developments with no interaction between land uses. Based on the traffic volumes presented in the previous tables and the expected transport infrastructure required to accommodate these volumes, it is anticipated that this could result in abortive infrastructure. To better understand what a typical trip generation for an urban node would look like, Stellenbosch town was used as a case study.

3.4 Stellenbosch Case Study

To gain a better understanding of the typical traffic generated by a town, traffic volumes and patterns for Stellenbosch were analysed. The objective was to observe the typical externally generated traffic volumes during the morning peak hour and to assess how this traffic is distributed across the main access routes into the town of Stellenbosch. The most recent available traffic count data (2024), along with probe data, were utilised to provide greater insight into Stellenbosch's prevailing traffic volumes, route choices, and overall travel patterns. Thereafter, to compare these findings to the expected traffic and travel patterns for the Koelenhof node.

3.4.1 Traffic Volumes

The major transport corridors serving inbound and outbound traffic to and from Stellenbosch were identified for the analysis. The latest available traffic count data was used to assess peak hour traffic volumes along these key routes. The following primary corridors were identified:

- R304 towards Koelenhof
- R44 North towards Klipmuts

- R44 South towards Somerset West
- R310 (Devonvalley)
- R310 (Helshoogte Road)

Refer to **Figure 24** for the location of these counts along the identified corridors.

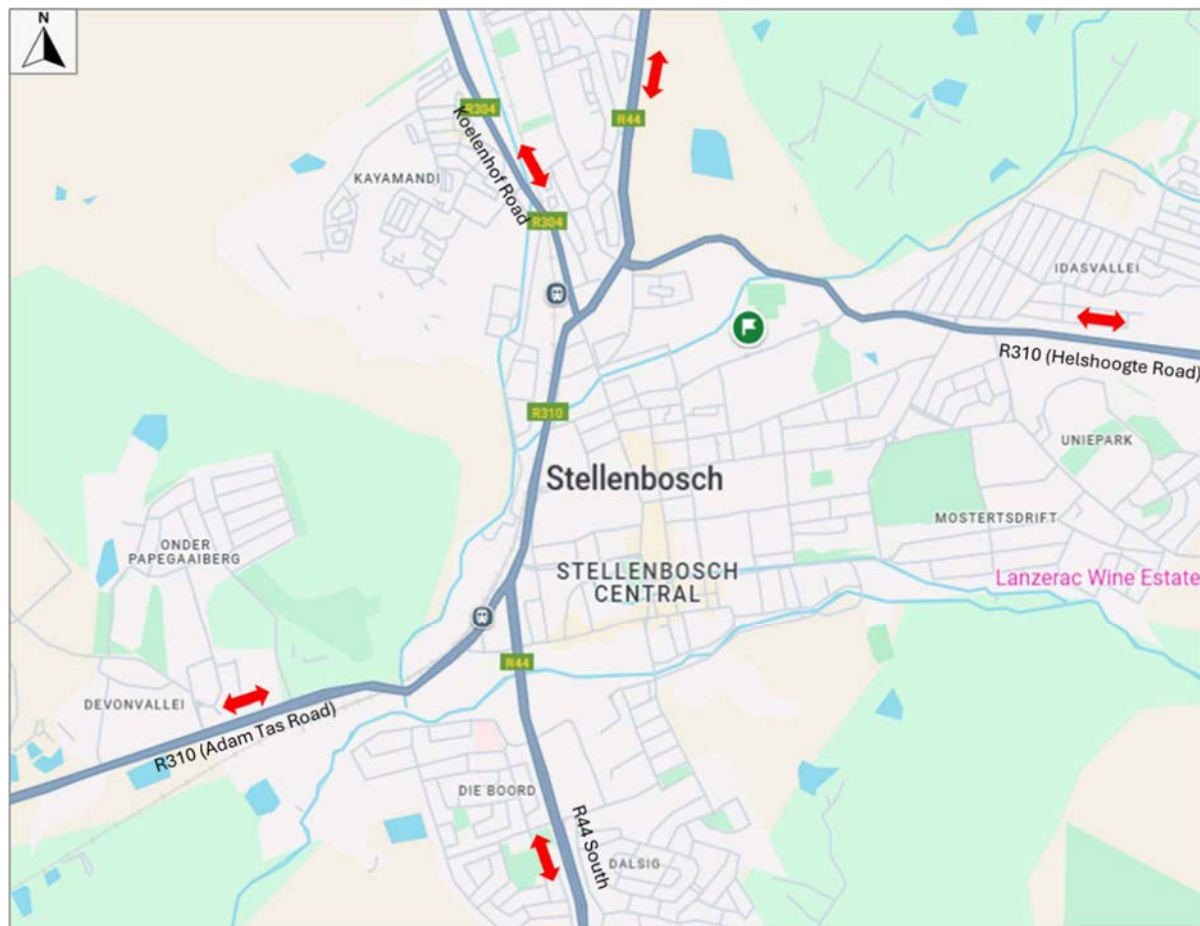


Figure 24: Traffic count locations for Stellenbosch

Both the morning and afternoon peak hours were analysed, and the volumes for the peak hours are provided in **Table 8**.

Table 8: Peak Hour Volumes In and out of Stellenbosch

Corridor	AM Peak Hour		PM Peak Hour	
	IN	OUT	IN	OUT
R304	1 368	657	642	1 085
R44 North	1 305	679	993	983
Helshoogte	572	653	486	822
R44 South	1199	1 276	1 254	1 307
Baden Powell	1 325	883	1 056	972
Total	5 769	4 148	4 431	4 169
TOTAL per peak hour	9 917		9 600	

The above table indicates that approximately 9 900 veh/h are travelling in and out of Stellenbosch during the morning peak hour and 9 600 veh/h in and out during the afternoon peak hour. It is important to note

that the queues into Stellenbosch extend to over an hour, and the above figures are only representative of the hour with the highest volumes into and out of Stellenbosch. It therefore also may not include actual demand due to congested conditions. Refer to the following figures showing the morning and afternoon peak periods indicating that the demand is spread over a 2-hour period. The locations of these counts are at the intersection of R44/R310 representing the northern side of Stellenbosch and the R44/Dorp Street representing the southern side of Stellenbosch.

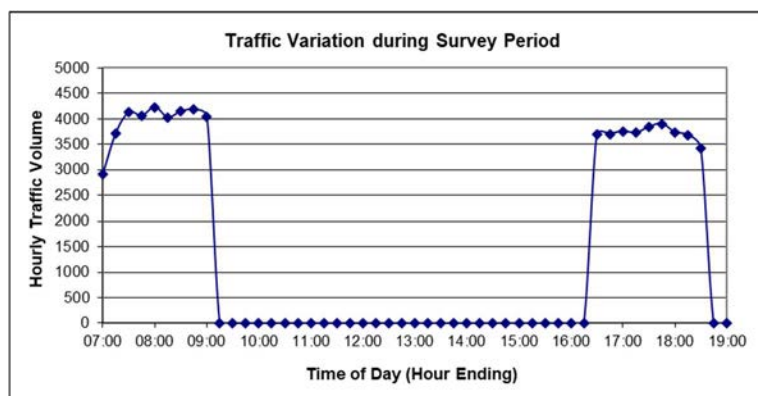


Figure 25: Intersection of R44/R310 Hourly Volumes (February 2024)

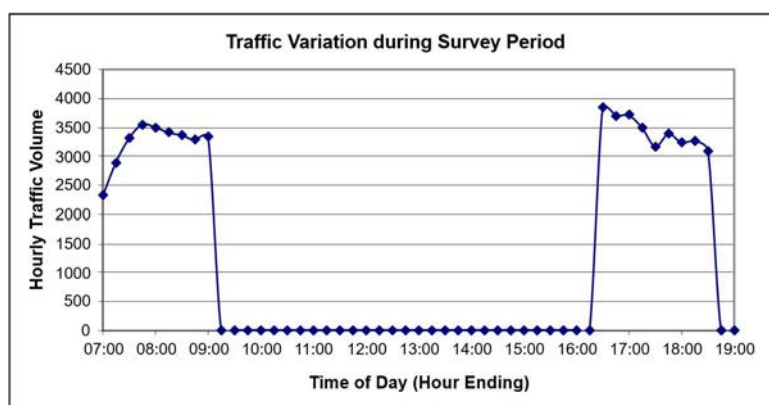


Figure 26: Intersection R44/Dorp Street Hourly Volumes (February 2024)

Comparing the ~9 600 veh/h for Stellenbosch during the afternoon peak hour to the future expected trips for the Koelenhof area, it is expected that Koelenhof will produce more trips during the afternoon peak hour than the town of Stellenbosch. This clearly indicates that one cannot apply the conventional TMH trip generation rates without applying reduction factors and make allowance for internal trips associated with integrated land uses inside the Koelenhof area.

If conventional trip generation methods are applied to the Koelenhof node, they predict a disproportionately high volume of external trips, surpassing those expected for Stellenbosch. This highlights a potential overestimation in applying standard methodologies to the development of an urban node like Koelenhof, where internal trip generation and integration between land uses are likely to be much higher which reduces the external trip generation.

3.4.2 Probe Data

Probe data was collected for Stellenbosch town to understand the distribution of trips going in and out of Stellenbosch during the morning and afternoon peak periods. The following times were used for the peak periods:

- Morning Peak Period: 06:00-09:00
- Afternoon Peak Period: 16:00-19:00

Refer to **Figure 27** and **Figure 28** for the trip distribution for Stellenbosch during the morning and afternoon peak periods, respectively.

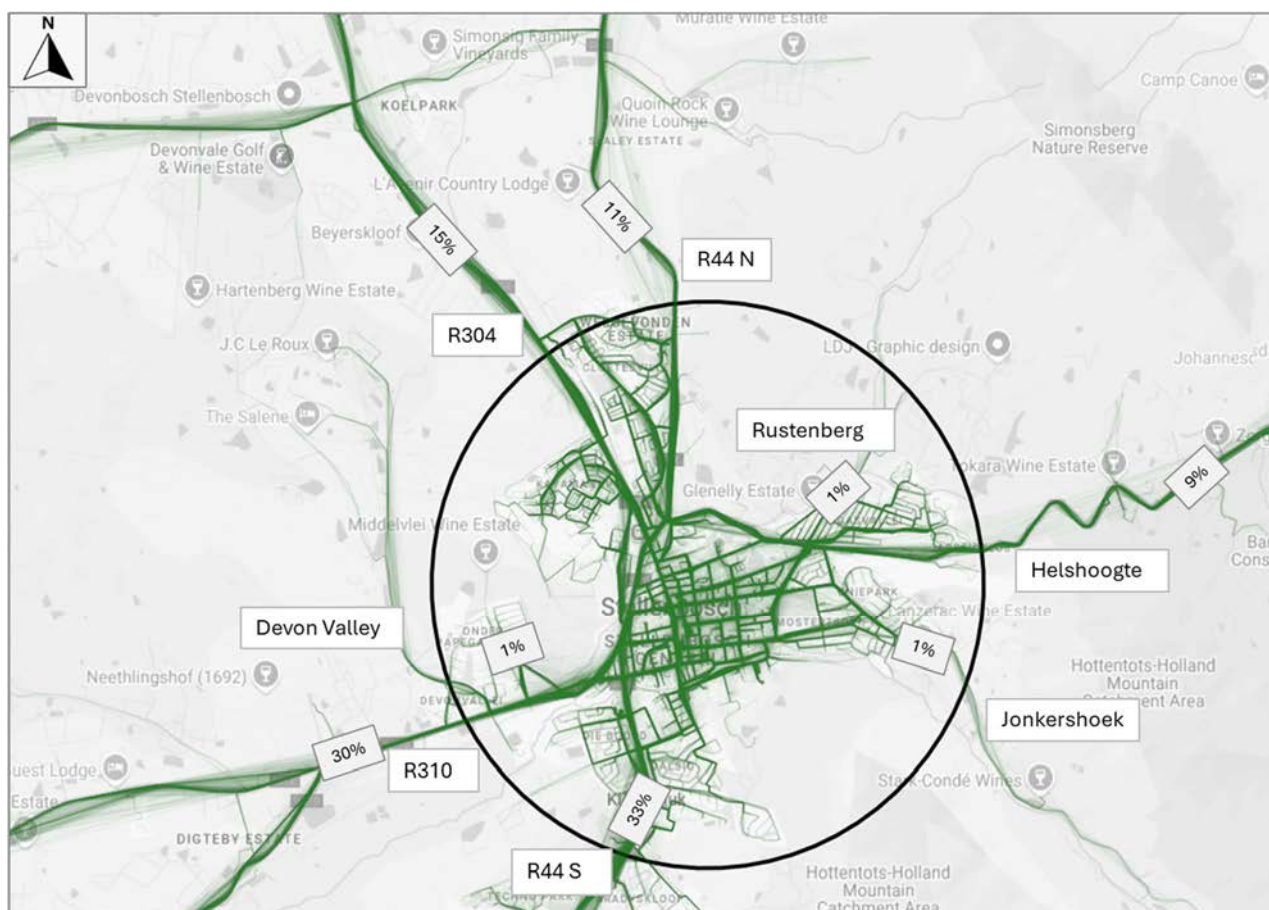


Figure 27: Probe Data Trip Distribution for Stellenbosch: AM Peak Period Inbound

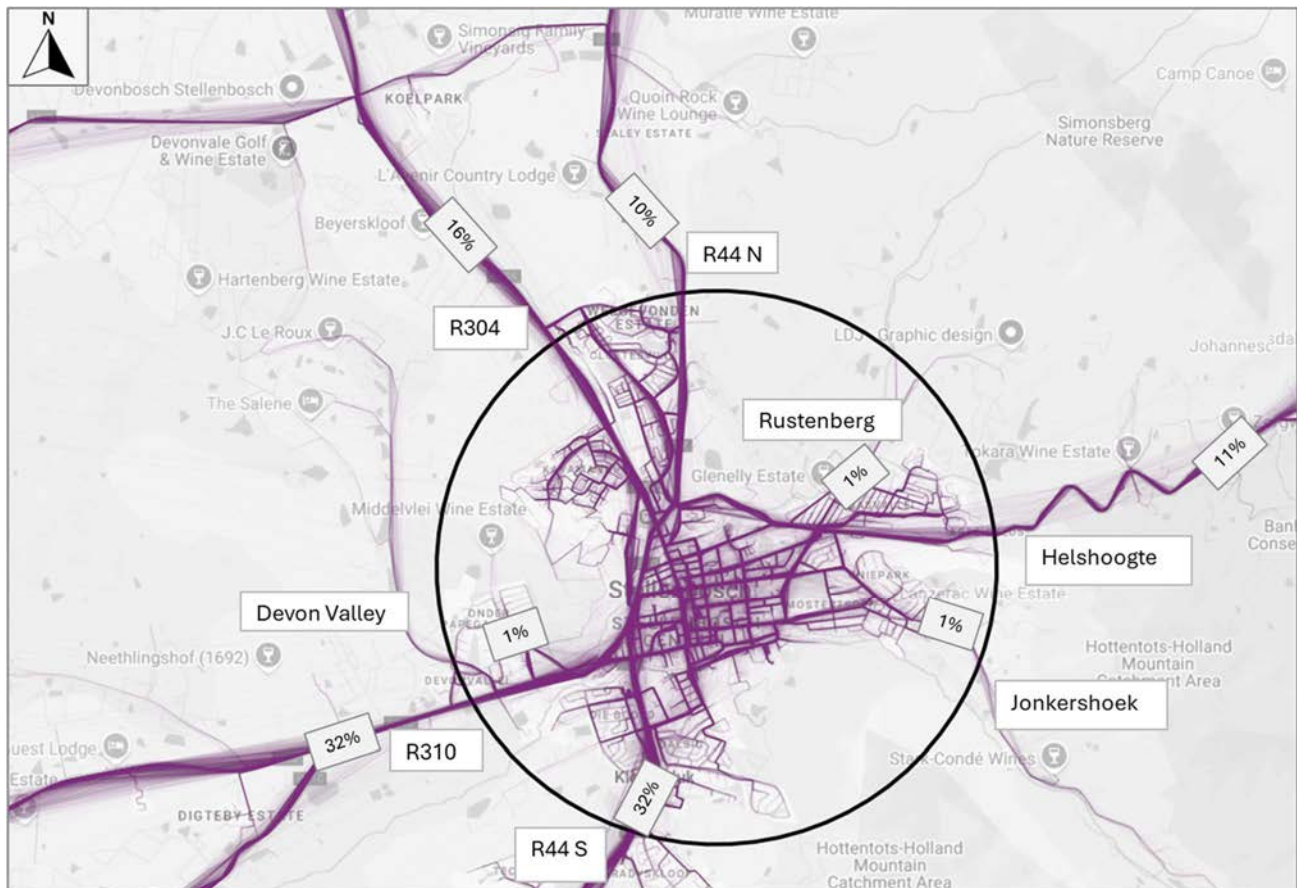


Figure 28: Probe Data Trip Distribution for Stellenbosch: PM Peak Period Inbound

3.5 Trip Reduction

Based on the preceding discussion regarding expected future development trips and the comparison with trips generated by Stellenbosch, there is clear justification for applying trip reduction factors to the Koelenhof node. This approach accounts for the likely integration of land uses and internal trip capture, which conventional trip generation methods may otherwise overestimate.

The following trip reduction factors will be discussed and motivated:

- Mixed-use
- Public Transport

3.5.1 Mixed-use reduction

The mixed-use reduction factor accounts for the interaction between different land uses within a development or area that reduces the overall number of external trips. In mixed-use environments—where residential, commercial, institutional, and recreational uses are located in close proximity—many trips can be made internally, either by walking, cycling, or short internal vehicle trips, thereby reducing the reliance on external road networks.

The following can be applied to the Koelenhof area:

- **Intra-Precinct Trip Reduction:** At intra-precinct level, the reduction factor is applied within a single development or node (e.g., Koelenhof or Devonbosch). This assumes a high level of internal trip production and attraction due to the spatial integration of land uses. For example,

residents may live, work, shop, and access services within the same precinct, eliminating the need for external vehicle trips. Trip generation calculations can therefore be adjusted downward by applying mixed-use reduction factors to the trip rates based on the mix and balance of land uses. Refer to **Figure 29** for the graphical representation of intra-precinct connectivity.

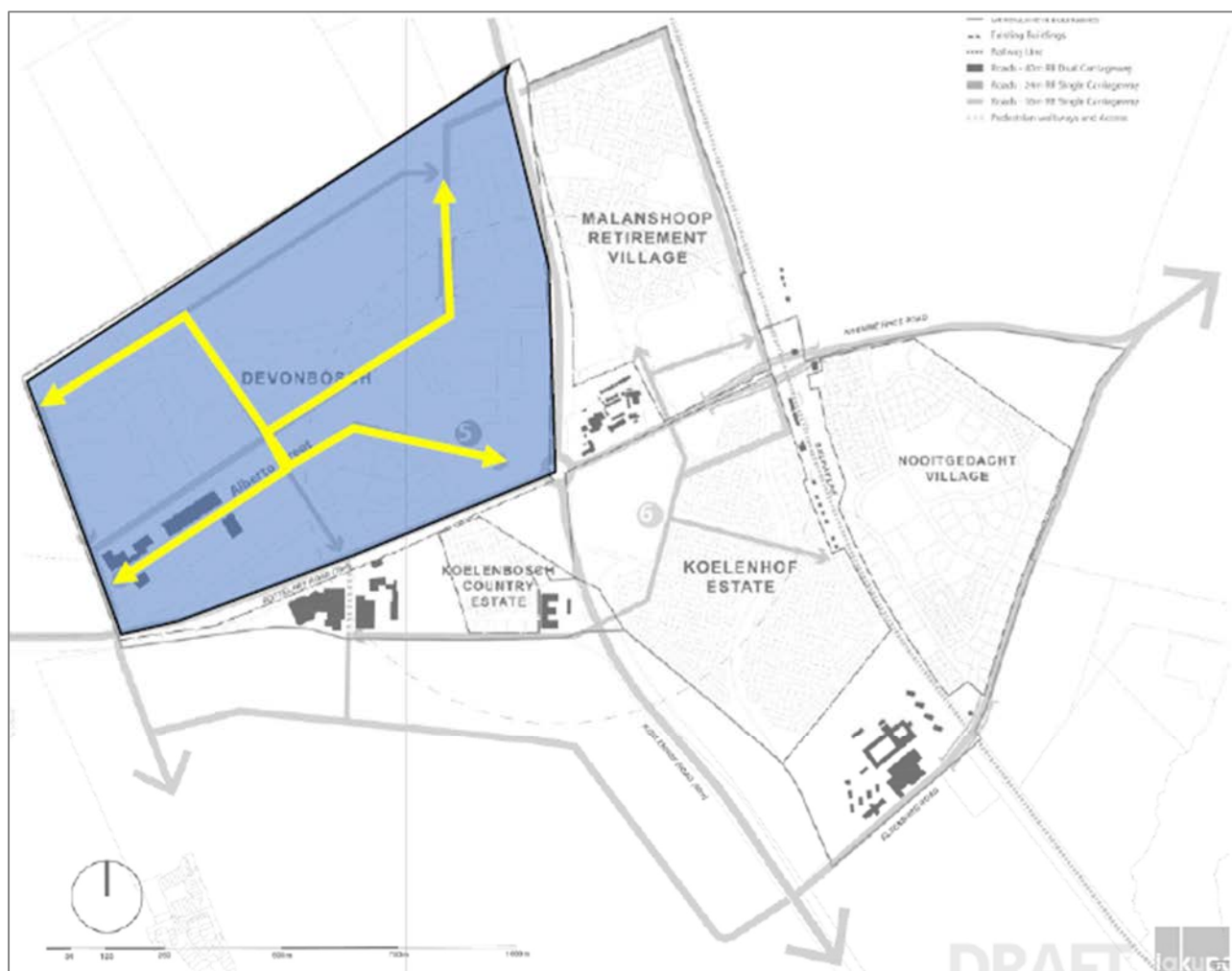


Figure 29: Graphical representation of intra-precinct connectivity (Jakupa, 2025)

- **Inter-Precinct Trip Reduction:** At inter-precinct level, the reduction factor can be extended to neighbouring or adjacent precincts where strong functional relationships and connectivity exist. For example, if Koelenhof Estate is designed to complement surrounding precincts through well-connected local streets, shared facilities, and coordinated land use planning, it is reasonable to assume that some trips will be absorbed within this broader network rather than placed on regional roads. This justifies further reductions in projected external trips. Refer to **Figure 30** for the graphical representation of intra-precinct connectivity.



Figure 30: Graphical representation of inter-precinct connectivity (Jakupa, 2025)

In both cases, the successful application of mixed-use reduction factors depends on land use mix, density, connectivity, and transport infrastructure, and should be supported by a contextual assessment rather than rigid application of standard trip generation rates. Refer to **Table 9** for the illustration of the mixed-use reduction factor.

Table 9: Expected trips with mixed-use reduction factor

	Attractions	Productions	Total	% Intra	Reduced	% Inter	Reduced
Quadrant 1: North-East - Malanshoop Estate	64	158	222	~15%	188	~15%	160
Quadrant 2: South-East - Koelenhof Estate	444	1 520	1 964		1 669		1 419
Quadrant 3: South-West - Koelenbosch Estate	430	74	504		430		365
Quadrant 4: North-West - Devonbosch Estate	8 676	3 085	11 761		9 996		8 497
Total	9 613	4 837	14 450		12 284		10 441

Balancing trip attractions and productions across the various quadrants indicates that the applied 15% mixed-use reduction factor is a conservative estimate. In reality, a higher proportion of intra-precinct trips is expected once the Koelenhof area is fully developed, due to the proximity and integration of complementary land uses. However, to maintain a conservative approach, a 15% reduction was applied to both intra-precinct and inter-precinct trips. This ensures that trip generation remains conservative while still acknowledging the benefits of a mixed-use, integrated development. Applying these mixed-use factors reduces the expected future trips to ~10 500 veh/h, which is significantly less than the original expected peak hour trips of 14 450 veh/h.

3.5.2 Public transport reduction

The public transport reduction factor accounts for the anticipated shift of trips from private vehicles to public transport modes, thereby reducing the projected vehicle trips generated by a development. This factor is especially relevant in areas served by established or planned public transport infrastructure, where residents and commuters have viable alternatives to private car use.

Within the Stellenbosch Municipality, the Passenger Rail Agency of South Africa (PRASA) provides Metrorail services as part of the Cape Metropolitan rail network. The Northern Line branch serving Stellenbosch includes seven stations across approximately 18 km: Lynedoch, Vlorentburg, Stellenbosch (CBD), Du Toit, Koelenhof, Muldersvlei, and Klapmuts (see **Figure 16**). The Koelenhof rail station, located strategically between the Nooitgedacht Village development and the future Koelenhof Estate, places all planned developments within the Koelenhof node within a 1.4 km radius of a rail station.

In addition to rail, minibus taxi movements along key study roads such as Bottelary Road and the R304 show substantial usage during peak periods. High volumes were particularly observed on eastbound right-turn and northbound left-turn and through movements, highlighting the importance of this informal yet critical public transport mode in the local travel network (see **Figure 17**).

Given these factors, a public transport reduction factor can be reasonably applied to the trip generation estimates for the Koelenhof node and Stellenbosch urban area. While the availability of rail provides viable alternatives to private car use.

It is important to note that discussions have been held with PRASA, who is aware of the developments surrounding the Koelenhof station and has expressed interest in upgrading the facility to better accommodate future demand in the Koelenhof area.

Based on the potential of rail facilities in the Koelenhof area in the future applying a 15% reduction factor for public transport to the future expected trips provides a total of ~8 900 veh/h for the peak hour after the reduction factor was applied. Refer to **Table 10** for the expected peak hour trips after the reduction factors have been applied.

Table 10: Expected trips with public transport reduction factor included

	Attractions	Productions	Total	% Intra	Reduced	% Inter	Reduced	% PT	Reduced
Quadrant 1: North-East - Malanshoop Estate	64	158	222	15%	188	15%	160	15 %	136
Quadrant 2: South-East - Koelenhof Estate	444	1 520	1 964		1 669		1 419		1 206
Quadrant 3: South-West - Koelenbosch Estate	430	74	504		430		365		310
Quadrant 4: Northwest - Devonbosch Estate	8 676	3 085	11 761		9 996		8 497		7 222
Total	9 613	4 837	14 450		12284		10 441		8 875

Trip reduction factors were applied to account for the integration of land uses within the Koelenhof node and the availability of public transport, both of which are expected to lower external vehicle trip demand compared to conventional estimates. A 15% mixed-use reduction was applied at both intra- and inter-precinct levels to reflect internal trip capture between complementary land uses, reducing the original peak hour trip estimate from 14 450 veh/h to approximately 10 500 veh/h. An additional 15% public transport reduction was applied to account for the proximity of developments to the Koelenhof rail station, planned upgrades to rail facilities, and significant existing minibus taxi usage, further reducing peak hour trips to roughly 8 900 veh/h. These reductions provide a more realistic estimate of future external traffic demand.

4 TRANSPORT RESPONSE FOR KOELENHOF

4.1 Historical Solution

In response to increasing development pressures and growing traffic demand within the Koelenhof node, a historical solution was previously proposed to address future congestion and protect the long-term mobility function of the MR174 (R304). This solution involved the dualling of the MR174, upgrading the current single carriageway to a dual carriageway, to increase capacity and accommodate the anticipated regional traffic growth. The MR174 serves as a key arterial route linking Stellenbosch to the N1 freeway and surrounding areas, and its continued mobility function was considered a critical design objective.

To mitigate delays at the intersection of R304 (MR174), Bottelary Road (M23), and Kromme Rhee Road, identified as the critical node, an interchange was proposed. This would allow MR174 through traffic to pass uninterrupted above the intersection via a newly constructed bridge. In this concept, all intersecting traffic movements would be routed through an at-grade, roundabout positioned below the elevated MR174. This roundabout would facilitate local circulation and manage access to and from the MR174 via directional ramps. The separation of regional through-traffic from local access traffic was aimed at reducing conflict points, improving safety, and maintaining mobility movement along MR174. Refer to **Figure 31** for the concept of the historical approach to the R304 (MR174)/Bottelary Road intersection.



Figure 31: Historical solution to increase in traffic volumes along the R304 (MR174)

While the proposed infrastructure effectively addressed vehicle throughput along the R304 (MR174), the solution focused heavily on car-based transport and assumed conventional traffic generation patterns, with minimal consideration for future shifts toward public transport or non-motorised modes. It also did not integrate with the now-surrounding land use vision of the Koelenhof area. Given the current emphasis

on public transport investment, shuttle services, and land use integration in the Koelenhof area, this historical solution is now being re-examined. Alternative approaches that support mixed-use trip reduction, rail accessibility, and reduced dependency on private vehicles may prove more contextually appropriate and cost-effective in the long term.

4.2 Alternative approach

The Koelenhof node is expected to undergo significant transformation, driven by a combination of existing developments and large-scale future land use applications. In response to the pressures this growth will place on the transport system, a coordinated and holistic transport response is essential. This chapter sets out a forward-thinking strategy aimed at ensuring the long-term sustainability and efficiency of mobility in the Koelenhof area while also maintaining the “hamlet” feel of the Koelenhof area.

The transport response is informed by the cumulative development footprint, expected trip generation patterns, and lessons drawn from comparable towns, such as Stellenbosch. It presents a series of strategic interventions to reduce external trip demand, manage congestion, and improve internal connectivity. Central to this approach is the application of realistic trip reduction factors—such as mixed-use integration and public transport availability—based on the unique characteristics of Koelenhof’s land use and transport context.

This chapter further outlines, on a high level, the proposed upgrades to the road network, enhanced public transport integration (including plans for the Koelenhof Station), and non-motorised transport infrastructure. It aims to balance local access needs with regional mobility objectives while preserving the liveability and connectivity of the future Koelenhof urban node.

The transport response to the objectives for the Koelenhof Transport Master Plan are as follows:

- **Objective 1:** Preserve the mobility function of the R304 (MR174)
Ensure that this key regional arterial route continues to serve as a high-capacity mobility corridor by limiting interruptions and managing access appropriately.
- **Objective 2:** Reduce overall trip generation and dependence on arterial roads
Promote the use of alternative modes of transport, particularly rail, by improving accessibility to public transport facilities, thereby reducing private vehicle usage. This is a key objective and all efforts to implement transport solutions pro-actively to support behavioural change must be prioritized.
- **Objective 3:** Develop safe and continuous non-motorised transport (NMT) infrastructure
Provide dedicated walking and cycling facilities throughout the Koelenhof area to support sustainable and inclusive mobility options. This intervention must also be prioritised to improve the integration between land uses and reduce external trips.
- **Objective 4:** Divert through-traffic away from the Koelenhof centre
Alleviate congestion within the core development area by re-routing regional and non-local traffic via alternative alignments or bypasses.
- **Objective 5:** Implement a practical funding and phased expenditure approach
Prioritise spending of Development Contributions (DCs) on municipal and public transport infrastructure first, thereby enhancing sustainable transport options early. Delay capacity upgrades on provincial roads where possible. Encourage developers to contribute by creating

integrated road networks and offering alternative travel choices that align with sustainable transport objectives.

The following sections will explore each objective in detail, outlining the planned strategies to achieve them. This discussion will ultimately lead to the development of a comprehensive alternative proposal for the Koelenhof area.

4.2.1 Objective 1

To preserve the R304's function as a key regional mobility corridor, several important measures must be implemented to prevent future congestion and maintain its long-term efficiency. One important step is to limit direct access along the R304 by restricting the number of intersections. This approach reduces conflict points between vehicles and helps maintain traffic flow.

Another priority is the implementation of bypass roads designed to divert traffic away from the central Koelenhof node. These bypass routes are expected to decrease current traffic volumes on the R304 by about 40%. Moreover, they will intercept approximately 30% of the additional traffic generated by new developments. As a result, this intervention is estimated to reduce vehicle volumes at the critical R304 and Bottelary Road intersection by around 5 000 vehicles during peak hours, significantly improving capacity and reducing delays. Refer to **Figure 32** for the critical ring roads to be constructed to improve capacity through the critical node.

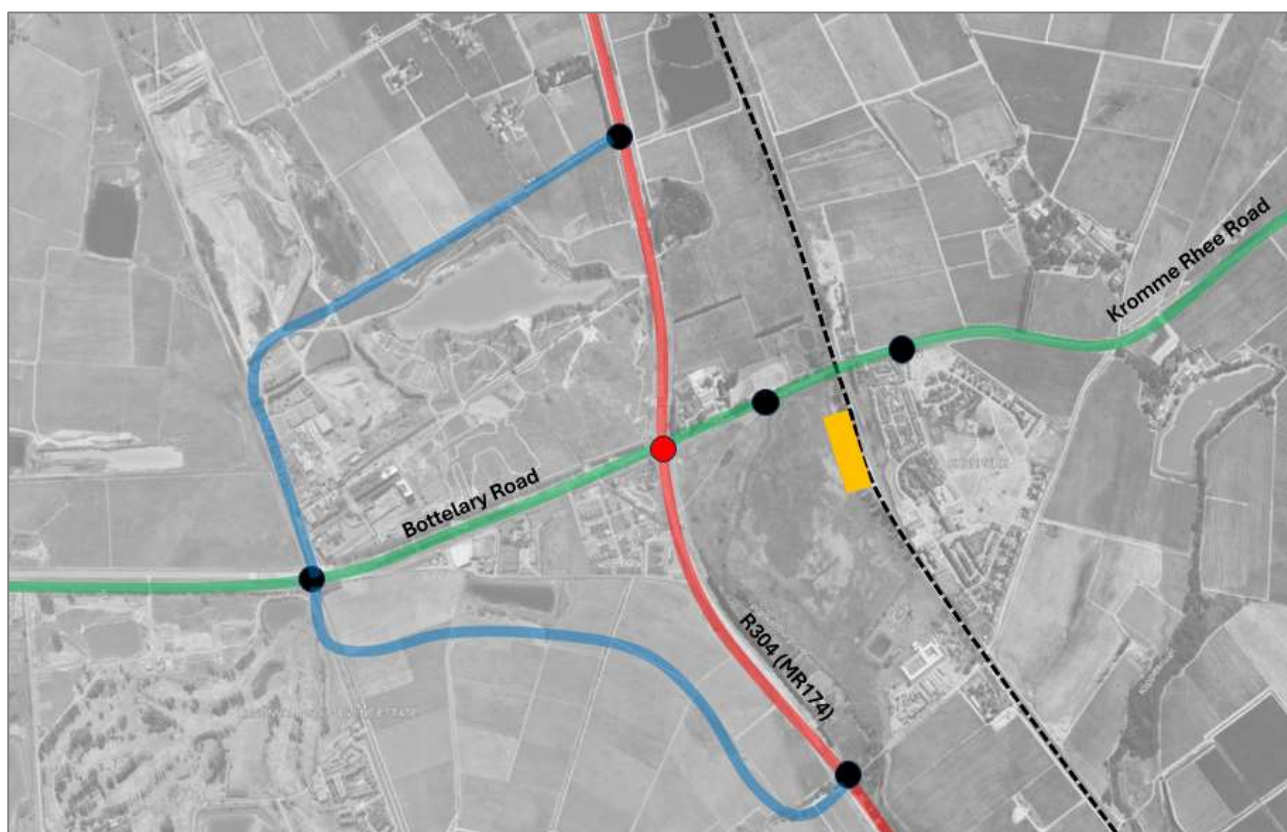


Figure 32: Transport Response 1: Introduce ring roads

4.2.2 Objective 2

Reducing trip generation and dependence on private cars is a crucial strategy for alleviating pressure on the regional road network. This can be achieved by actively encouraging a shift away from private vehicle use towards alternative transport modes.

To counter car dominance, it is essential to promote public and non-motorised transport options. This requires integrated planning and targeted investment in infrastructure that supports these modes, making them more attractive and accessible for everyday travel.

Upgrading and integrating the Koelenhof rail station is a key component of this strategy. By transforming the station into a multimodal hub, it can be better connected to nearby residential, commercial, and institutional areas, facilitating smooth and convenient transfers between different transport modes.

Investing in station accessibility and improving last-mile connectivity is equally important. Enhancements should include better non-motorised transport infrastructure and feeder routes that improve access to both the Koelenhof and Stellenbosch rail stations. Introducing a shuttle service within the Koelenhof area developments will further increase convenience and reliability for rail users. Refer to **Figure 33** for the location of the rail station in relation to the surrounding developments and the important locations where connection to the rail is vital.

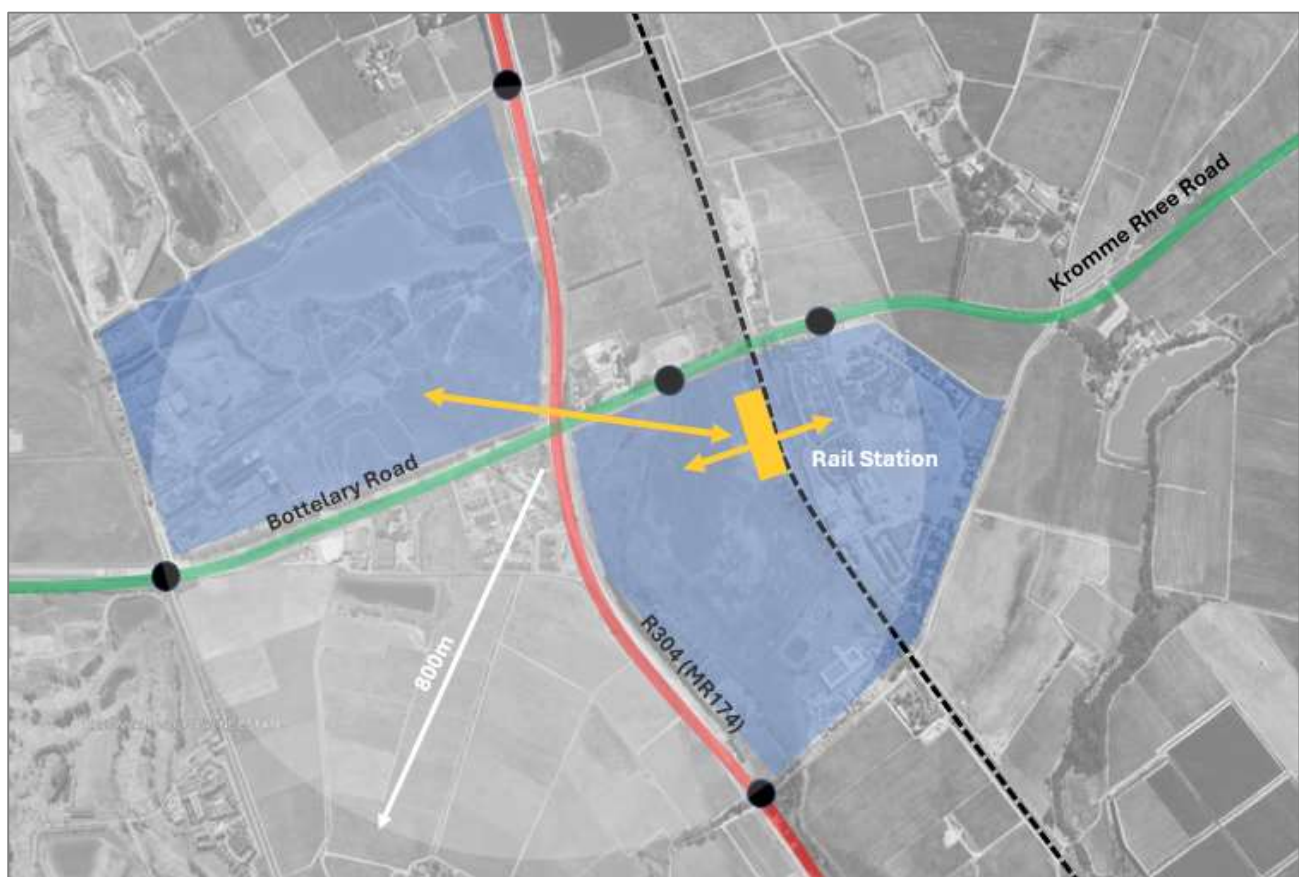


Figure 33: Transport Response 2: Improve connection between rail station and quadrants

Given that over 40% of the development-related traffic is destined to or originate from Stellenbosch, improving rail services and accessibility has the potential to significantly reduce road traffic. If only half of these trips were to shift from private cars to rail, it could result in a reduction of approximately 2 500 vehicles per hour at the critical R304/Bottelary intersection during peak periods.

4.2.3 Objective 3

Prioritising pedestrian infrastructure and internal mobility is essential to promote a walkable and transit-oriented development in Koelenhof. This approach supports sustainable travel and enhances the overall accessibility of the area.

Seamless pedestrian access between different land uses must be ensured by providing continuous, safe, and direct routes connecting residential, commercial, institutional, and transport nodes within and across precincts. Such connectivity encourages walking as a convenient mode of travel for short trips within the community. Improving pedestrian connectivity to the Koelenhof rail station is also a key priority. This involves creating well-designed pedestrian pathways and safe crossings that allow commuters to access the station comfortably and directly, promoting the use of public transport.

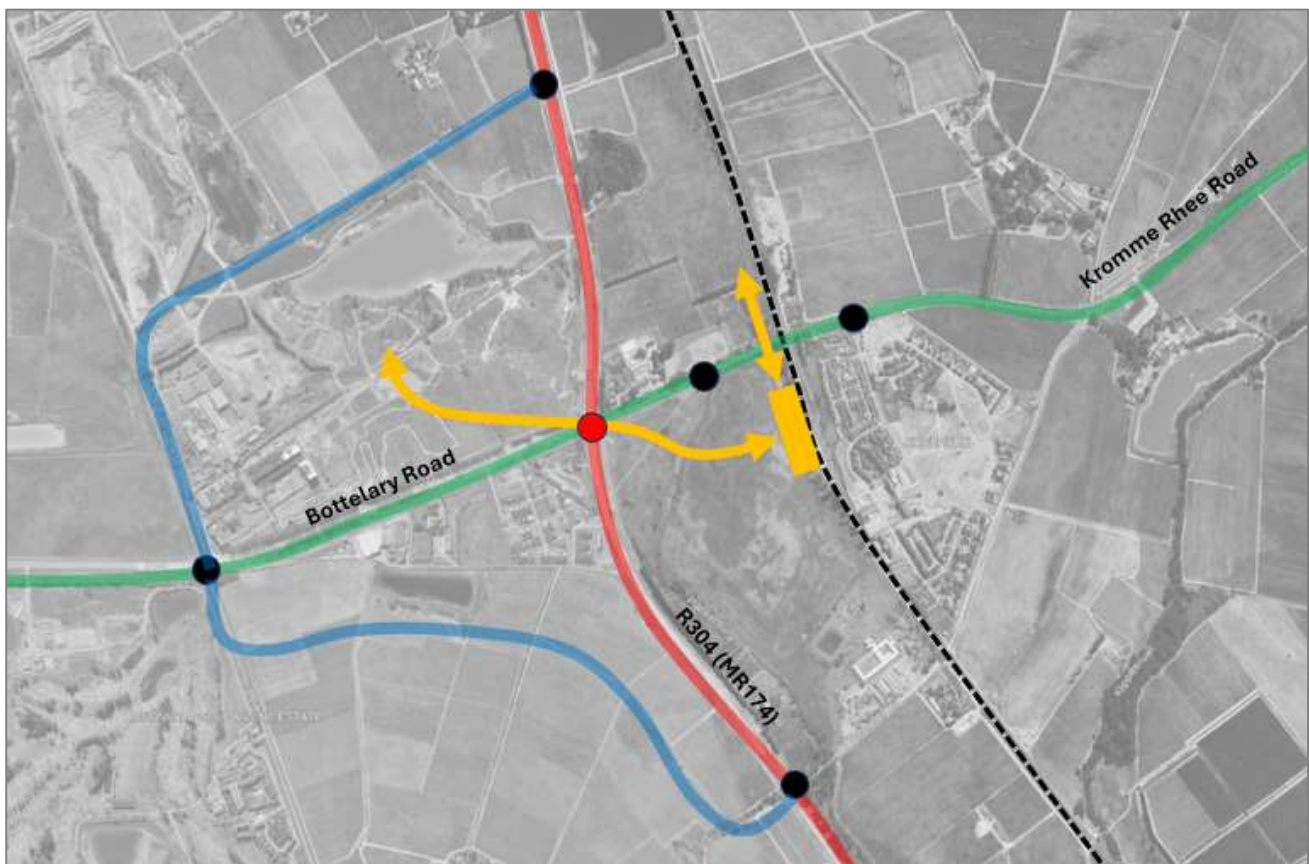


Figure 34: Transport Response 3: NMT infrastructure connecting the developments to the rail station

Minimising at-grade level crossings along the R304 (MR174) corridor is critical for safety and mobility. Implementing grade separations where possible reduces conflicts between pedestrians, vehicles, and trains, thereby preserving the corridor's role as a key regional arterial route. Refer to **Figure 35** for an example of an underpass that is 7-10m wide. This proposal is to reduce the cross-section of Bottelary to create a walkable environment, should the R304 be grade-separated over Bottelary Road.



Figure 35: Example of a 7-10m wide underpass (Source: Transport NSW, June 2023)

Introducing a local shuttle service within the precinct will further support last-mile connectivity. This shuttle can link residents and visitors to the rail station and other important nodes, reducing reliance on private cars for short trips and improving overall transit convenience. In fact, the development extent of the node would justify a full public transport system that can serve local trips and trips to external nodes.

Encouraging modal shifts, traffic volumes on arterial roads such as Bottelary Road and the R304 will decrease significantly. This reduction will delay the need to dual Bottelary Road and enable a more compact, context-sensitive road design that better fits the local environment.

4.2.4 Objective 4

To protect the mobility function of the R304 (MR174) and accommodate future traffic demand, a phased approach is proposed to divert through-traffic and upgrade intersections. This strategy balances immediate needs with long-term infrastructure planning to maintain efficient traffic flow.

Grade separation, involving the construction of overpasses or underpasses, is planned as a final phase of this approach. Such infrastructure will only be necessary if improvements in public transport—such as enhanced rail and shuttle services—do not sufficiently shift travel demand away from private vehicles. By implementing grade separation of the R304 over Bottelary Road, the option to introduce two additional traffic signals is created. However, the addition of signalised intersections along the R304 could compromise Objective 1, the mobility along the R304, and would be counterintuitive to spend capital costs on a bridge.

The necessity for grade separation will be evaluated based on the success of public transport upgrades. If the rail station improvements and shuttle services effectively capture a large portion of trips to and from Stellenbosch, grade separation may become unnecessary, thereby avoiding costly capital expenditures.

The phasing plan must be designed in such a way that it does not preclude or restrict the implementation of any future transport solutions. This ensures that interim interventions remain flexible and adaptable, allowing for the integration of long-term infrastructure upgrades—such as grade separation, public transport enhancements, or additional capacity improvements—should they become necessary over time.

Furthermore, the completion of a double ring road network, system of bypass routes, will reduce traffic volumes on both the R304 and Bottelary Road by about 1,000 vehicles per hour. This reduction will mitigate congestion at the critical intersection and throughout the Koelenhof area, contributing to safer traffic conditions and less delays along the R304. Refer to **Figure 36** for the schematic of the internal ring road that will further reduce the vehicles along the R304. It is recommended that these new intersections be either priority- controlled or left-in/left-out to sustain the mobility of the R304.

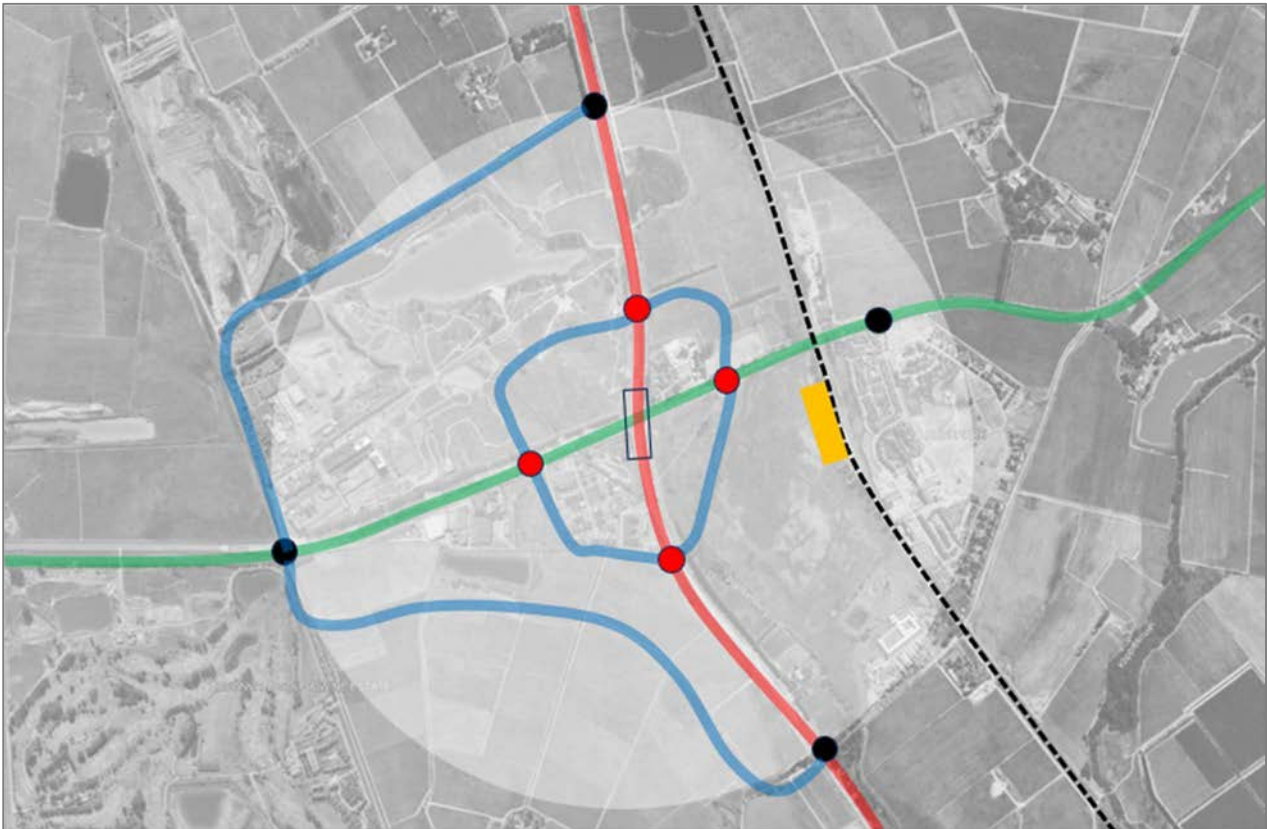


Figure 36: Transport Response 5 - Schematic for the internal ring road system

4.2.5 Objective 5

A strategic and phased approach to funding is crucial to optimising the use of available resources and achieving long-term transport goals. Prioritising Development Charges (DCs) for investment in municipal and public transport infrastructure, such as upgrading local roads, enhancing the Koelenhof rail station, improving non-motorised transport (NMT) facilities, and implementing shuttle services, ensures that initial funds deliver immediate benefits within the local transport network. This approach encourages a modal shift away from private vehicles towards more sustainable travel options. This is an essential approach to the achieve the objectives of the transport master plan.

Delaying major capacity upgrades on provincial roads, such as widening arterials, prevents premature expenditure on costly infrastructure that may induce additional traffic demand. Instead, focusing first on enhancing public transport and active travel infrastructure makes transport investments more cost-effective and sustainable.

In addition, requiring developers to contribute to the creation of an integrated internal road network, designed to support diverse and alternative travel modes, further strengthens connectivity and accessibility within Koelenhof. This coordinated investment and planning framework reduces traffic

congestion on key regional routes like the R304 and Bottelary Road, supports a reduction in car dependency, and fosters a safer, more inclusive mobility environment.

5 TRANSPORT PROJECT PHASING AND COSTS

5.1 Estimated Construction Costs

The construction costs for all major transport-related infrastructure projects have been estimated based on unit rates (i.e. high-level calculations). The costs include professional fees and exclude VAT. A summary of the projects and cost estimates is presented in **Table 11**.

Table 11: Cost Estimates

Trigger	Upgrade	AUTHORITY	Construction Cost
1	EA LT and RT lanes	WCG	R 2 350 000
2	NA through + Acceptance lanes	WCG	R 4 380 000
3	Upgrade rail station (Koelenhof & Stellenbosch)	PRASA PPP	R 10 000 000
4	NMT network	SM	R 5 000 000
5	Implement Southern By-pass	SM	R 66 734 728
6	Implement northern by-pass	SM	R 111 168 574
7	Dedicate RT lane EA	WCG	R 2 000 000
8	Dedicate RT lane SA	WCG	R 2 000 000
9	Roundabout at Koelenhof Estate	Dev	R 10 000 000
10	Traffic Signal At Nooitgedacht	Dev	R 5 000 000
11	Traffic signal at Devonvale Roundabout	WCG	R 5 000 000
			R 223 633 303

Not all projects are within the jurisdiction of the Stellenbosch Municipality. Table YY summarises the apportionment of transport project costs for various authorities.

Table 12: Estimate of Transport Project Costs for Various Authorities

Authority	Estimated Costs	%
Developers	R 15 000 000	7%
PRASA PPP	R 10 000 000	4%
Stellenbosch Municipality	R 182 903 303	82%
Western Cape Government	R 15 730 000	7%
Grand Total	R 223 633 303	

It is clear from the table that more than 80% of the transport-related projects are municipal and can be constructed from Development Charge funding.

5.2 Development Charges (DCs)

An estimation of the DCs was done based on the provided future land uses (refer to **Table 6**). The DCs are calculated on 2025/26 tariffs and exclude VAT. The DCs, as summarised in **Table 13**, are for the Roads and Stormwater engineering components only.

Table 13: Development Charges per Development

Development	Development Charges
Malanshoop	R 8 105 850
Koelenhof Estate	R 26 290 019

Nooitgedacht	R 18 013 000
Koelenbosch	R 1 008 728
Devonbosch	R 313 684 629

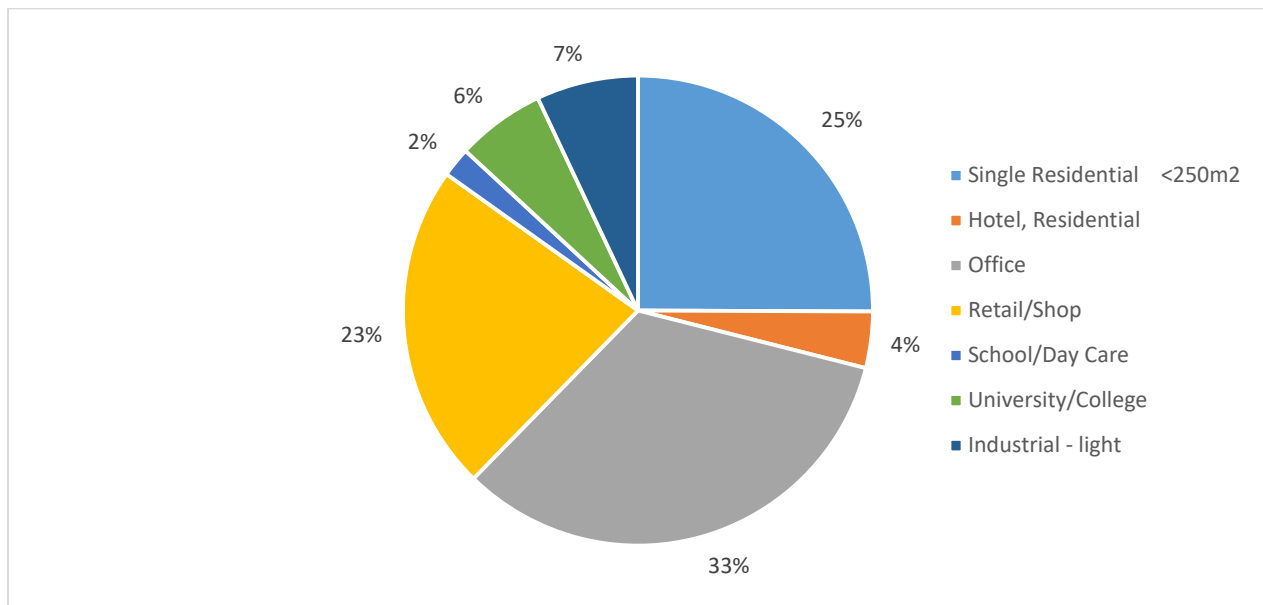


Figure 37: Summary of Land Uses DCs are based on

A total of approximately R367 million of DCs is estimated to be generated by the proposed developments. The Devonbosch development will generate more than 85% of the total expected DCs, refer to **Figure 38**.

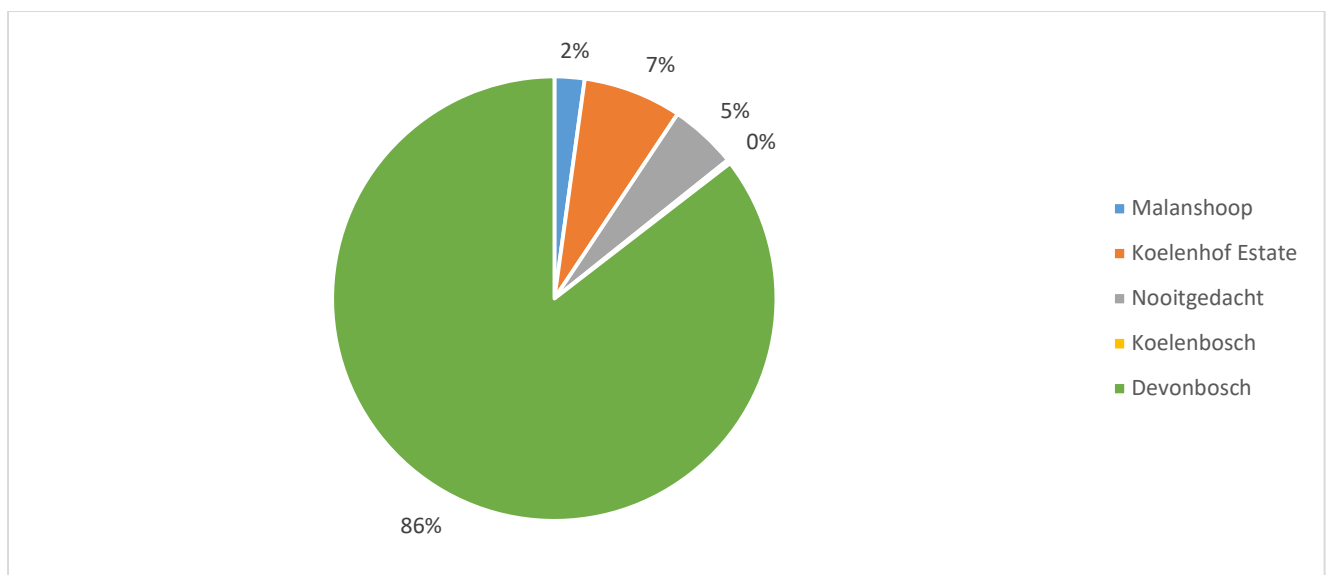


Figure 38: Development Charges Contribution by Development

It is concluded that the estimated DCs exceed the estimated construction value of all projects, excluding any grade-separation.

5.3 Phasing Recommendations

The implementation of transport infrastructure in the Koelenhof area is structured into 11 phases, each linked to cumulative trip thresholds. This phased approach ensures that capacity upgrades and modal interventions are aligned with actual development-generated demand. The phasing is selected with the following objectives in mind:

- Invest in NMT and public transport initiatives first to reduce overall external travel demands,
- Invest in NMT and integration between land uses to reduce overall external travel demands,
- Start to plan, design and implement the by-pass routes as soon as possible to limit any abortive upgrades of the R304/Bottelary intersection,
- Upgrade the R304/Bottelary intersection with upgrades that will not be abortive once the by-pass routes are constructed,
- Monitor the trip generation of the node to confirm assumptions of integration and external reductions.

5.3.1 Methodology

The total expected construction values were divided by the total expected peak hour trips for the full development to calculate a unit rate (R/trip). The cost of each transport project was divided by the unit rate to determine the number of trips to be generated to establish triggers.

Refer to the table below for the proposed upgrades/phasing along with the proposed construction costs and total trips that will trigger the upgrades.

Table 14: Proposed Phasing/Upgrades

Trigger	Upgrade	AUTHORITY	Construction Cost	Trips	Trigger Cumm. Trips
1	EA LT and RT lanes (included in Devonbosch approval)	WCG	R 2 350 000	200	200
2	NA through + Acceptance lanes (include din Devonbosch approval)	WCG	R 4 380 000	300	500
3	Upgrade rail station (Koelenhof & Stellenbosch)	PRASA PPP	R 10 000 000.00	250	750
4	NMT network	SM	R 4 400 000	300	1050
5	Implement Southern By-pass	SM	R 66 734 728	4500	5550
6	Implement Northern by-pass	SM	R 111 168 574	7450	13000
7	Dedicate RT lane EA	WCG	R 2 000 000	150	13150
8	Dedicate RT lane SA	WCG	R 2 000 000	150	13300
9	Roundabout at Koelenhof Estate	Dev	R 10 000 000	700	14000
10	Traffic Signal At Nooitgedacht	Dev	R 5 000 000	350	14350
11	Traffic signal at Devonvale Roundabout	WCG	R 5 000 000	350	14700
			R 223 633 303		

Triggers 9 to 11 will be development dependent and could be triggered earlier. The sequence of triggers must be monitored and can be amended as developments within the node progress.

5.3.2 Proposed 10-year roll-out

The first 10-year development programme for the Koelenhof area (2026–2035) is expected to generate approximately 5 600 peak-hour trips, representing around 38% of the ultimate build-out demand. Refer to **Table 15** for the proposed 10-year rollout.

Table 15: Proposed 10-year roll-out that includes Combined Devonbosch Precinct A, Malanshoop, Koelenhof Estate

Year of Occupation	Residential	Retail	Office	Warehouse/Industrial	Institutional	Other	Peak Hour Trips	Cumm. Peak Hour Trips
	(Units)	(Floor Area - m ²)	(Floor Area - m ²)	(Floor Area - m ²)	(Floor Area - m ²)	(Floor Area - m ²)		
2026		128				1206	30	30
2027	17	2738	18926		8750		1094	1124
2028	226	3343	11000				505	1628
2029	290	10605	8000	1008	2500		976	2604
2030	310	20000	10800			12334	1411	4015
2031	150	5000	10000			2200	516	4531
2032	250	2000	10000				468	4999
2035	324	1736	16329				628	5627
TOTAL	1567	45550	85055	1008	11250	15740	5627	

It will be difficult to accurately estimate the horizon years when the full Koelenhof node will be developed and the exact lane configurations at each signalised intersection. It is therefore recommended that the first 10-year horizon be assessed to guide capacity improvements. The TIA must be updated accordingly over time to establish or confirm the next roll-out of infrastructure.

The transport triggers outlined in Section 5.3.1. are therefore aligned with these trip thresholds to ensure capacity and accessibility are provided as required:

- 2026 – 2027 ($\pm 1\,130$ trips): Development is minimal, with only limited retail and other uses. No major road upgrades are required at this stage, and the existing network can accommodate the demand. Implement triggers 1 and 2, which are already conditions of approval of the current phases of Devonbosch.
- 2028–2029 ($\pm 2\,600$ cumulative trips): Residential and office development continues, with further increases in trip generation. At this stage, the demand approaches the threshold for Trigger 3, which includes upgrades to the Koelenhof and Stellenbosch rail stations (PRASA), and Trigger 4, which involves the roll-out of a local NMT network by Stellenbosch Municipality. These interventions encourage modal shift, reduce private vehicle reliance, and support sustainable travel patterns.
- 2030 ($\pm 4\,000$ cumulative trips): Significant residential, retail, and office development occurs, driving an increase in traffic volumes. At this point, the combined demand exceeds 4 000 trips, meaning both the rail and NMT interventions must already be in place. Planning should also commence for the Trigger 5 Southern Bypass, as it is triggered at $\pm 5\,500$ trips, which is expected within the following five years.

- 2031–2032 ($\pm 5\,000$ cumulative trips): Moderate growth continues, reinforcing the need for operational improvements already delivered in Phases 1–4. The network remains functional but under increasing strain, confirming the importance of proceeding with bypass planning.
- 2035 ($\pm 5\,600$ cumulative trips): The cumulative trips surpass the 5 500 threshold, triggering the implementation of the Southern Bypass (Trigger 5) by Stellenbosch Municipality. This marks the first major reconfiguration of the road network, diverting through-traffic from the Koelenhof node and preserving local accessibility.
- The northern by-pass will be constructed with the development of Devonbosch over time.
- The order of the transport projects can and should be changed in accordance with actual development applications.

6 CONCLUSIONS

6.1 Summary

The transport response for Koelenhof must evolve beyond the traditional car-centric solutions of the past to effectively manage the transport pressures of significant future growth. While the historical proposal of dualling the MR174 and constructing a grade-separated interchange addressed capacity and safety concerns at the critical node, it did not sufficiently consider sustainable mobility principles or the integration of public transport and non-motorised modes. It also did not consider the future urban development of the Koelenhof node.

The alternative approach presented in this report offers a more holistic and forward-looking strategy. By preserving the R304's role as a regional mobility corridor through managed access and bypasses, promoting modal shift through rail station upgrades and shuttle services, and enhancing pedestrian and cycling connectivity, the plan supports a sustainable, transit-oriented development model. Managing vehicle speeds and diverting through traffic via phased infrastructure improvements through the developments further contributes to safer and more efficient road operations.

Importantly, this approach is flexible, allowing for future infrastructure interventions like grade separation only if public transport initiatives do not achieve the intended trip reductions. The integration of land use and transport planning ensures that Koelenhof can grow in a way that balances regional mobility needs with local liveability and accessibility. Refer to **Figure 39** for the development framework for the Koelenhof Node.

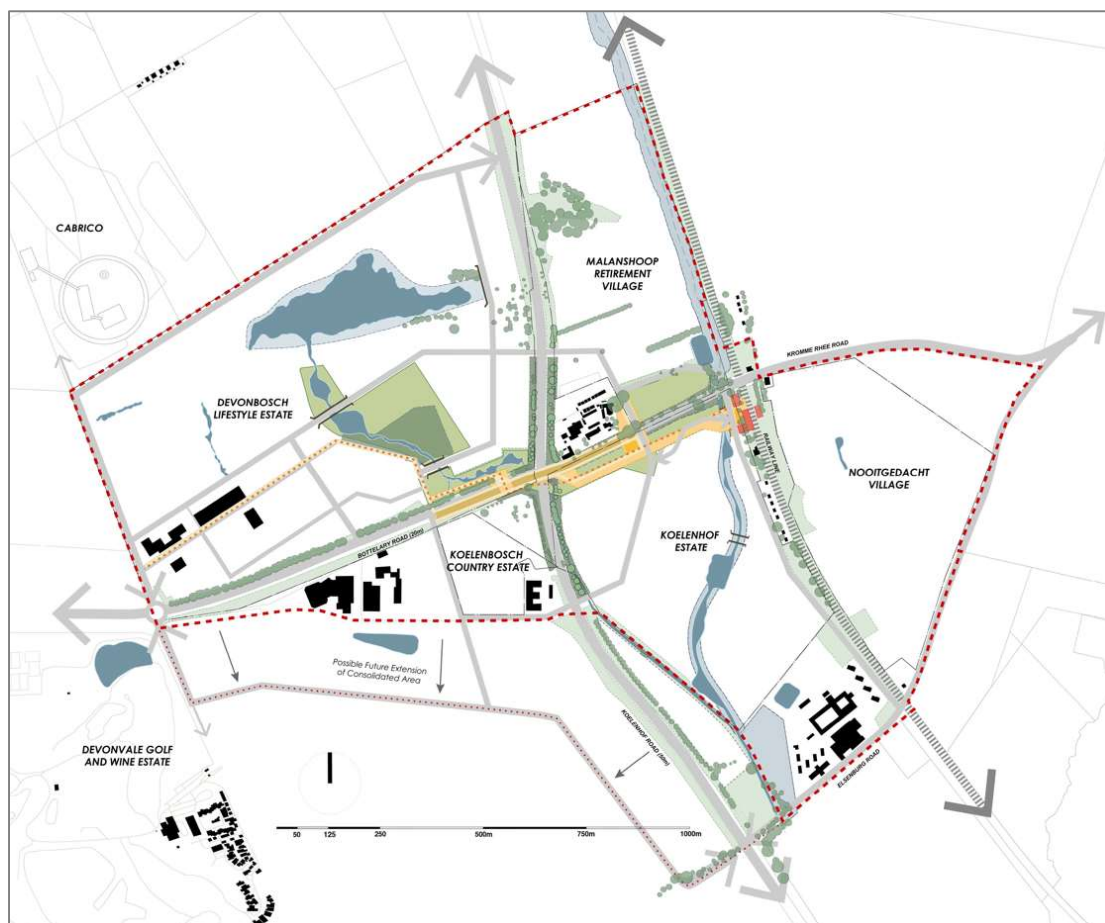


Figure 39: Future Koelenhof node with ring roads, and connectivity between precincts (Jakupa, 2025)

The proposed transport strategy for Koelenhof is structured around five key objectives that aim to balance regional mobility needs with local accessibility, sustainability, and safety. Each objective is supported by targeted interventions that respond to the area's unique development pressures and transport context. The table below provides a summary of these objectives and outlines how each is addressed through the proposed measures:

Table 16: Summary of objectives, how the objectives are planned to be achieved and the results of each objective

OBJECTIVE	HOW IT IS MET	RESULT
1. Preserve the mobility function of the R304 (MR174)	By limiting direct access to the R304, the main arterial function is maintained. The construction of bypass roads diverts significant traffic volumes away from the central node, preserving capacity and reducing congestion.	The proposed bypass routes are expected to accommodate approximately 5 000 vehicles per hour, effectively extending the capacity of the critical intersection and alleviating congestion along the R304 corridor.
2. Reduce overall trip generation and dependence on arterial roads	Investments in the Koelenhof and Stellenbosch rail stations, introduction of public transport services, and improved accessibility promote a shift from private vehicle use to public transport. This reduces car dependency and alleviates pressure on the arterial network, particularly at critical intersections.	A shift from private vehicle use to rail transport, with more than 2 500 vehicles per hour anticipated to be accommodated by rail during peak hours towards Stellenbosch will significantly reduce traffic volumes at the critical R304/Bottelary Road intersection.
3. Develop safe and continuous NMT infrastructure	Dedicated pedestrian and cycling routes connect land uses and transport nodes, enabling safe non-motorised travel. Pedestrian access to the rail station and minimised at-grade crossings along the R304 enhance walkability and reduce conflicts with vehicles.	The result is a measurable change in travel behaviour, with more commuters opting for public transport, particularly rail, instead of private vehicles, leading to reduced congestion, improved network efficiency, and a more sustainable transport system for the Koelenhof area.
5. Divert through traffic away from the Koelenhof centre	A phased bypass and double ring road network divert regional traffic from the town centre. This not only reduces congestion but also supports local access and pedestrian activity. Grade separation remains a long-term option, should public transport not shift sufficient volumes off the road.	Traffic volumes within Koelenhof's central area will decrease significantly, improving local access and pedestrian safety. The reduced congestion enhances the liveability of the town centre while maintaining the flow of regional traffic on alternative routes.
6. Implement a practical funding and phased expenditure approach	Prioritise the use of Development Charges (DCs) to fund municipal and public transport infrastructure improvements first—such as upgrading local roads, enhancing rail stations,	This phased funding strategy optimises resource allocation, delivers immediate benefits in local mobility and accessibility, and delays costly road expansions. It

	developing NMT facilities, and implementing shuttle services—before committing resources to major provincial road capacity upgrades. Developers contribute to the creation of an integrated internal road network and support infrastructure encouraging alternative travel modes.	reduces induced demand, lowers overall transport costs, and supports a sustainable, integrated transport system that aligns with long-term growth and liveability goals for Koelenhof.
--	--	--

It is also concluded that the DCs will exceed the total construction value of the transport projects. Therefore, the development over time and the associated trip generation will be able to fund the preferred option of transport projects.

If the reduction in the estimated trip generation does not realise through the investment in rail and NMT infrastructure, the future grade separation of the R304/Bottelary intersection can still be implemented with minimal abortive costs over time. Both the proposal of only grade-separating the R304 over Bottelary Road without any ramps or the initial roundabout interchange can be implemented in future.

6.2 Recommendations

The conclusions of this study indicate that accommodating the forecasted growth in Koelenhof requires a transport approach that integrates land use planning with multimodal mobility solutions, rather than relying solely on conventional road capacity expansion. The recommendations outlined below are informed by an assessment of current and projected traffic volumes, anticipated development patterns, and the operational constraints of the regional network. They are designed to preserve the R304's strategic mobility function, facilitate modal shift through targeted public transport and NMT investments, and phase infrastructure delivery in a manner that avoids abortive expenditure. Collectively, these measures provide a framework for guiding infrastructure planning, funding allocation, and implementation sequencing in support of Koelenhof's long-term mobility and urban development objectives. The following are recommended:

- **Utilise Development Charges on public transport and non-motorised transport infrastructure:** Leverage Development Charges to fund municipal and public transport improvements. Ensure that developers contribute to an integrated road and transport network that supports alternative modes, reducing long-term reliance on expensive provincial road projects.
- **Preserve the R304's Regional Mobility Function:** Implement strict access management on the R304 to maintain its primary arterial role. Construct bypass roads to divert through traffic. This will protect corridor capacity and reduce congestion at the Koelenhof node.
- **Promote a Shift from Private Vehicles to Public Transport:** Invest in upgrading Koelenhof and Stellenbosch rail stations, enhance service reliability, and introduce feeder/shuttle services to

connect residential areas to public transport hubs. These measures should aim to capture significant peak-hour demand, particularly for trips towards Stellenbosch.

- **Develop Safe and Continuous NMT Infrastructure:** Prioritise dedicated pedestrian and cycling facilities that link residential, commercial, and public transport areas. Improve pedestrian access to rail stations, and ensure infrastructure design supports safety, accessibility, and year-round usability.
- **Monitor and Adjust the Strategy Over Time:** Establish a monitoring framework to track public transport uptake, traffic patterns, and land use integration outcomes. Use this data to adjust phasing, funding priorities, and project designs to ensure alignment with Koelenhof's growth, mobility, and liveability objectives.

It is further recommended that the following approach for implementation of transport projects be adopted:

- Invest in NMT and public transport initiatives first to reduce overall external travel demands,
- Invest in NMT and integration between land uses to reduce overall external travel demands,
- Start to plan, design and implement the by-pass routes as soon as possible to limit any abortive upgrades of the R304/Bottelary intersection,
- Upgrade the R304/Bottelary intersection with upgrades that will not be abortive once the by-pass routes are constructed,
- Monitor the trip generation of the node to confirm assumptions of integration and external reductions,
- Road authorities agree to the financing options for the implementation of the recommended transport projects.

The following transport projects must be implemented over time to accommodate the growth of the Koelenhof node:

- East Approach: Left turn and right turn lanes (included in Devonbosch approval)
- North Approach: Through Lanes and Acceptance lanes (included in Devonbosch approval)
- Upgrade rail station (Koelenhof & Stellenbosch)
- Non-motorised network
- Implement Southern By-pass
- Implement Northern By-pass
- East Approach: Dedicate the right turn lane
- South Approach: Dedicate right turn lane
- Roundabout at Koelenhof Estate
- Traffic Signal At Nooitgedacht
- Traffic signal at Devonvale Roundabout

7 REFERENCES

1. Stellenbosch Municipality Roads Master Plan, WSP, October 2022
2. Pedestrian Underpass Design Guideline, Transport for NSW, June 2023

ANNEXURE F

URBAN DESIGN FRAMEWORK





KOELENHOF

Stellenbosch Farms

DEVELOPMENT FRAMEWORK REPORT

25/06/2025

the team

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OUR BRIEF AND THE SITE

A number of development proposals have therefore been submitted to the municipality for approval. Many of these have been put on hold. Jakupa was appointed to provide urban design services to establish a coherent urban design vision for the whole neighbourhood. The process endeavours to unpack the neighbourhood's character and development potential that could produce a coherent neighbourhood with great spatial quality and performance.

The extent of the study area is defined as the neighbourhood known as Koelenhof, straddling the intersection of Koelenhof Road (R304) and Bottelary Road. The future development will be largely residential in character, including retail and offices. The area includes a church and primary school, a garage and train station.

The nature of the developments under consideration tends to replicate the status quo and it is the ambition of this report to shift the pattern of development and bring spatial coherence across the divergent development parcels.

OUR OBJECTIVE

Through the identification of contextually appropriate design principles and guidelines, the Urban Design Framework Document intends ultimately to put good urban design principles into practice, making evident the Stellenbosch Municipality's intentions of making great places in an evolving built environment.

A context analysis will be undertaken to critically examine the site and its surroundings in order to uncover informants that will be used later to establish a set of design principles and guidelines in response. This analysis will also be used to formulate a series of Design Strategies for the area as a whole as well as various parts of the site.

The analysis will aid us in constructing a contextually appropriate structure plan that responds strategically to the needs of the site and the client with development that supports the genius loci of this context and the creation of a sustainable neighbourhood.

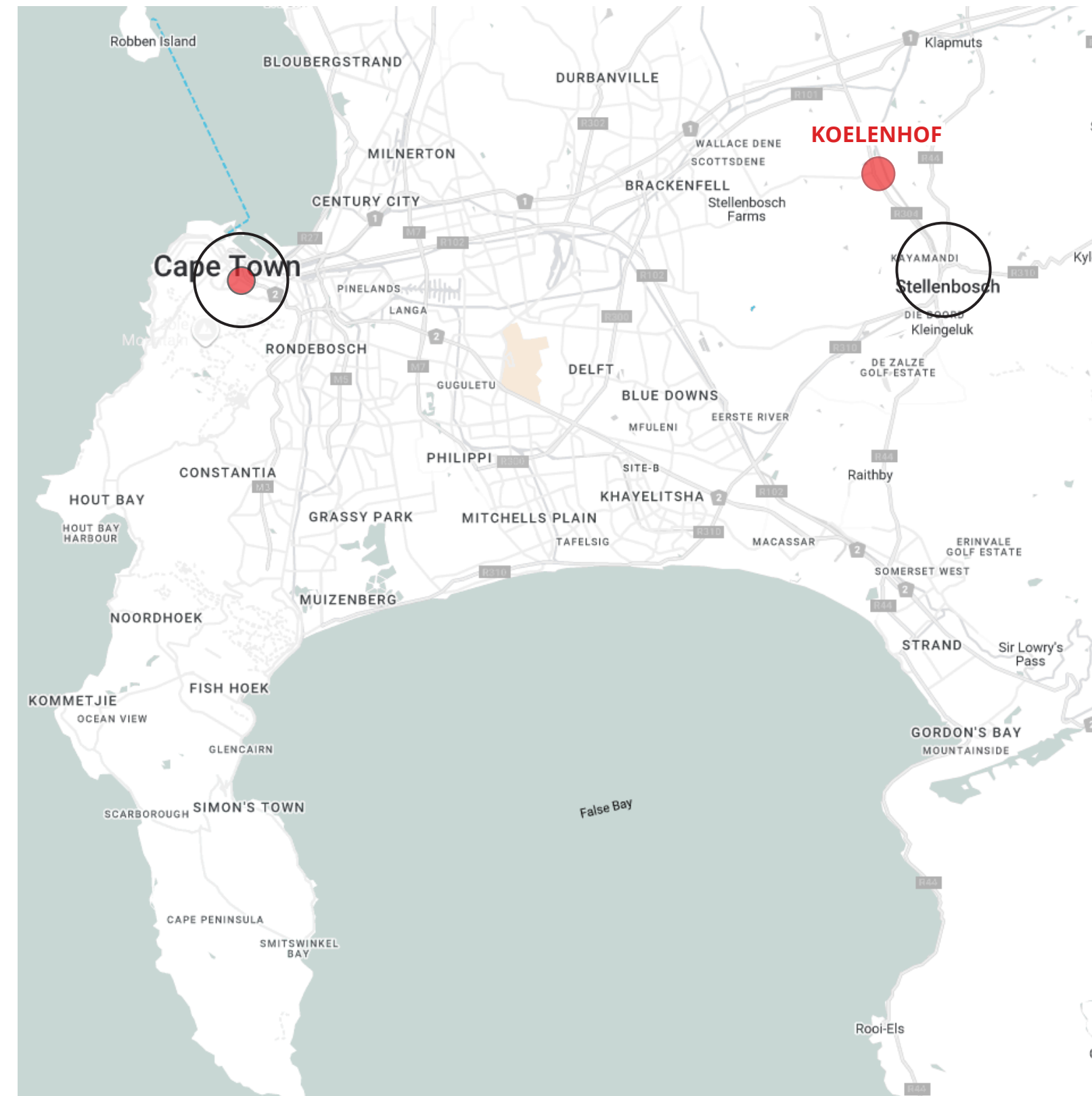


figure 1
Location of Koelenhof in relationship to Cape Town and Stellenbosch.

INTRODUCTION

METHODOLOGY

BIAS FOR A DESIGN BASED METHOD

Design and, more so, urban design is an iterative design led process. Requiring the testing of urban design principles and ideals against often competing, pragmatic and feasibility constraints. As such, a process of negotiation, where principles, trade-offs and mitigation drives the final outcome, is necessary and ultimately desirable. Jakupa values a collaborative approach. This work has evolved from a process of ongoing collegial collaboration and cooperation.

Our method is a structured planning approach opposed to a master planning approach. The intent of which is to ensure that the minimum amount of strategic interventions are identified to unlock the maximum amount of benefits and opportunities on any given site.

OUR PROCESS

The foundation of our methodology is to produce active documents that results in developable actions. Key to the ability to influence development decisions is the view that we are not the final decision maker in the making of rich and vibrant environments. Meaningful public environments have to be layered by many hands over time as economic and socio-political changes shape the making of cities.

Iteration of refining the making of public space over time by many people has the potential to produce places that reflect the culture of its people that are layered and nuanced and where the immediate outcomes may not be predictable but has a great potential of becoming a vibrant and exciting place that reflects its context in time and place.

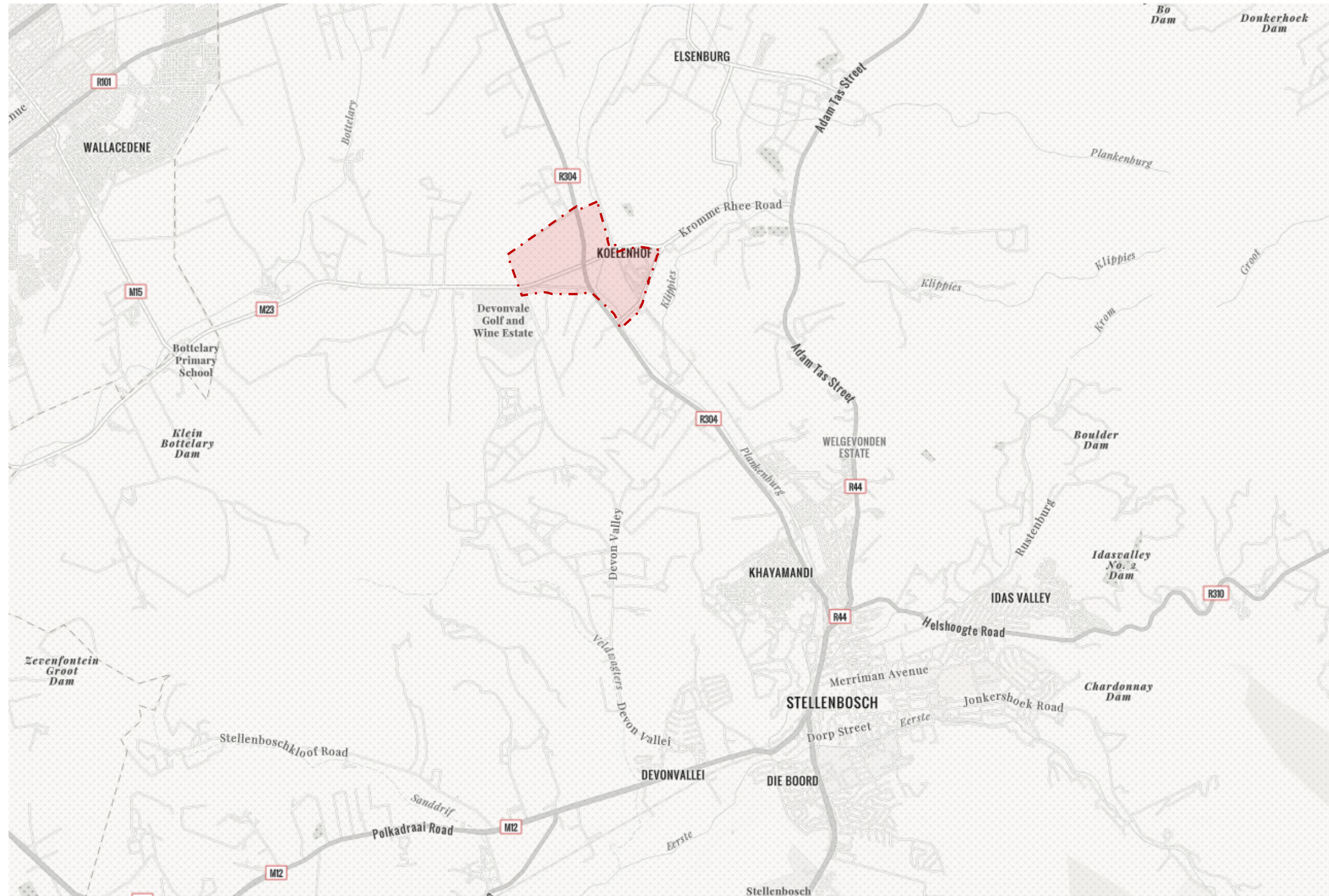


figure 2

Map of Koelenhof and Road network throughout Stellenbosch Farms.

INTRODUCTION

PURPOSE

PURPOSE OF THIS DOCUMENT

The primary role of this document is to record a set of design principles that largely emerged from a series of design charrettes. The neighbourhood design problem is interpreted as the attempt to find the balance between compact and vibrant urban environments and the pragmatic demands of the context and what is feasible to aid development.

The purpose of this document is to:

- develop a spatial set of principles and a rationale for the way in which the neighbourhood could transform over time;
- be used as a tool to negotiate and guide the various actors in the development process as the various proposals are processed by the Municipality, property owners, their professional teams and development partners that responds to the generally accepted urban design principles;
- be used as a tool for the authorities to measure the development proposals.

The document also intends to support the making of memorable places that reflects the culture and identity of its people, place and time. It supports a positive and legible urban structure that is integrated into the neighbourhood's "found potential". It argues for an improved spatial quality of the public realm and promotes the creation of safe and vibrant places. It makes room for social and economic opportunities that are accessible and diverse.

To this end we've negotiated the enclosed set of principles and guides which was developed through a series of design charrettes with the developers currently proposing developments in the neighbourhood. Through consultation and negotiation, the proposals were analysed and developed to produce adjusted proposals.



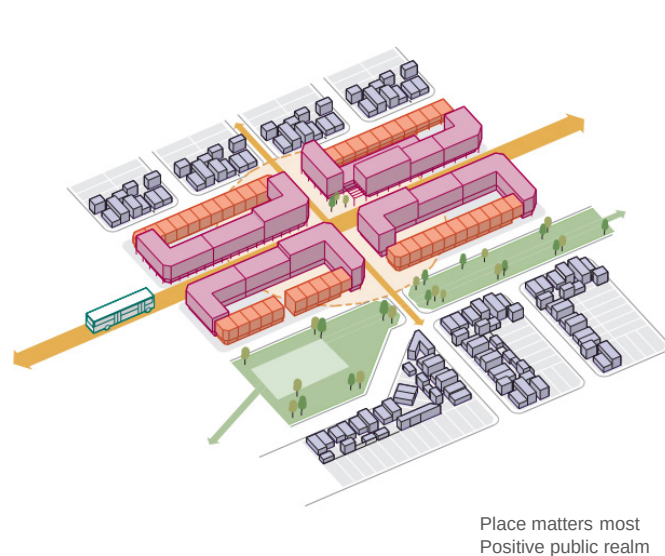
figure 3
Koelenhof greater extent and boundaries around Devonbosch Lifestyle Estate, Malanshoop and Koelenhof Estate.

INTRODUCTION

DESIGN PHILOSOPHY

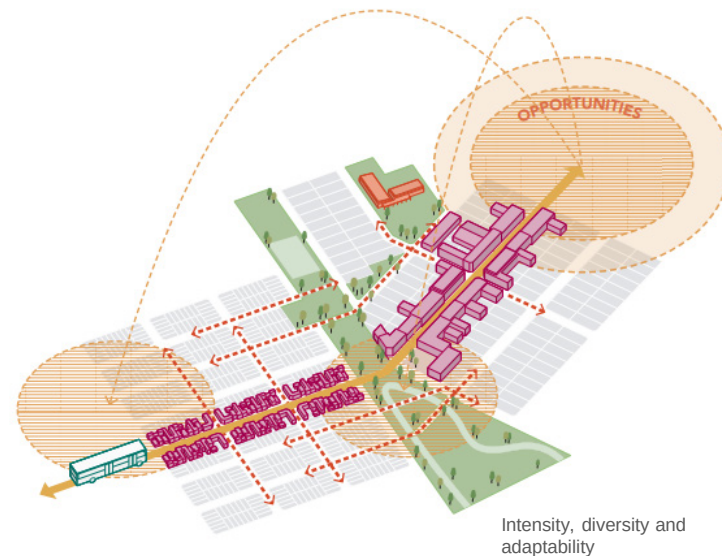
BIAS FOR A DESIGN BASED METHOD

Our approach is governed by humanistic ideals translated into pragmatic solutions. The key high-level principles that guide our approach are:



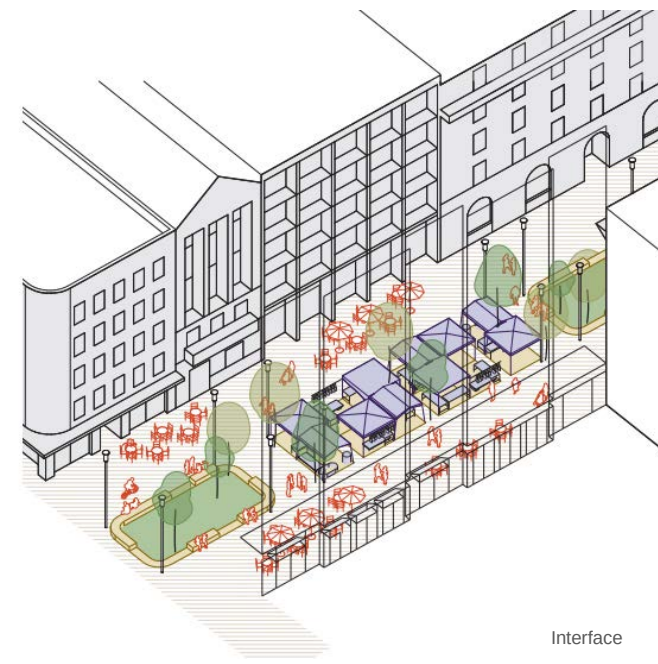
1 Places Matter Most

Places are much more important than singular elements in the built environment. We will create attractive and interesting places that are shaped by the qualitative and functional organisation of the site. We hope to enliven the physical experience of the precincts by identifying informants in order to develop a robust framework for the area. The rich cultural landscape and its broader context provide key qualitative principles from which to draw inference.



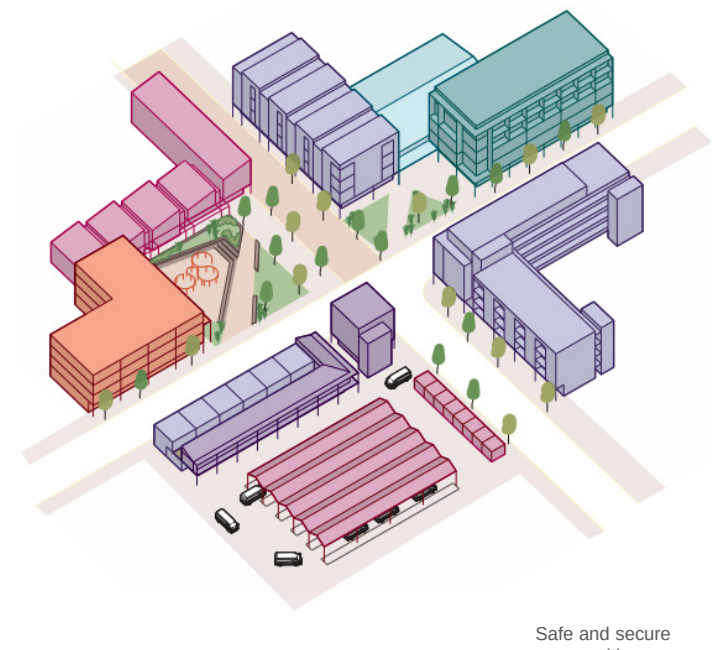
2 Responsiveness

The framework needs to be responsive to the complexities and nuances of the site. We pay attention to the grain and texture of the urban form. These elements must be complemented by the crafting of the making of space and place. All too often commercial and industrial developments are associated with crass built forms shaped by reductive technocratic solutions. We will seek site informants that will aid to steer the design decisions to an informed and appropriate outcome.



3 People and Space Integration

We will encourage a positive relationship with the existing morphology and integrate the development to suit the context on the urban periphery. The sense of place includes the relationship with farmlands, the natural systems, people, their activities and cultural practices. It is important we understand how each of these elements occur on site and in its context before we can propose an appropriate design response.



4 Community over Time

Phasing and incremental development will allow opportunity for the development to shape its form and character over time. Sustainability [social, economic, environmental, resource management] is to be treated as a matter of course. We argue that the development should allow for flexibility in accommodating a changing program that may be influenced by changing needs over time. By looking at the dynamic and fast changing context we, will be able to uncover cues that will allow us to tap into their rhythm and manipulate positive change.

- figure 4
1. (UD Policy, 2023, 2.2 The "whole" above the "parts")
 2. (UD Policy, 2023, 2.4 Integration and spatial transformation)
 3. (UD Policy, 2023, 2.3 Identity, Context and Place making)
 4. (UD Policy, 2023, 2.6 Intensity, Diversity and Adaptability)

The nature of the urban design proposal argues for making a place that is deeply rooted in great city-building traditions. Some of these robust urban design principles include:

INTRODUCTION

URBAN DESIGN PRINCIPLES

01 THE GREATER PUBLIC GOOD

These development guidelines work towards reconciling a long-standing problem posed by rapid and disparate development by creating and linking places of existing amenity value where people can come together to enjoy the shared benefits of living in a close-knit community.

It is proposed that this is achieved through a balanced mix of residential, retail and office uses and complimented by a local transit system and amenities such as schools and sport facilities. The development is imagined as primarily having a rural-urban interface through an open space system that supports and connects existing ecological corridors into a coherent system, which in turn links into the ecological systems of the surrounding landscape to initiate a broader suburb-wide spatial system.

The project has the enormous benefit of creating vibrant social and economic opportunities in an otherwise underdeveloped neighbourhood. The set of development guidelines has the potential to transform the site into a busy and thriving community.



INTRODUCTION

URBAN DESIGN PRINCIPLES

02 THE WHOLE ABOVE THE PARTS

The foundation of the urban design rationale is that instead of following the existing model of fragmented development that threatens to consume the landscape which could otherwise be used for economic growth and agricultural productivity, that the proposed new development model consolidate development into a coherent spatial system that enforces a stronger link between developments and reinforces the identity of the local area.

The proposal recommends a myriad of improvements to the existing precinct. This includes traffic flow/ vehicular movement improvements, pedestrian oriented spatial systems, NMT and public amenity upgrading and a range of uses that have the potential to transform the site's identity into a memorable place that will be part of the greater Stellenbosch farm and wineland experience.

The proposal undertakes to improve the environmental performance of the consolidated area with integrated and holistically sustainable networks that offer connection between developments as well as amenity to residents and visitors.



INTRODUCTION

URBAN DESIGN PRINCIPLES

03 IDENTITY, CONTEXT + PLACE MAKING

The proposal makes considerable effort in extracting the found potential on site and making it evident to bolster its representation in its genius loci. All these benefit from a sustained urban relationship which goes beyond the constraints of individual developments.

The rural-urban identity is one that reflects the local character and identity of Stellenbosch of farms and winelands, through making places that are relevant to locals and one that's rooted in its time and context. It is also argued that a place of deeper meaning will emerge through time as it settles into its skin once it becomes inhabited and the community and businesses reflect their identity through placemaking. The development will fundamentally alter the existing character of the place for the better: creating a vibrant, people oriented and safe space.



INTRODUCTION

URBAN DESIGN PRINCIPLES

04 A TRANSITION BETWEEN URBAN PERIPHERAL AND RURAL

As cities have developed, they can no longer be understood solely as singular urban units, but as complex structures with edges that morph in response to the changing needs and development patterns of our complex modern conditions. Today, it is the edges of the city that reveals its social, political, technological and environmental dynamics, through the development that takes place on the edges of it's boundaries. While peri-urban areas are peripheral, these dynamics indicate that they can and already do play a major role in in the overall functioning of cities.

The site serves as a transitional space between the urban periphery and the agricultural/rural landscape towards Stellenbosch. Therefore, it is apt that the urban design proposal reflects this very distinct characteristic at the local level. Rather than a forced juxtaposition of conditions, the framework sets up a language of threshold and mediation.



INTRODUCTION

URBAN DESIGN PRINCIPLES

05 FUTURE PROOFING, ADAPTATION AND RESILIENCE

Climate proofing cities for drought, flood, fire, food, water and soil security are part of the design challenge. In order to respond in a way that drives resilience, a holistic approach to these factors is paramount. This will be a process of considerations and negotiations to find the most sustainable outcomes whilst still meeting developmental goals.

This can arguably be considered one of the biggest challenges of our future cities. Changing weather patterns and extreme climate threats need to be accounted for in our design responses. It has become evident that our former urban practices that prioritized development over the environment are unsustainable and undesirable. We need to prepare our cities for future climate challenges and acknowledge our responsibility to attempt to mitigate these challenges where possible.

The city's Municipal Spatial Development Framework begins by acknowledging the city's vulnerability to draught and a day-zero, among other climate related challenges. This together with the consolidation of Spatial Development Frameworks with Environmental Management Frameworks demonstrates the importance of this thinking in the current South African socio-political climate.

Globally, the development of Landscape Urbanism practices has been employed in an attempt to mitigate these challenges. Landscape urbanism, to explain simplistically, is a school of thought in urban practice whereby we aim to create cities that are flexible and adaptable with the ability to accommodate the dynamic nature of the environment. Thus, ensuring resilience and longevity of our cities. "In a landscape urbanism strategy, the site becomes the controlling instrument of the interface between culture and nature; site phenomena are generative devices for new forms and programmes (Shannon & Manawadu; 2007)."

Landscape urbanism encompasses a variety of strategies to be employed on a site-by-site basis. Understanding the ecology and cultural landscape of a site prior to design is the first step in developing a sustainable design proposal. Green and blue systems of the preexisting landscape are to be respected, utilized and enhanced as much as possible and used to guide urban form. Existing data on weather patterns needs to be continuously consulted in order to create adaptability within design solutions.

In order to provide sustainable solutions that would be beneficial to all parties, we need to align our current economic and social desires with our environmental and ecological requirements.



read-ings

READINGS READING THE LANDSCAPE

WHAT IS 'READING THE LANDSCAPE'

Beyond simply describing the context, which tends to be reductive and repetitive, we have opted to “read” the context. Through reading the landscape we conceptualize our understanding of what exists and interpret its characteristics.

Contextual analysis is the study of Spatial ecology through understanding its layering of systems that combine to create the spirit of a place (its genius loci). It is responsible for how we experience the site. The Ecological systems and landscape form the base of the site. Layers of urbanity and human manipulation then get worked into these systems. Transit and movement routes inform our journey through the site, while urban forms shape our experience through visual cues that allow us to locate ourselves in relation to the site and the city.

A drawback in the normative method of ‘contextual analysis’ or analysing a site and its context through its layers is that this method does not recognize or acknowledge change, transition and social or cultural practices that are too nuanced. When developing a critical understanding of the environment in which we are acting; it is pivotal to develop an argument for a meaningful intervention towards appropriate development by understanding the qualitative characteristics of the site as well.

SPATIAL UNDERSTANDING

We will conceptualise the spatial challenges of the area through a reading of the site to establish a base set of issues that relate to the inherent nature of the place [the genius loci]. When coupling this with the interpretation of relevant municipal frameworks and policies as well as current global thought on urban design and development goals, we can create more informed and appropriate decisions that consider the surrounding urban context, including the rural-urban, urban morphology, spatial systems, movement, spatial patterns and ecological systems.

Our work should ideally be read in conjunction with analyses by the rest of the professional team. This could include studies by the town planner, environmental experts [especially establishing the extents of water courses and water bodies] and those of the traffic engineer and civil engineer to establish the various constraints and opportunities on site.

ECOLOGY



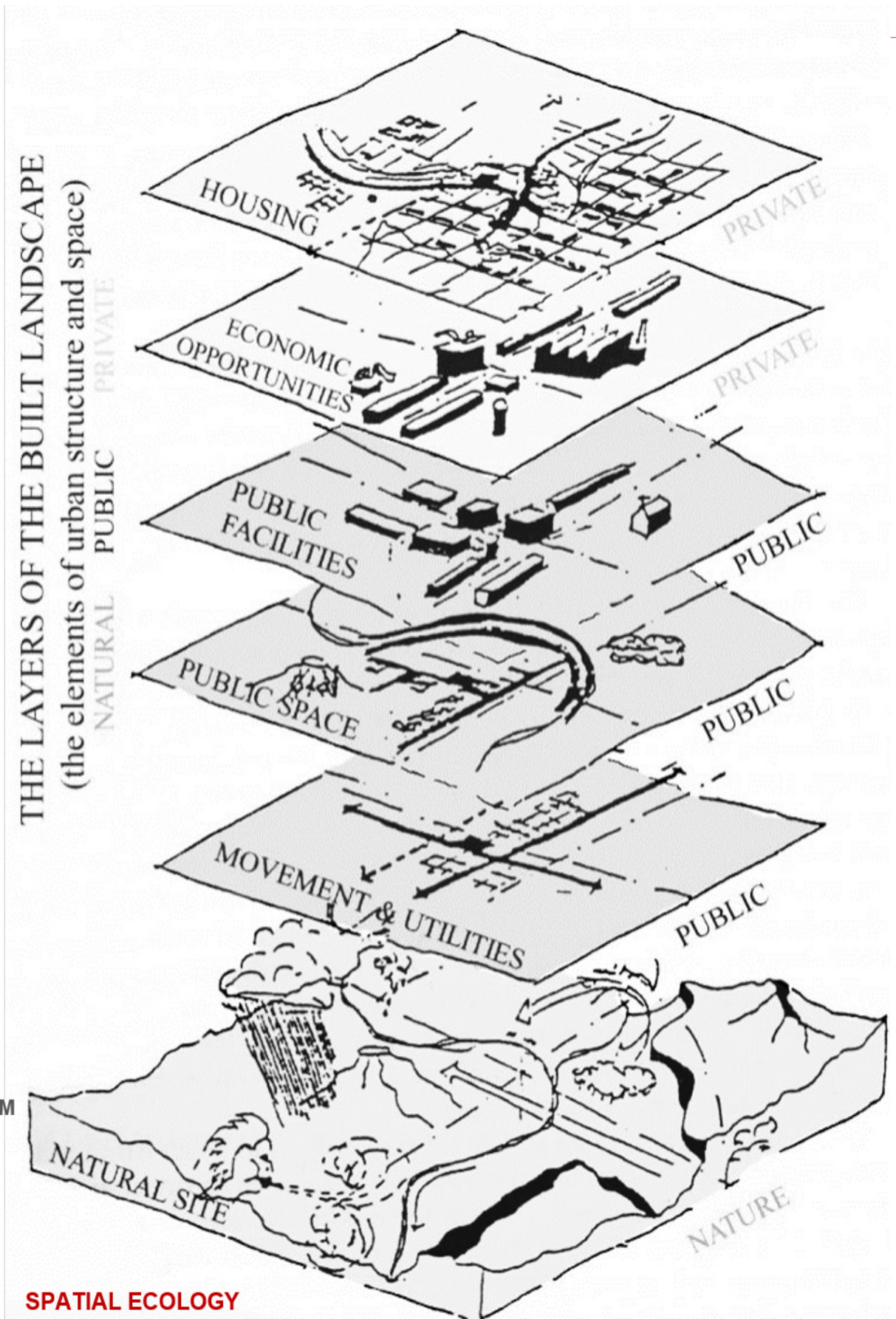
TRANSIT



URBAN FORM



THE LAYERS OF THE BUILT LANDSCAPE
(the elements of urban structure and space)



SPATIAL ECOLOGY

figure 5

The layers of the built landscape with which we analyze a site and its context.

Source: CoCT, “Urban Design Policy”, September 2013, pp. 12,10,9,13

READINGS

CHARACTER ZONES

3 CHARACTER ZONE STUDIES

The following 3 conditions are typically characteristic of the subdistrict in and around Koelenhof and concomitantly indicative of urban sprawl:



THE PERIPHERAL CONDITION

The periphery serves as a collector of the amalgamation of uses that are pushed towards the edges of the city and becomes an eclectic landscape. When considering the location of residential development, the periphery often buckles to developmental pressures and to the needs of a growing city looking to place residential estates in areas that are accessible, but do not pose as a conflicting use. For feasibility reasons, these uses are located in areas of lower land value and in green or brownfield sites on the outskirts, rather than closer to the city.

As this 'natural' progression is inevitable it is our responsibility to pay attention to the interplay between these boundaries and land-uses and promote appropriate transitional spaces.



THE TRANSITIONAL LANDSCAPE

The area of Koelenhof can be considered a place in flux of continual and increasing development. The predominant land uses include industrial/offices, rural and residential. These uses take form over the area through both formal and informal drivers meaning the future of the area is currently being negotiated.

Another pattern that is emerging is the decrease in the agricultural landscape. This can possibly be attributed both to the decline in financial viability of farming in general or the decrease in agricultural potential of the land. Either way decommissioning of agricultural fields for residential uses is escalating.

figure 6

Photograph taken from the Railway.

figure 7

Photograph taken of the entrance of Devonbosch.

figure 8

Photograph taken of the entrance of Nooitgedacht Village.



THE SPATIAL SACRIFICE FOR SECURITY

Large gated housing estates, single private residences with high walls and secured industrial parks make for safe internal spaces. The consequence of this is the harsh juxtaposition with the outside or in-between spaces not enclosed and therefore not considered. These public roads, streets or parks are consequently separated from one another, void of foot-traffic (in a vehicular existence), and therefore unsafe and undesirable areas.

Pressures to develop in this way are very real and as long as each new development endeavors to only look out for itself this pattern will continue.

READINGS
DEVELOPMENT IN
ISOLATION

Analysis of the consolidated plan.
The three developments are Devonbosch Lifestyle Estate,
Malanshoop Retirement Village and Koelenhof Estate.

-  Ecological Systems
-  Movement + Access
-  Barriers + Grain



figure 9
Koelenhof greater extent and boundaries around Devonbosch Lifestyle Estate, Malanshoop and Koelenhof Estate.

READINGS
DEVELOPMENT IN
ISOLATION



ECOLOGICAL SYSTEMS

Blue and green elements and spaces within all three developments have been studied and respectfully included in each of the development's plans. The ecological systems are not cohesive or congruent across the precinct with no collective plan straddling the proposed developments. The waterscape, ecological systems and the congruent agricultural landscape is the overwhelming experience of the place and key to the success in maintaining the character of place is the protection, completion and engagement with the various ecological systems on site.



figure 10
Visual representation highlighting the functional ecological corridors and the green network on site



figure 11
Visual representation highlighting the functional ecological corridors and the green network on site



READINGS DEVELOPMENT IN ISOLATION



MOVEMENT + ACCESS

There is evident disconnect between the movement system of each of the individual developments. Any development at an intersection of a class 2 road is prone to poor accessibility. Access to each development is restrictive as well as access/connectivity between developments is made impossible.

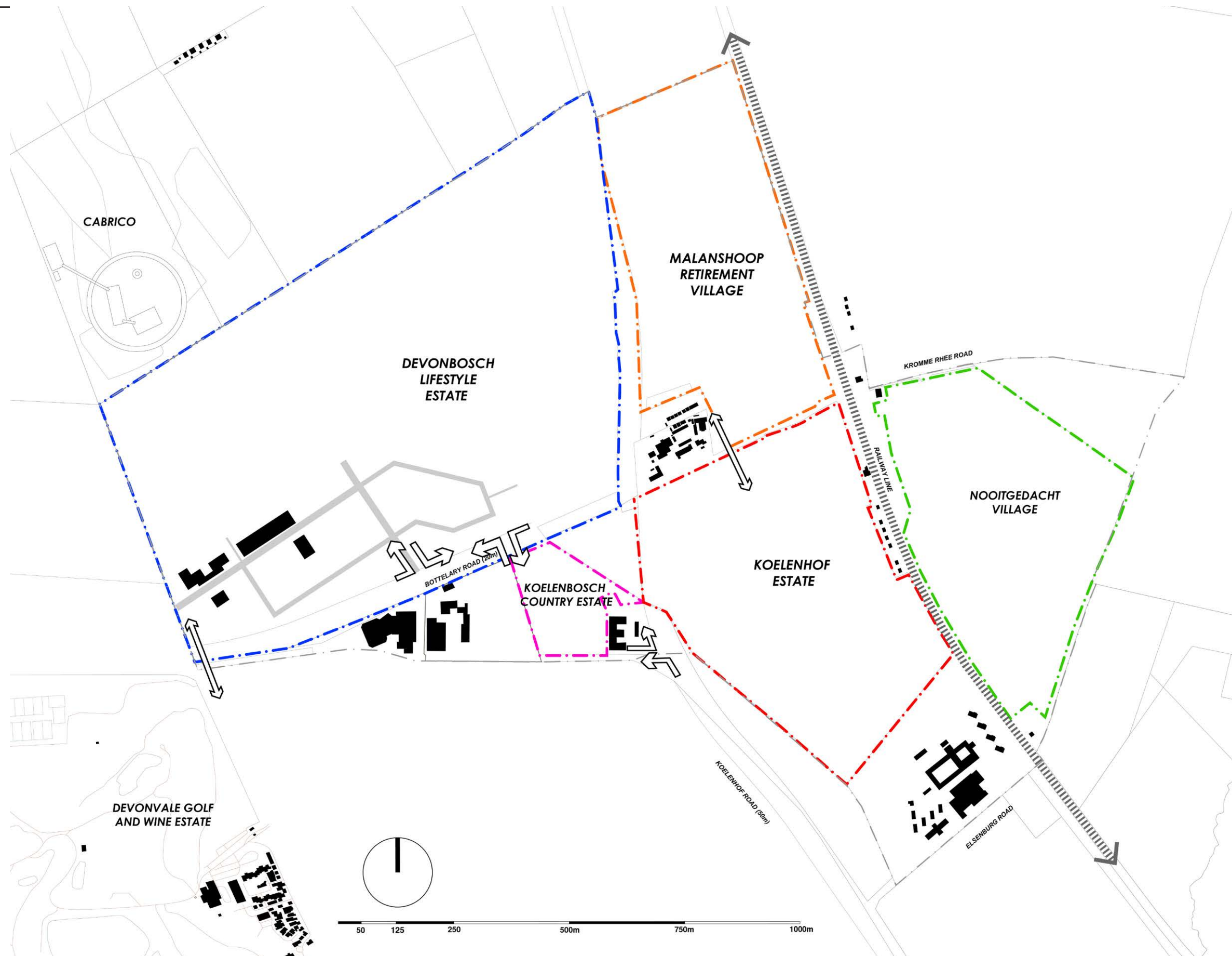
All access points within 540m of the Koelenhof and Bottelary Road Intersection are restricted to a left in and left out access route. Devonbosch has full, signalized intersections onto Koelenhof and Bottelary Road. However, these intersections fail to create connectivity between developments.



figure 12
Visual representation highlighting the access points and network on site



figure 13
Visual representation highlighting the internal and pedestrianised access within the site



READINGS

DEVELOPMENT IN ISOLATION



BARRIERS + GRAIN

Nooitgedacht Village and Koelenbosch Country Estate are gated, middle-to-high-income residential developments. These developments currently predominate in the landscape with their monotonous architecture. These estates act like isolated islands in the landscape.

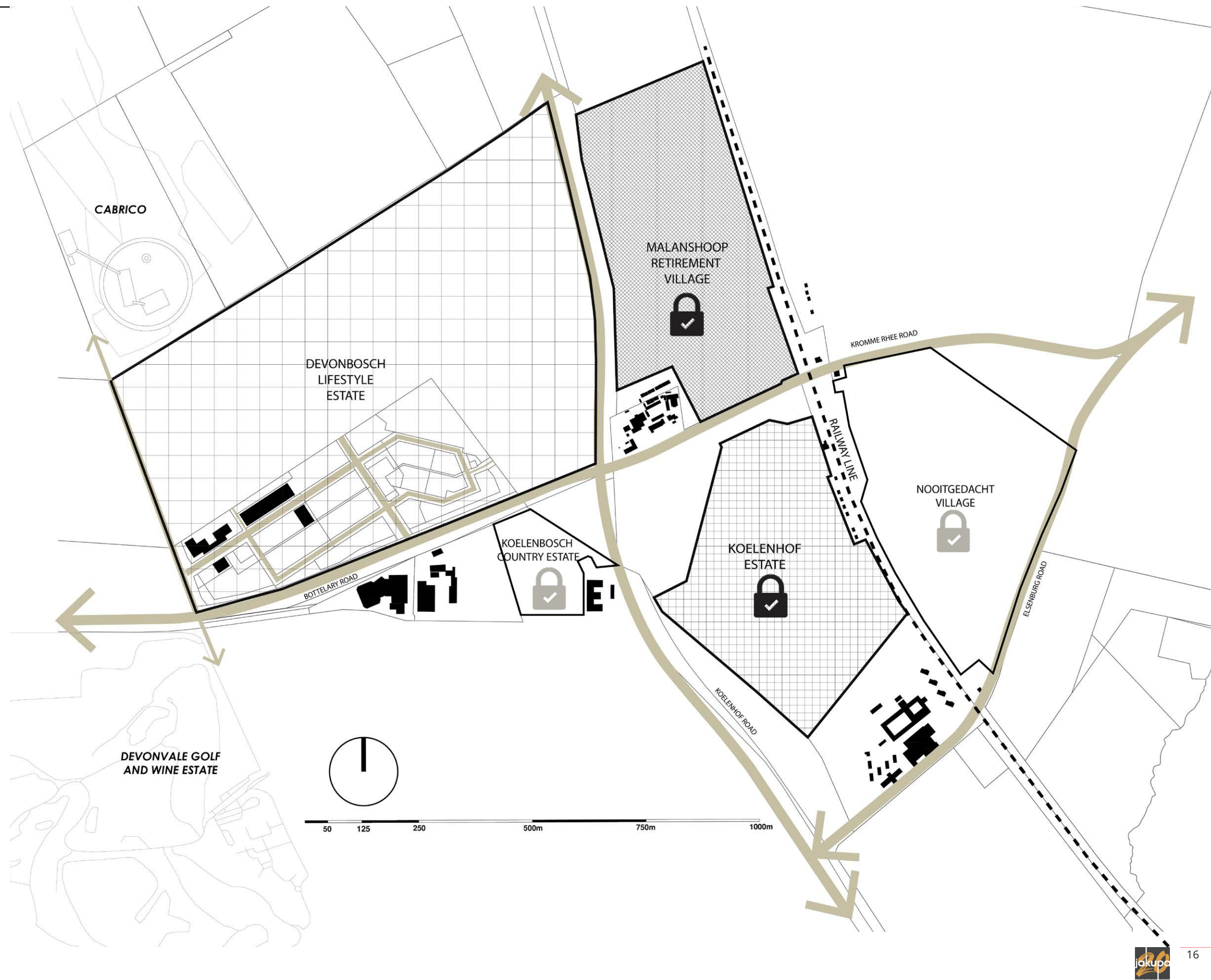
The proposed developments are at risk of replicating this phenomenon. The dangers of a predominantly gated urban landscape are that it has poor relationships with the surrounding landscape and one another, making the in-between space all the more unfriendly, unsafe, and vehicular dependent.



figure 14
Photograph of the Nooitgedacht Village, Stellenbosch Farms



figure 15
Realistic Render of Devonbosch Lifestyle Estate, Stellenbosch Farms



READINGS

DEVELOPMENT IN ISOLATION



FORM AND PUBLIC INTERFACE

The analysis of existing spatial morphology (form) with a focus on its formation, transformation (over time), scale and physical characteristics informs appropriate urban interventions that, in turn, promotes sustainable urban development.

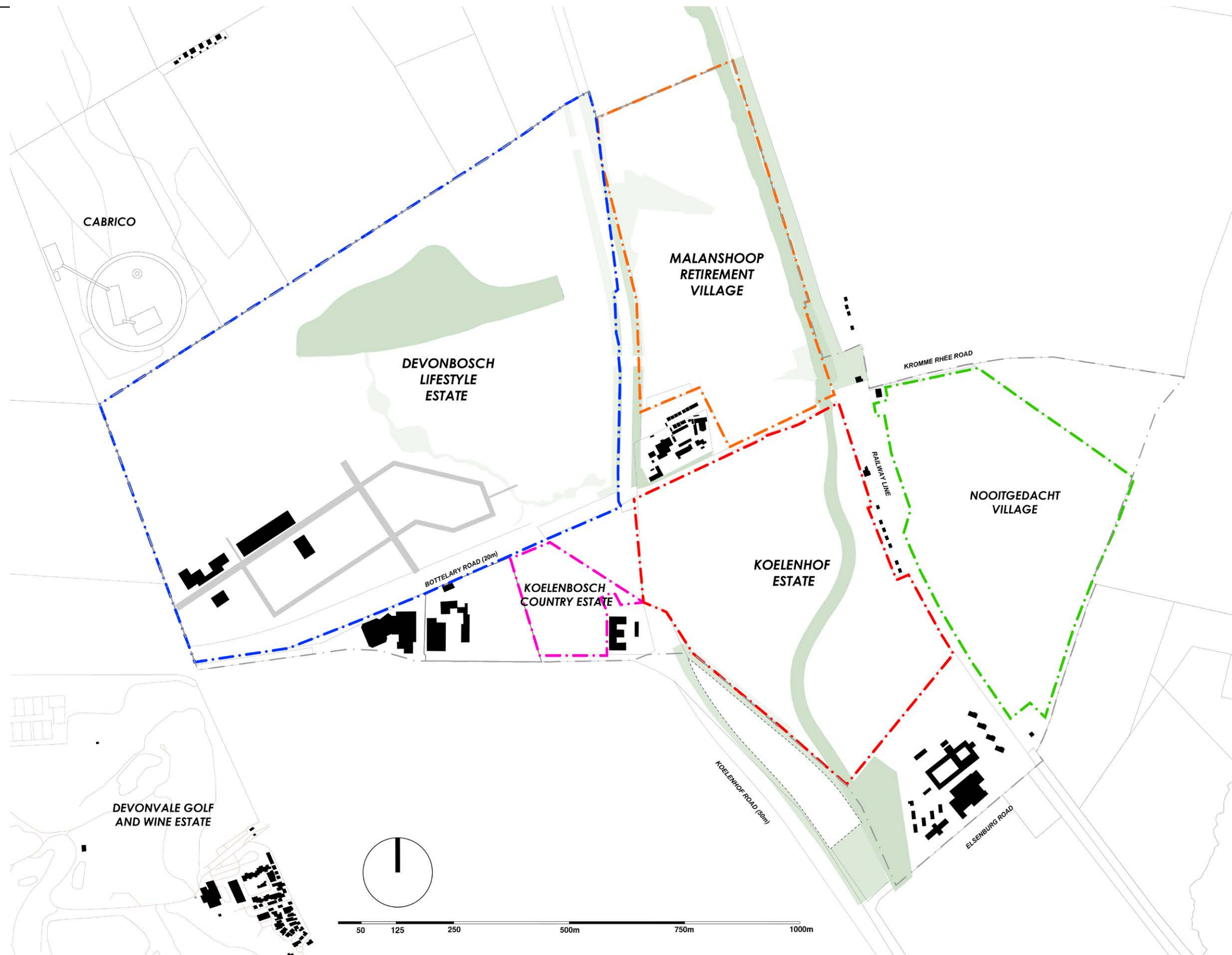
The existing urban morphology of Devonbosch Lifestyle Estate promotes a vibrant mix of building uses and typologies that respond to the rural-urban condition present within the area.



figure 16
Photograph of the Devonbosch Lifestyle Estate building form, Stellenbosch



figure 17
Photograph of the Devonbosch Lifestyle Estate street morphology, Stellenbosch Farms



READINGS - FIXES LOCATING SPATIAL CHARACTERS

LANDSCAPE IN TRANSFORMATION

Meaning in the built environment is conveyed by physical elements. These physical elements, through the use of urban and architectural order and form, can project specific messages into the spatial realm. The relationship between physical and social space establishes the precondition for the experience of a site, a sense of place and identity of the area.

The ever-growing expansion of the city, the location on the urban edge, and the comparatively abundant and cheap land on the periphery of the city have collectively given rise to a number of spatial forms in the area characteristic of urban sprawl.

The existing built and spatial form of the area is diverse and dynamic in character. The varying uses of the land - agricultural, industrial, low- to medium-income residential - have resulted in a grain that varies from superfine (such as the informal settlements) to extensive (industrial and commercial warehousing). These differences are juxtaposed and stand in stark contrast with each other often producing a hostile and segregated spatial form.

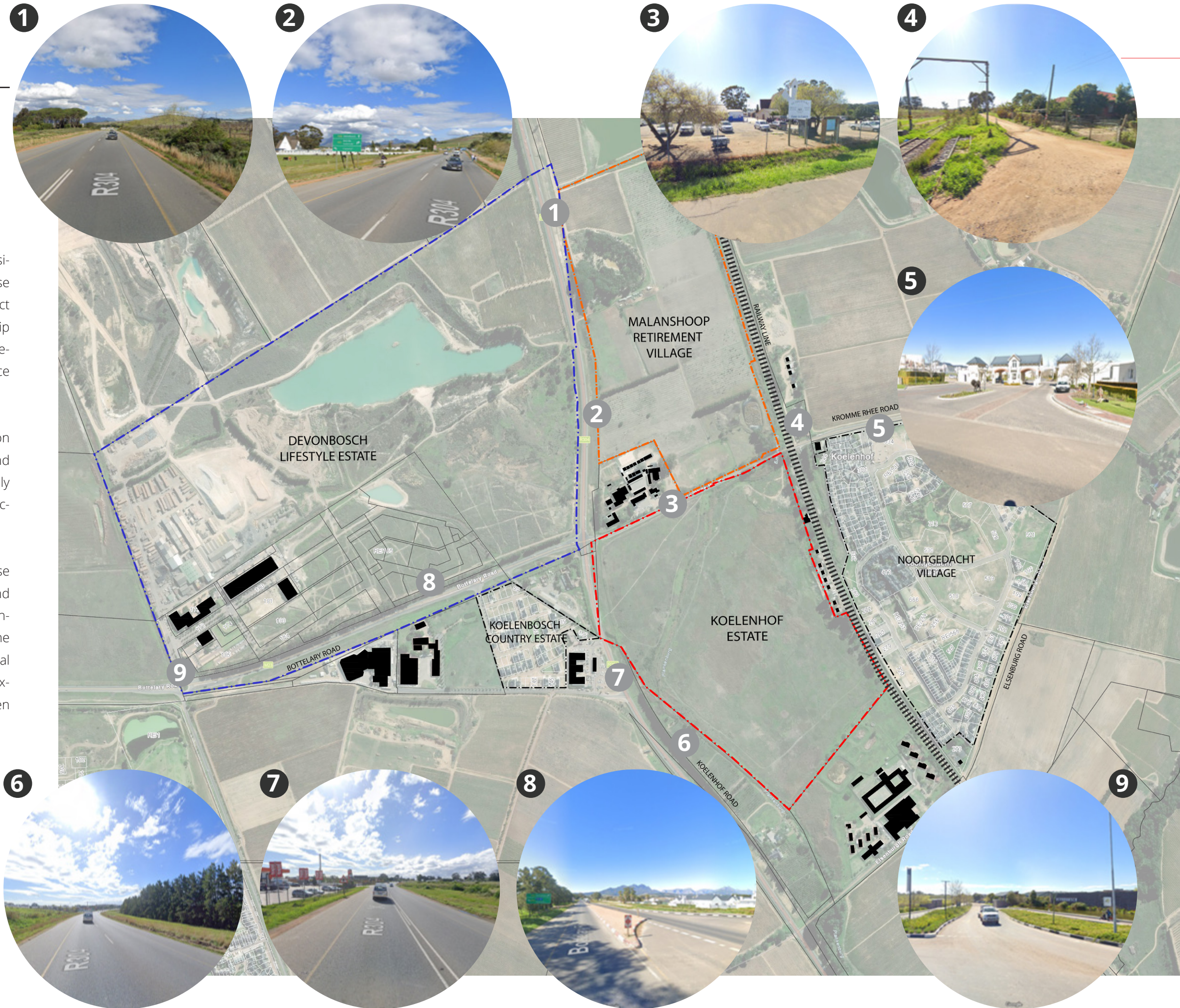


figure 17
Koelenhof greater extent and boundaries around Devonbosch, Malanshoop and Koelenhof Estate.

IDENTIFYING FIXES

THREE LENSES = 3 FIXES

OUR APPROACH

Broadly speaking, the intention of a contextual analysis is to provide informants that can aid in setting up guidelines and ensuring feasibility of a proposed design, by identifying or establishing fixes which will help to inform decisions that respond best to the environmental and built form of the site.

The following categories have been identified for their potential to provide a comprehensive lens through which, when viewed holistically, "fixes" can be identified to inform a proposed design of the spatial structure.

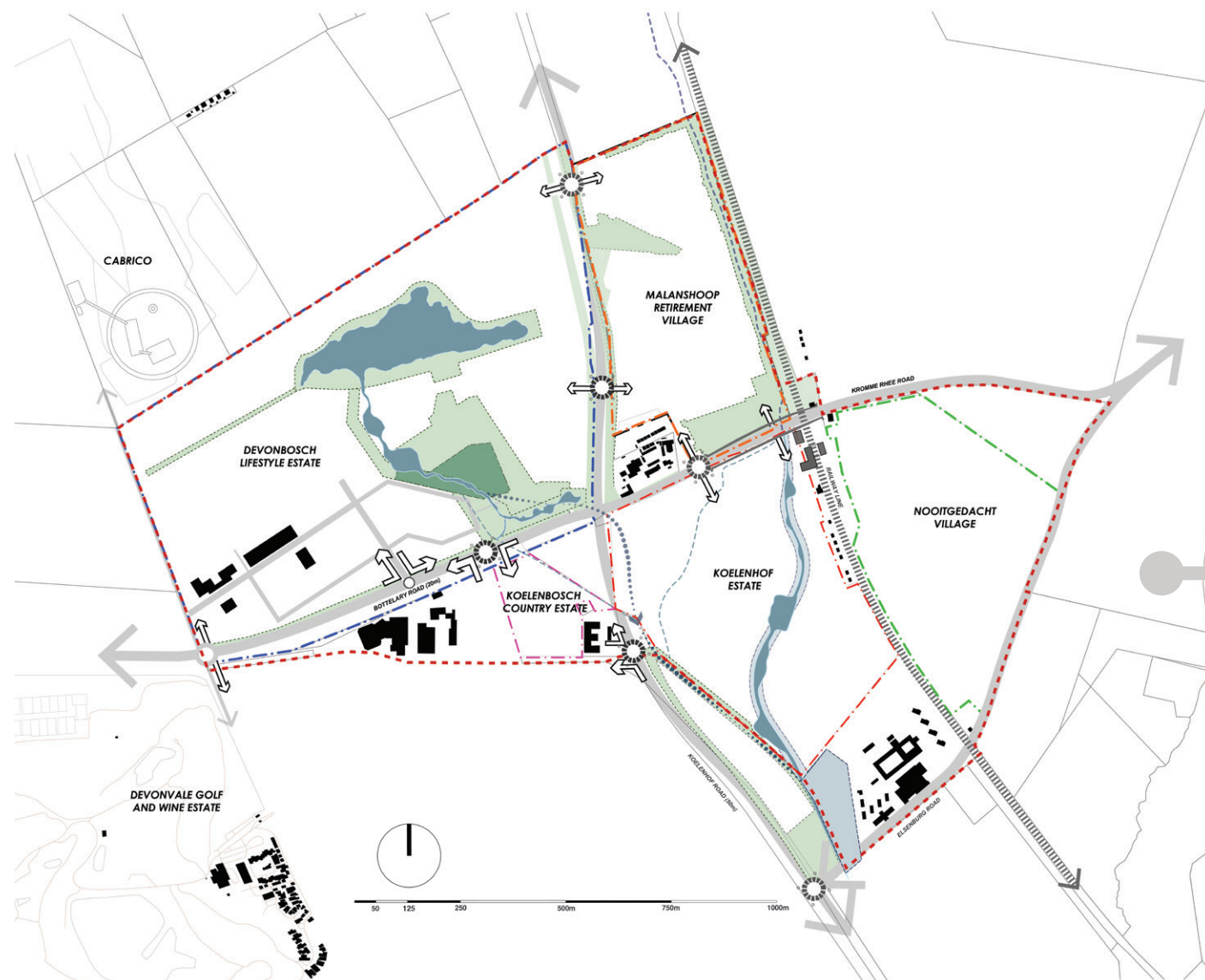


figure 18
Diagram of the layers that combine to show the evolving landscape

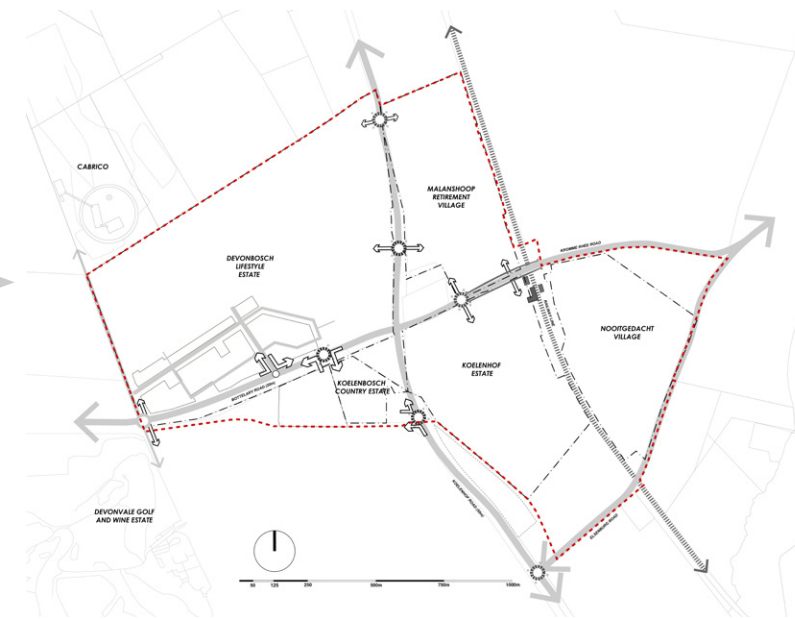
ECOLOGY AND WATER

Through an analysis of the existing ecological processes and the relationships of human as well as non-human organisms within the site and context, our aim is to promote connected and integrated ecological systems, in order to create resilient, sustainable and quality spaces and places.



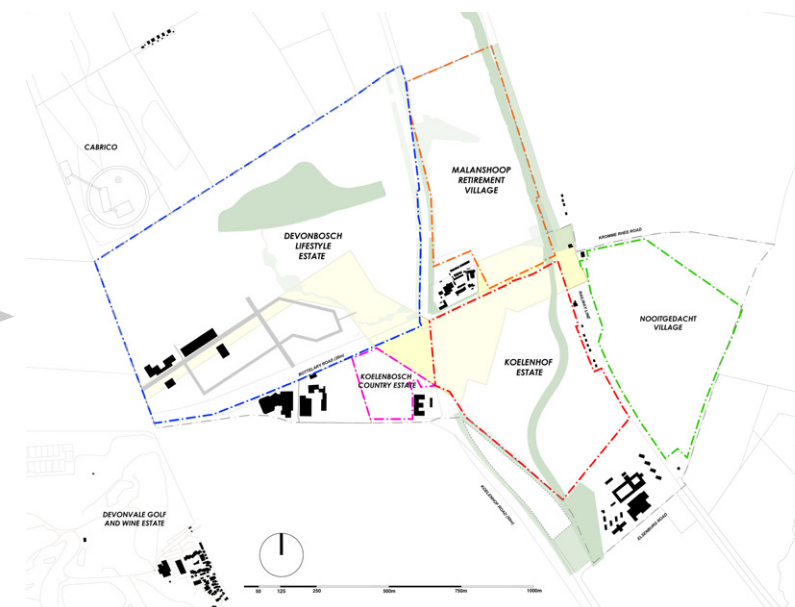
CONNECTIVITY AND MOVEMENT

Through an analysis of existing and proposed transport infrastructure, we promote dense, functionally mixed and walkable areas around transit nodes.



FORM AND PUBLIC INTERFACE

Form and Public Interface presents an analysis of the existing spatial morphology (form) with a focus on its formation, transformation (over time), scale and physical characteristics. This informs appropriate urban interventions that, in turn, promotes sustainable urban development.



ELABORATION - FIXES ECOLOGY AND WATER

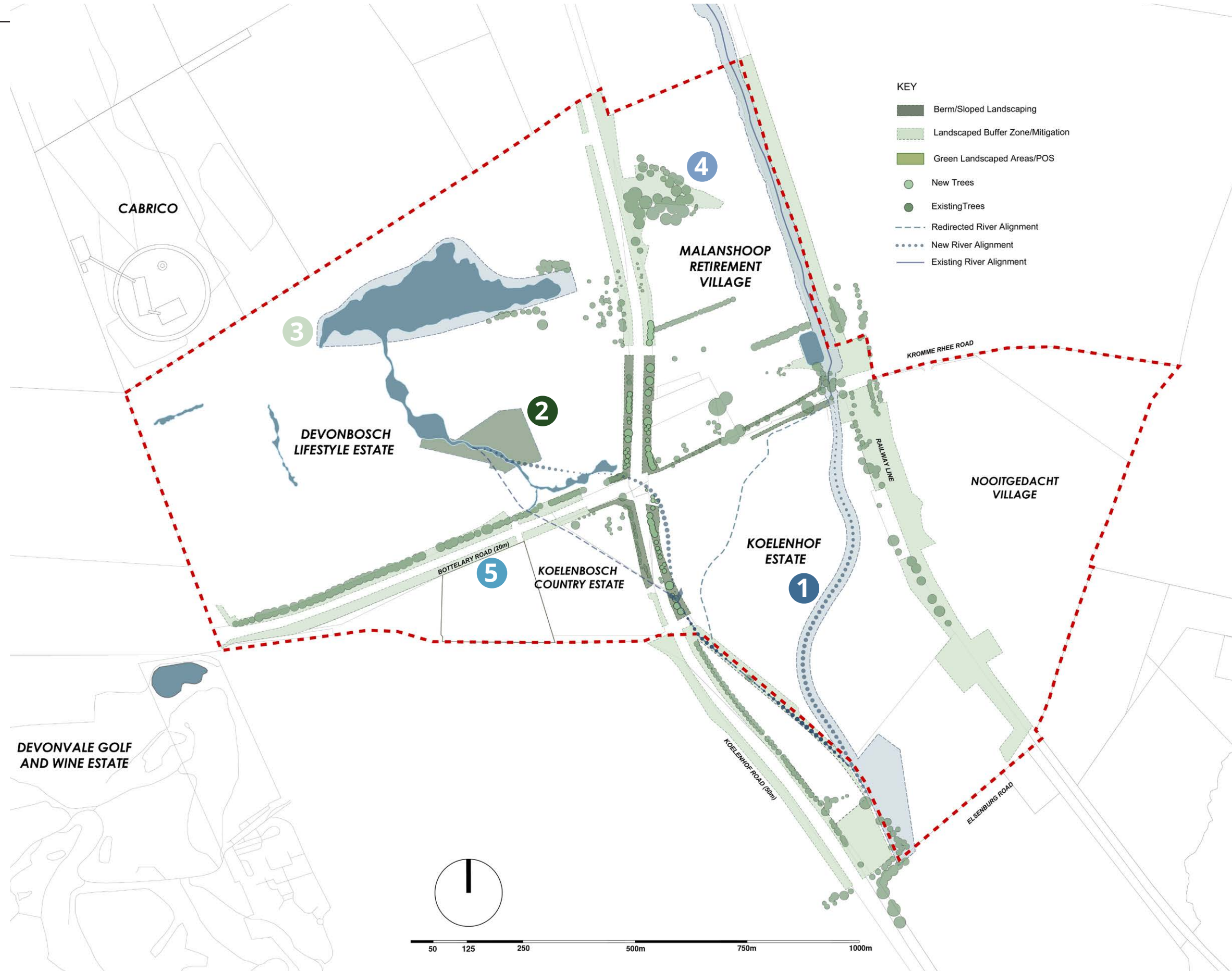


TOPOGRAPHY, WATER AND ECOLOGICAL PRESERVATION

The following ecological fixes have been identified and agreed upon, following collaboration with the developers and the consulting team.

ECOLOGICAL FIXES

- 1** All Rivers and their respective buffers
 - Realignment of the river passing through Koelenhof Estate to follow its previous path.
 - Two ecological corridors, running north to south through the site.
- 2** The recreational area (in green) in Devonbosch.
- 3** Existing agricultural water retention ponds that, in some cases, form part of the existing storm-water management system.
- 4** Mature tree lines and clusters on site.
- 5** Landscaped buffer of 20m either side of Koelenhof Road and Bottelary Road.



ELABORATION - FIXES CONNECTIVITY AND MOVEMENT



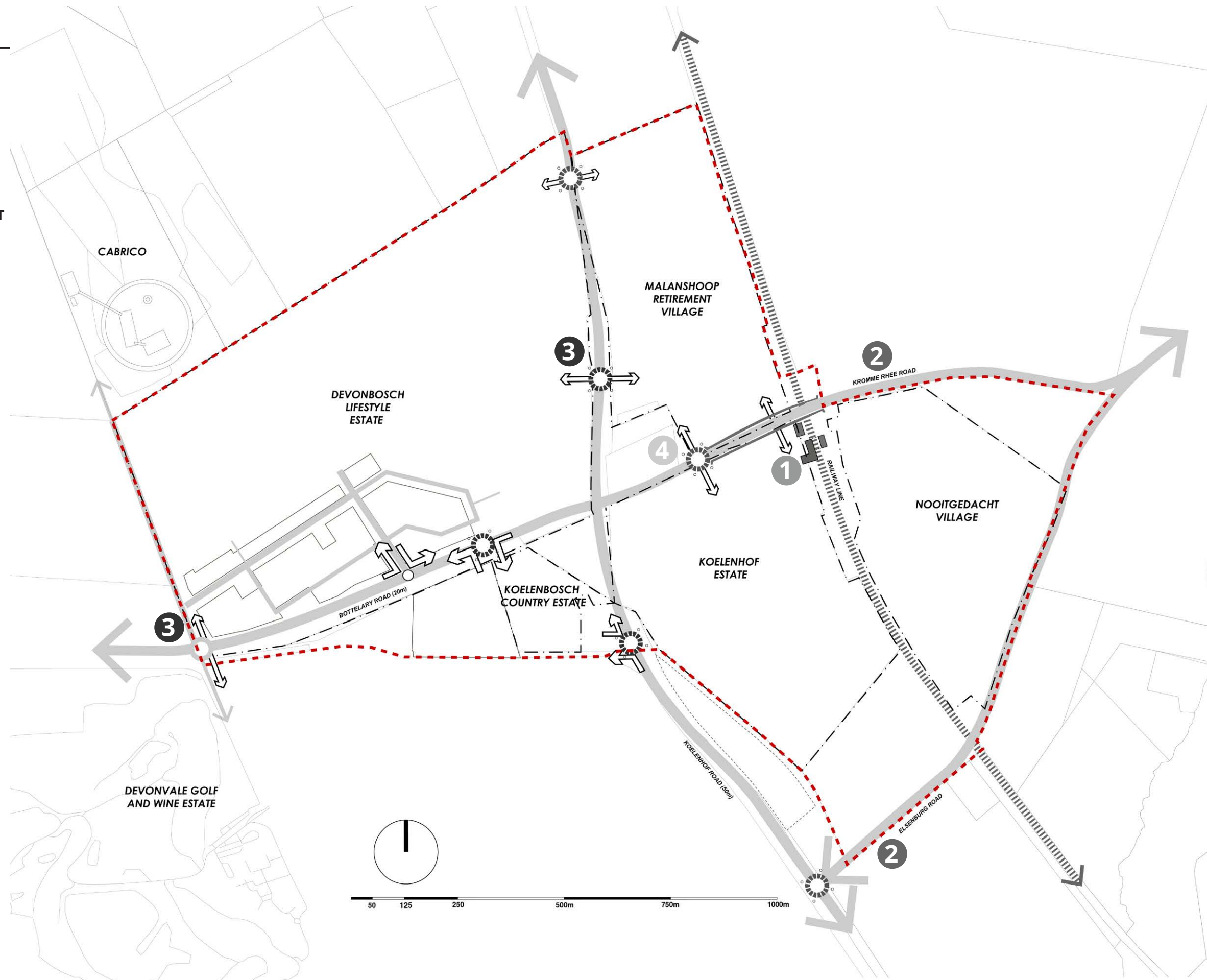
RE-ORGANISATION AND RE-ALIGNMENT ACCOMODATING FUTURE GROWTH

The following movement and connectivity fixes have been identified and agreed-upon following collaboration with the developers and the consulting team.

CONNECTIVITY FIXES

- 1**
 - Rehabilitation of the train station and potential NMT/public transit/shuttle system functioning off the station
 - Future widening of both Koelenhof Road and Bottelary Road
- 2** Upgrading of both Elsenburg and Kromme Rhee Road including an above grade intersection(bridge) with the railway line
- 3** Signalized intersections to access Malanshoop and Devonbosch off Koelenhof Road
Non-signalized Intersection to Devonbosch off Bottelary Road
- 4** Signalized intersection to access Malanshoop and Koelenhof Estate to pass under bridge alongside railway

Landscaped buffer of 20m either side of Koelenhof Road and Bottelary Road



ELABORATION - FIXES FORM AND PUBLIC INTERFACE

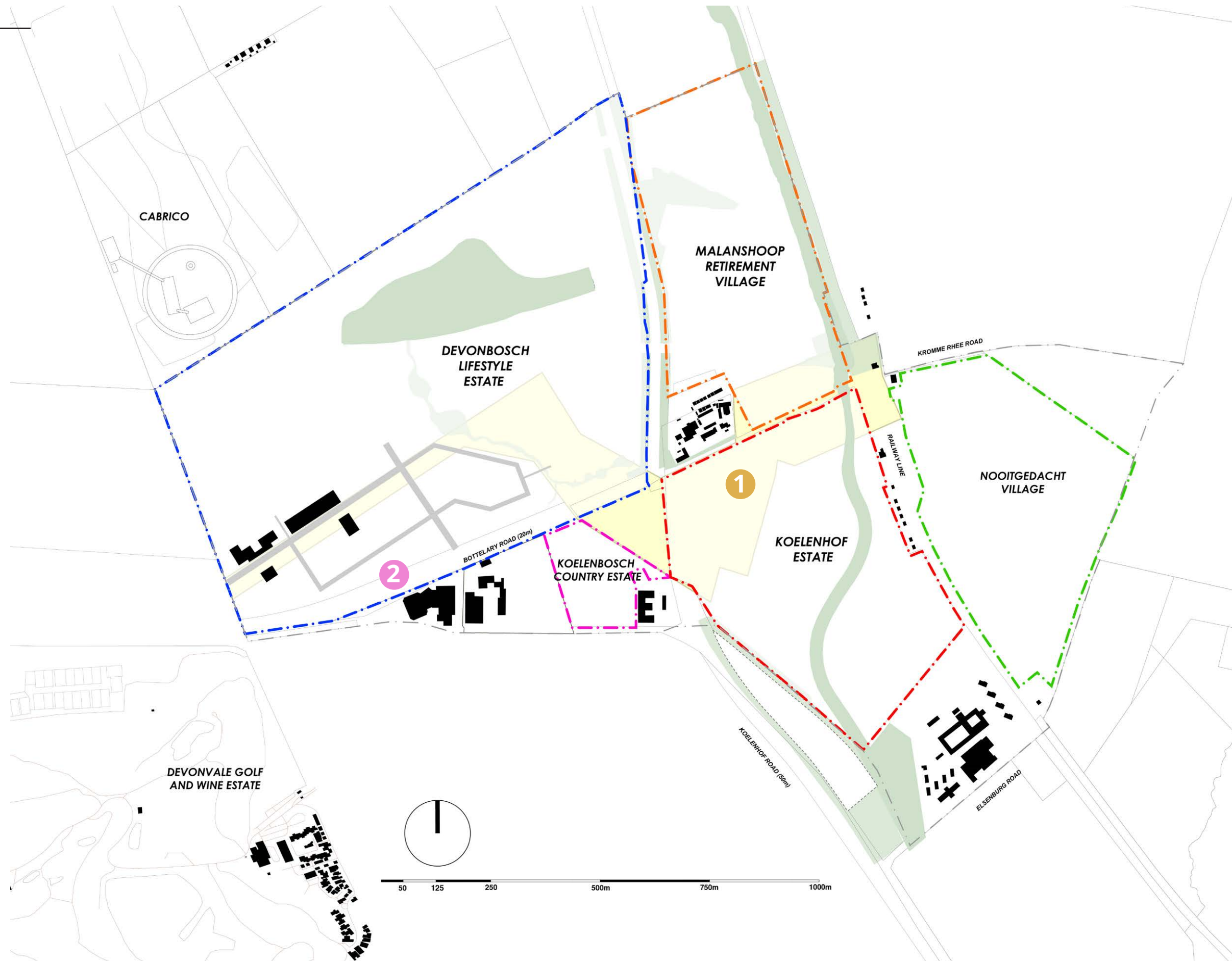


URBAN INTERSECTION | SACRIFICE FOR SECURITY

The following urban guides and fixes have been identified and agreed-upon following collaboration with the developers and the consulting team.

'URBAN' GUIDES AND FIXES

- 1 The public realm as a spatial fix was informed through the built grain, surrounding land uses and social context as an urban guide and edge connector of all three developments, which would facilitate and host a variety of uses and enable a high quality pedestrianised urban interface to complement the rural character of the surrounding area.
- 2 A development setback line along Bottelary Road facilitates the continuation of the public realm as expressed through a connected landscape buffer on either side of the road.



ELABORATION - FIXES

ALL SITE FIXES

The following set of identified fixes are drawn from the site analysis and informed through previous discussion with the respective developers, Clients and the consulting team:



ECOLOGICAL FIXES

- Rivers and their respective buffers
- The recreational area (in dark green) in Devonbosch
- Existing agricultural water retention ponds that, in some cases, form part of the existing storm-water management system
- Mature tree lines and clusters on site
- Two ecological corridors, running north to south through the site
- Landscaped buffer of 20m either side of Koelenhof Road and Bottelary Road



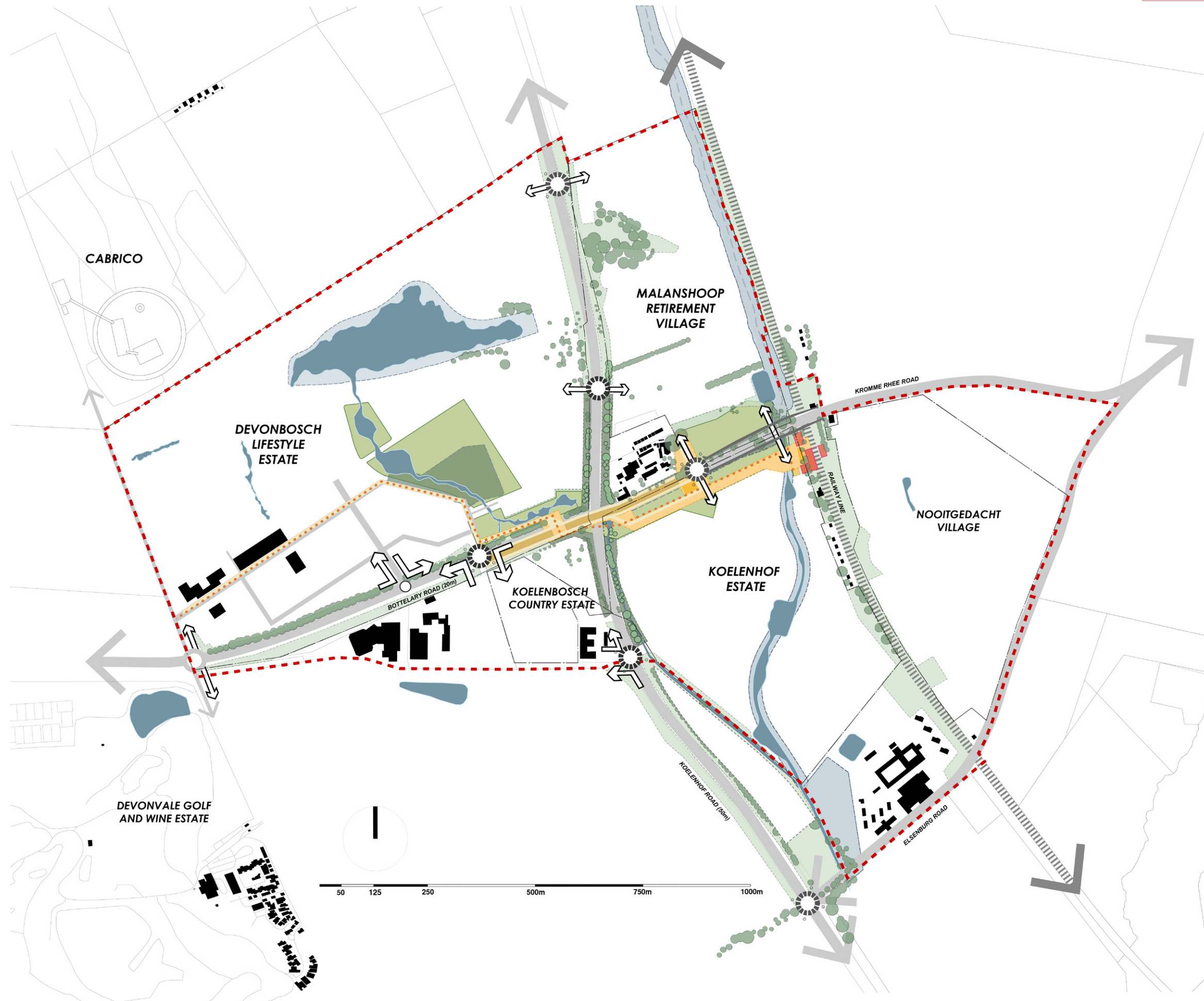
CONNECTIVITY FIXES

- Rehabilitation of the train station and potential NMT/public transit/shuttle system functioning off the station
- Future widening of both Koelenhof Road and Bottelary Roads
- Upgrading of both Elsenburg and Kromme Rhee Road including an above grade intersection (bridge) over the railway line
- Signalized intersections to access Malanshoop and Devonbosh off Koelenhof Road and Devonbosh off Bottelary Road
- Signalized intersection to access Malanshoop and Koelenhof Estate to pass under the bridge alongside railway



'URBAN' GUIDES AND FIXES

- The public realm as a spatial fix was informed through the built grain, surrounding land uses and social context as an urban guide and edge connector of all three developments, which would facilitate and host a variety of uses and enable a high quality pedestrianised urban interface to complement the rural character of the surrounding area.
- A development setback line along Bottelary Road facilitates the continuation of the public realm as expressed through a connected landscape buffer on either side of the road.



The following section discusses the design strategies used to formulate the proposed framework plan.

design strategy

DESIGN STRATEGY METROPOLITAN SCALE STRATEGY

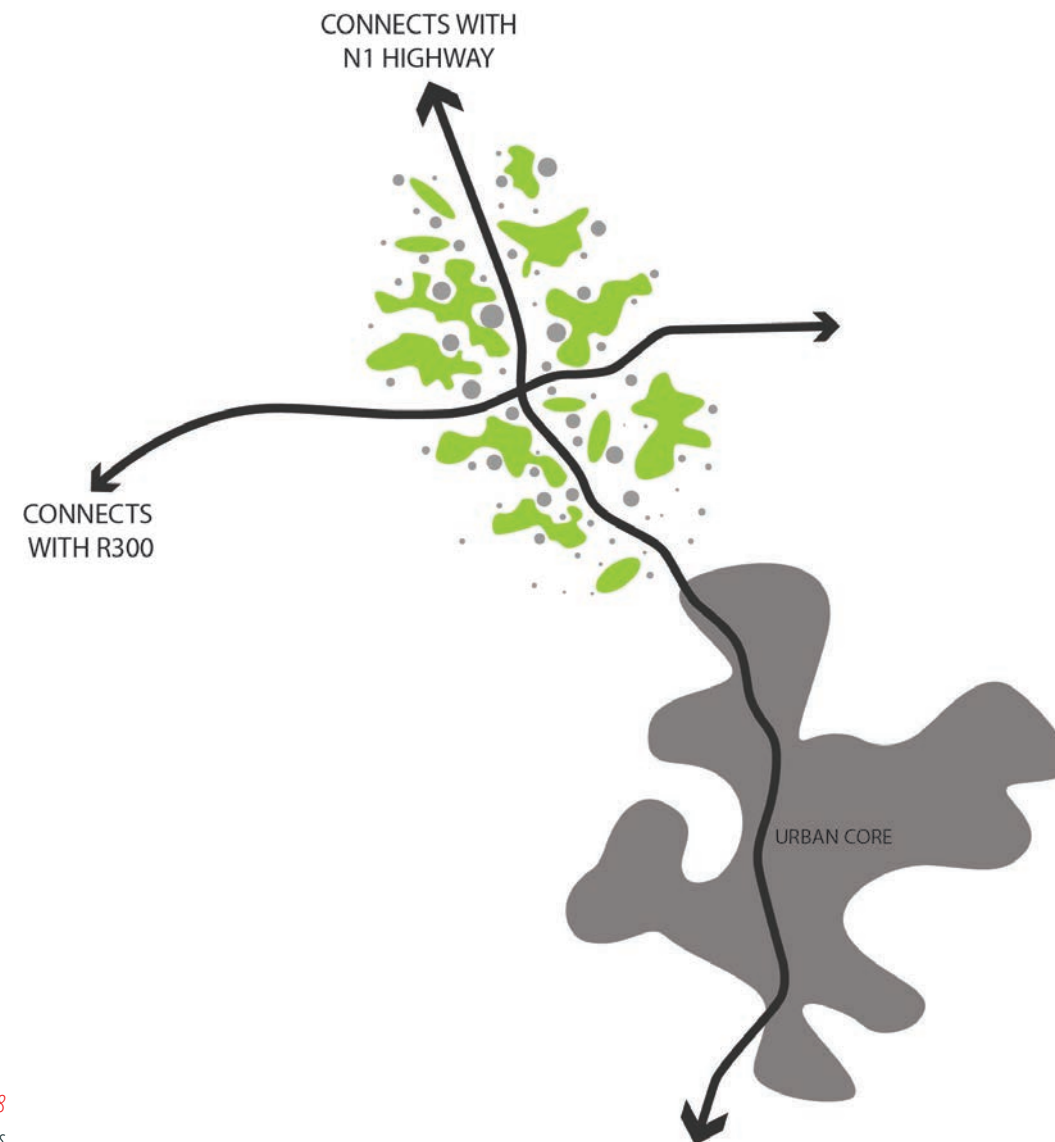
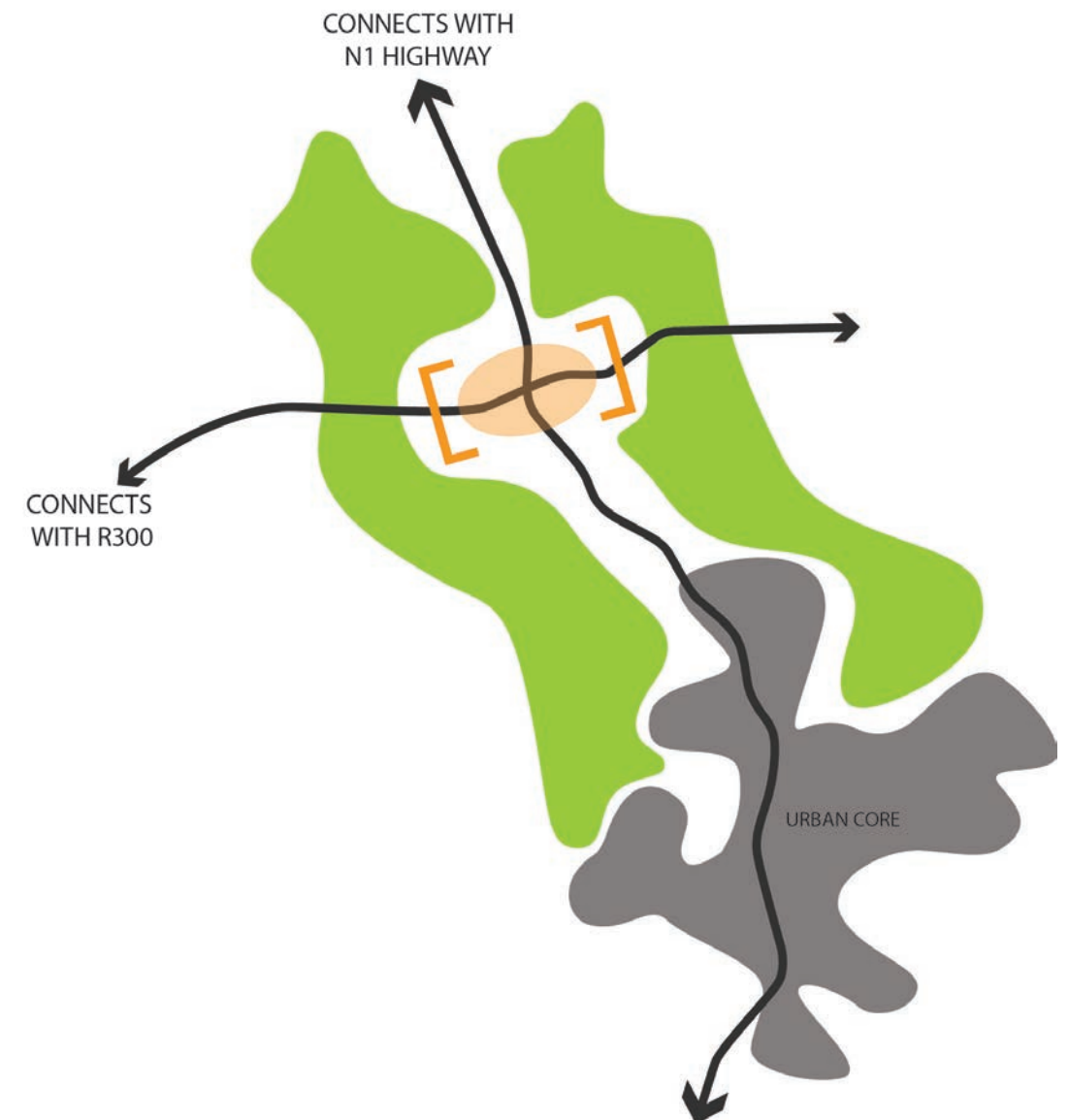


figure 18

Diagrams showing the current and proposed Metropolitan scale strategies

CURRENT SITUATION

At the metropolitan scale, the current development model follows a fragmented spatial logic which leads to the conversion of valuable farmland with adverse environmental, social and financial impacts.



PROPOSED SITUATION

We propose a strategic vision for the Koelenhof area where the developments are consolidated into one framework plan with a rural-urban interface that recognise and reinforce the local spatial identity of the area, freeing up the landscape to promote agricultural productivity, economic growth, connectivity and social networks to be established.

design strategy

DESIGN STRATEGY INTEGRATED AND CONSOLIDATED PLAN



Reinforcing existing ecological systems across all developments as a linking device.



Strengthening and creating movement links between the developments, bridging barriers and encouraging integration.



Consolidating and enhancing the built environment with public space activation.



figure 19

Koelenhof greater extent and boundaries around Devonbosch, Malanshoop and Koelenhof Estate.

DESIGN STRATEGY

GREEN & BLUE NETWORK STRATEGIES



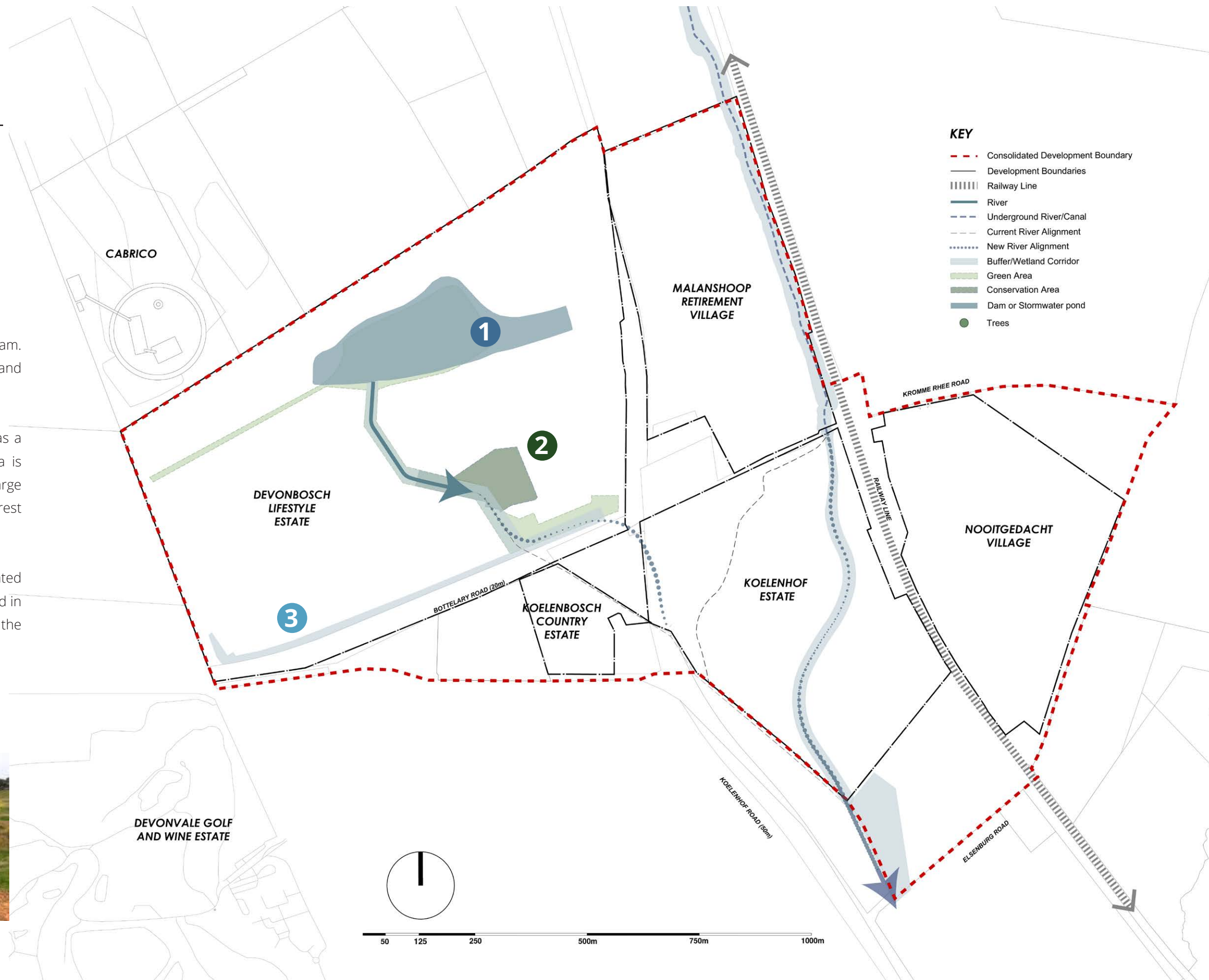
RIVER CORRIDOR

- 1** Retain and enhance the natural shape of the large dam. Surrounding development to make use of this visual and recreational asset.
- 2** The area demarcated in green has been identified as a recreational area and development within this area is restricted. This area has the potential to become a large recreational park with footpaths and pocket parks/rest spaces.
- 3** This blue strip along Bottelary Road has been demarcated as a protected wet buffer. This piece of land is covered in treelines that provide a screen for Devonbosch from the future class 2 road.



figure 21

Visual representation showing the expression of the river corridors.



DESIGN STRATEGY

GREEN & BLUE NETWORK STRATEGIES



GREEN AND BLUE SYSTEM STRATEGY

- 4** This river and wetland corridor along the eastern boundary of Malanshoop is to be maintained. Residential units on this eastern bank need to face onto this area to activate it. The boundary fence along this corridor needs to be transparent as to not create any visual obstruction as well as prevent contributing to unsafe spaces along the railway.
- 5** It is proposed that the river running through Koelenhof Estate is rerouted back to what was its previous/original path directly through the center of the property. The river has a 15m buffer either side and will be revived. This river corridor can become a potential asset to properties adjacent and facing onto it.
- 6** Water movement down the slope between Devonbosch and Koelenhof estate has been canalized and redirected into pipes underground. The proposal is to bring this water back to the surface and reroute this water movement to pass through the intersection.

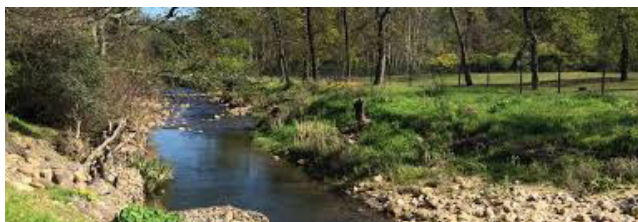


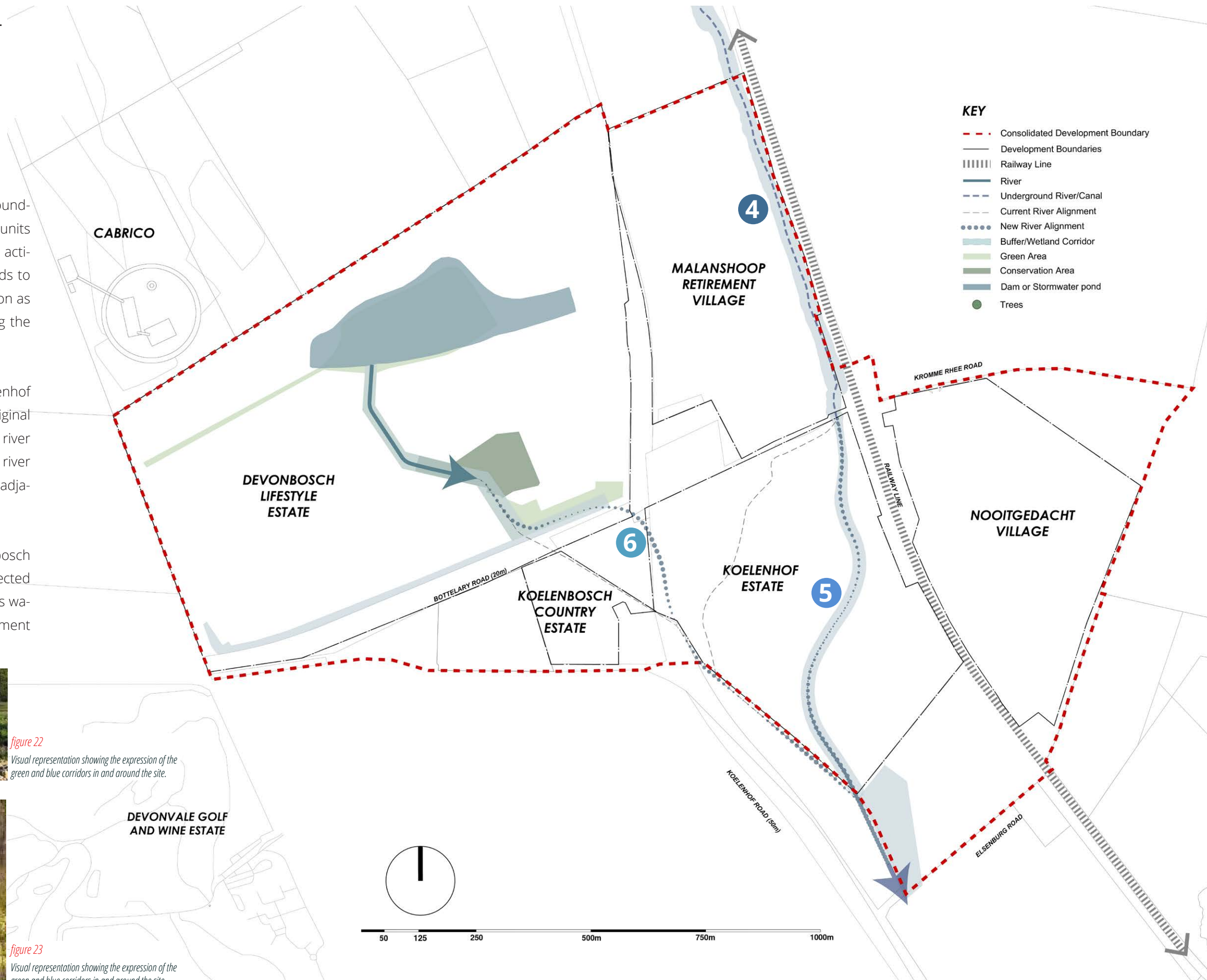
figure 22

Visual representation showing the expression of the green and blue corridors in and around the site.



figure 23

Visual representation showing the expression of the green and blue corridors in and around the site.



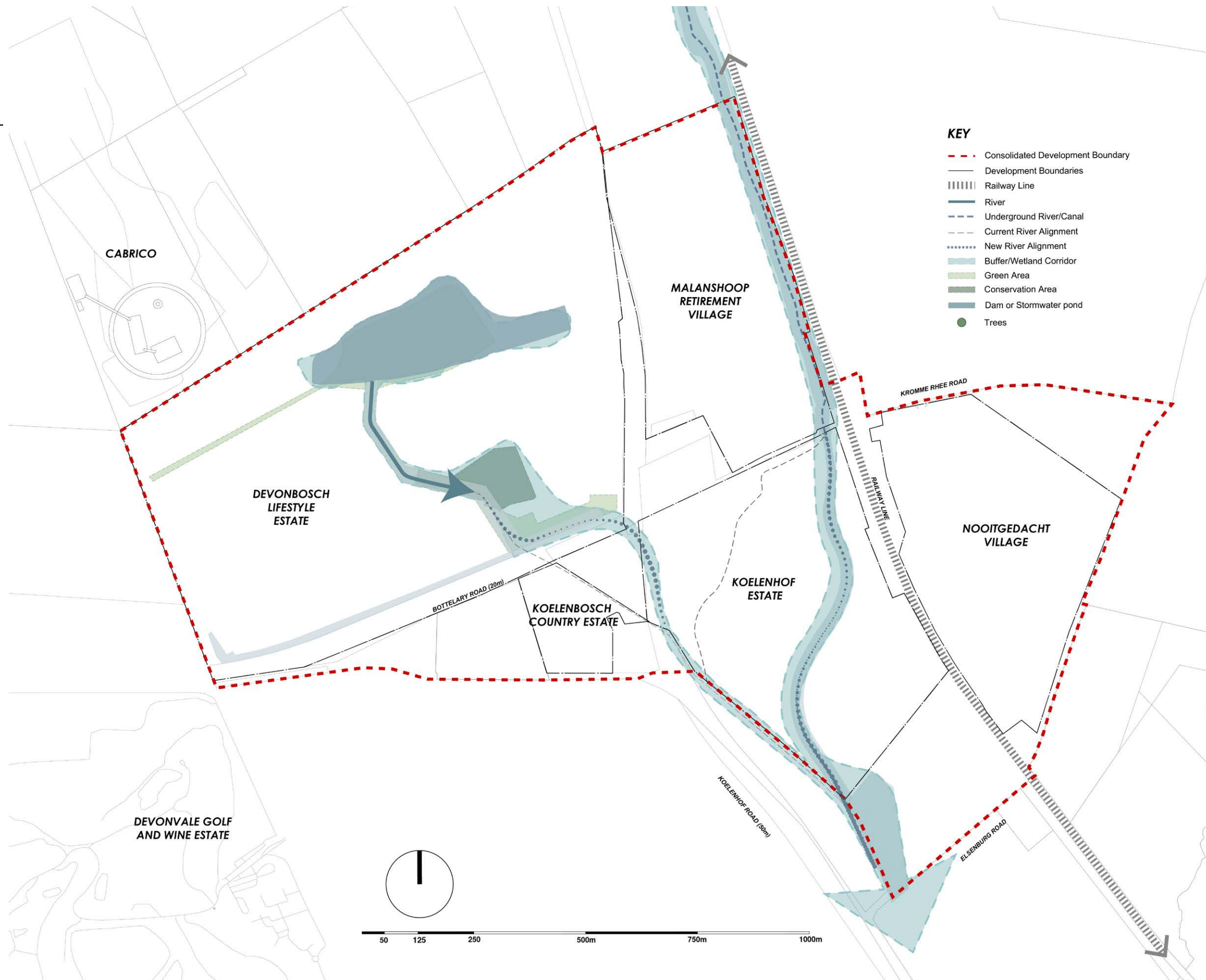
DESIGN STRATEGY

GREEN & BLUE NETWORK STRATEGIES



ECOLOGICAL CORRIDOR / SYSTEMS AS A WHOLE

Reinforcing existing ecological systems across all developments as a linking device. A designed landscaped interface that meets the requirements of an ecological corridor, is proposed. This space can also incorporate pedestrian movement, recreational as well as stormwater management functions.



DESIGN STRATEGY

GREEN & BLUE NETWORK STRATEGIES



BLUE NETWORKS AND STORMWATER

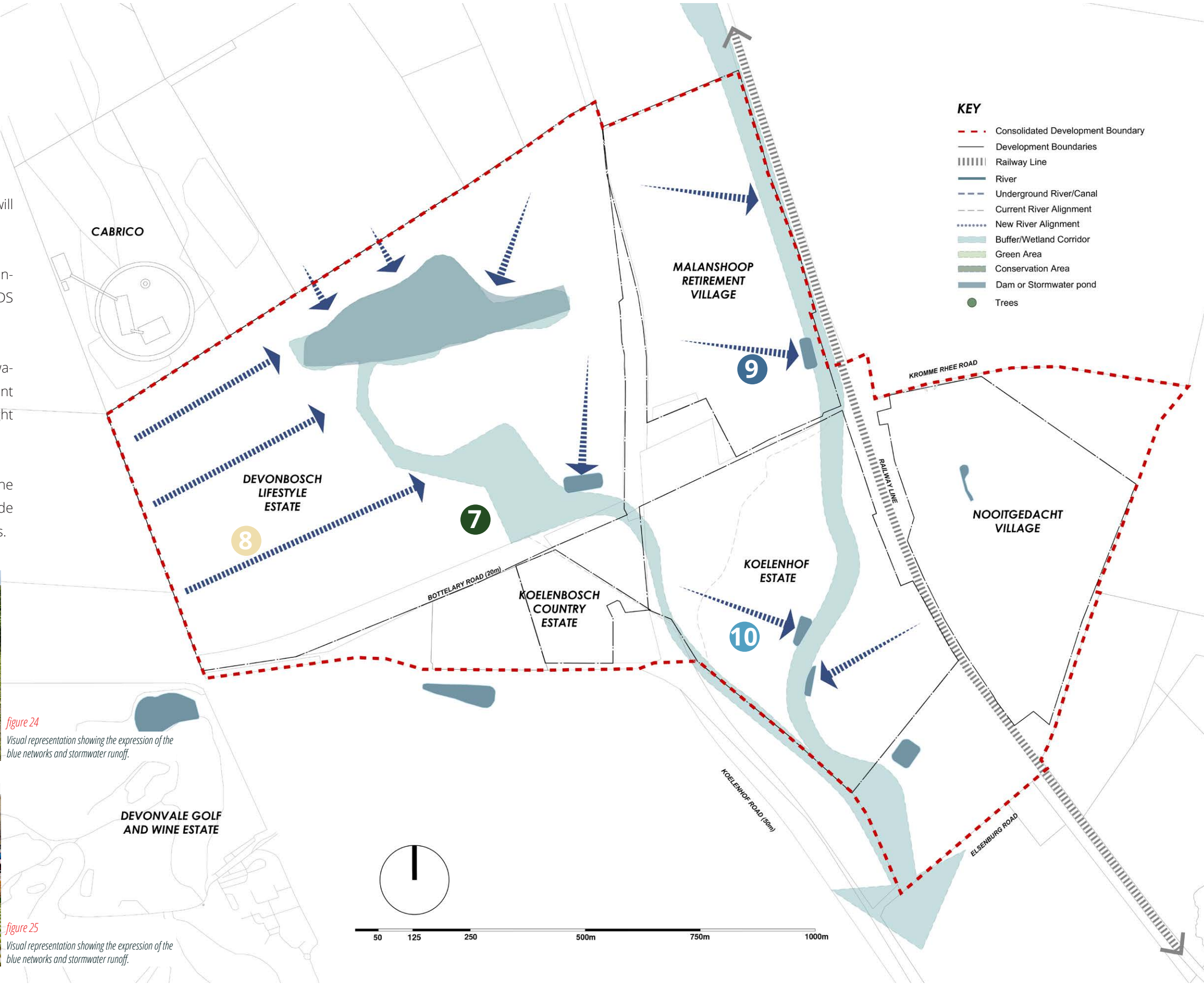
- 7** A stormwater pond is proposed for this location. It will hold water at the base of the slope.
- 8** Stormwater management along these streets in Devonbosch needs to be dealt with laterally in the form of SUDS integrated into the streets and sidewalks.
- 9** Stormwater runoff in this area will also require a stormwater pond at the lowest point on site. Run off to this point can be caught along the eastern boundary to be brought to this point.
- 10** Stormwater can be dealt with in small ponds along the river rather than one large pond. These ponds provide opportunity for recreational pocket parks and walkways.



figure 24
Visual representation showing the expression of the blue networks and stormwater runoff.



figure 25
Visual representation showing the expression of the blue networks and stormwater runoff.



DESIGN STRATEGY GREEN & BLUE NETWORK STRATEGIES



LANDSCAPE BUFFER

- 11** Dense existing treelines that provide a green buffer for Devonbosch from the future class 2 road. An equivalent buffer will be provided for on the other side of the road.
- 12** Where possible trees and treelines should be retained. The tree clusters in Malanshoop create an opportunity for a green neighbourhood park. Additionally, a 20m landscape buffer is proposed for either side of Koelenhof Road.
- 13** The landscape buffer is to be extended up to the intersection to act as a screen for pedestrians from the Class 2 road.



figure 36
Visual representation showing the expression of the landscape buffer in and around the site.



figure 37
Visual representation showing the expression of the landscape buffer in and around the site.

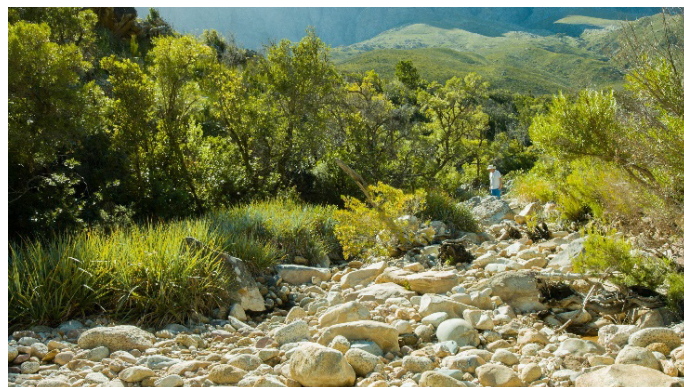
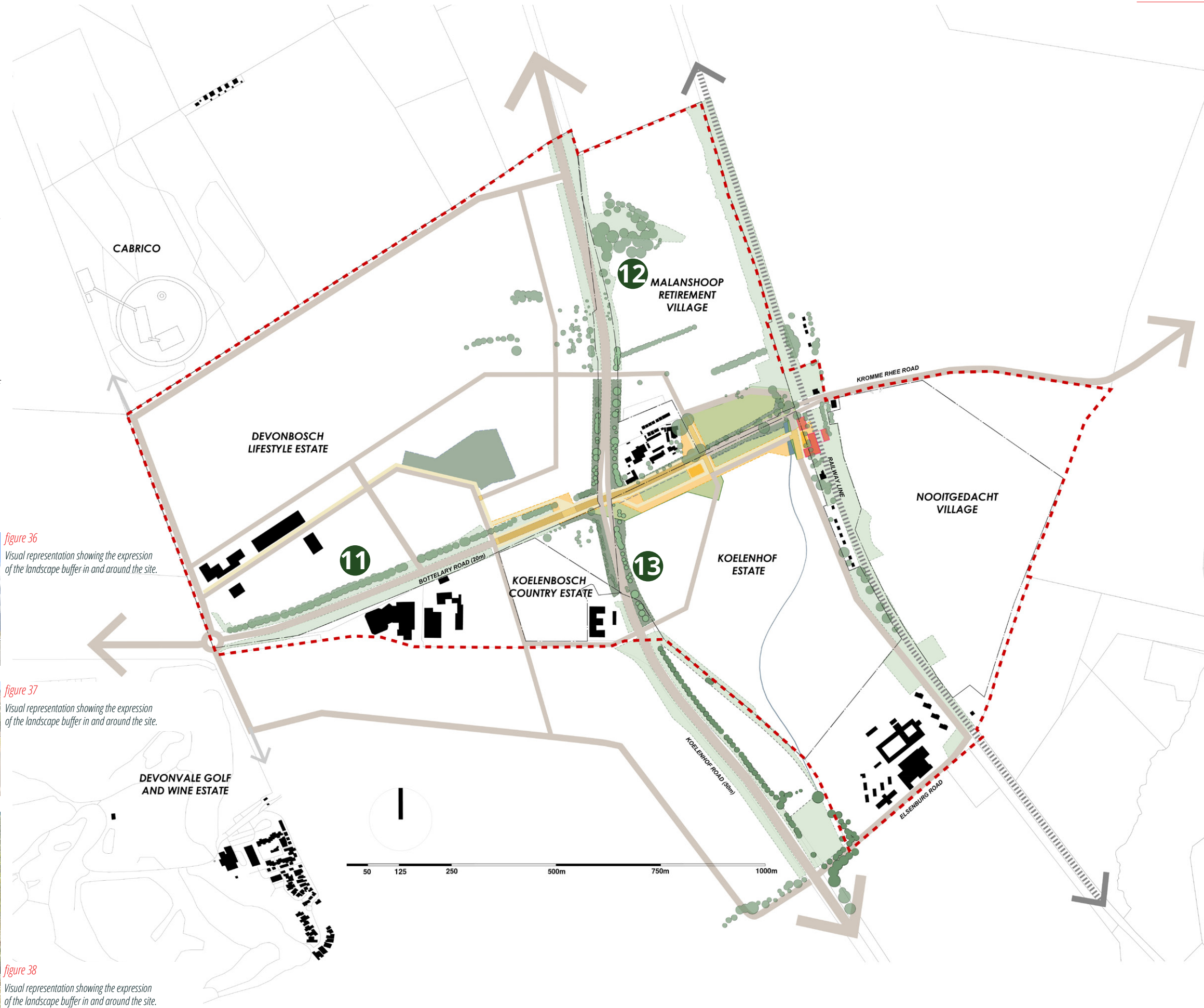


figure 38
Visual representation showing the expression of the landscape buffer in and around the site.



DESIGN STRATEGY BLUE NETWORK STRATEGIES



SUSTAINABLE DRAINAGE SYSTEMS

These strategies slow down the water drainage out of the site, allowing for filtration and recharging of ground water sources. Additionally it allows for ecological systems to thrive and provides a presence of water on the site that is visible to the user. It also provides an alternative to hard engineering solutions whilst creating a desirable environment for the users.

- 1 Soft engineering system that filters runoff from streets and roofs.
- 2 Permeable surfacing to allow water infiltration where possible. In select areas with no assigned sidewalks and hard surfacing, the streets double as pedestrian spaces that allow vehicular traffic.
- 3 Swale
- 4 Planted verges with indigenous water sensitive planting. Without hard surfacing, water is free to seep slowly into the ground.
- 5 Collect rainwater from roofs in water storage tanks to be used for landscaping irrigation.

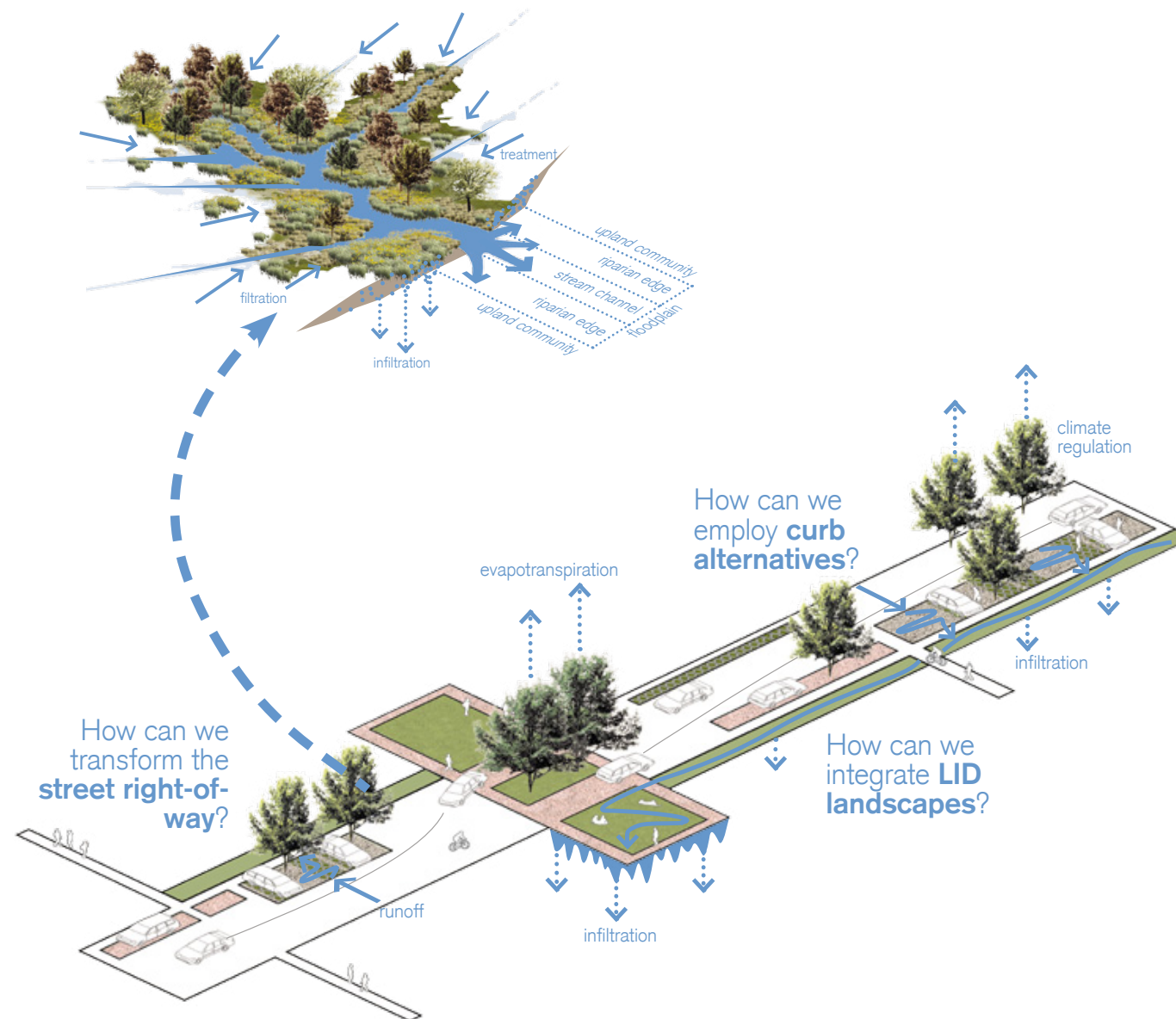


figure 27

A SUDS System. Source: *Low Impact Development: A Design Manual for Urban Areas*, AUCDC, 2010

figure 28

Picture 1. Good practice example of green stormwater infrastructure in Seattle, WA, <https://nacto.org/publication/urban-street-stormwater-guide/streets-are-ecosystems/sustainable-stormwater-management-matters/>

figure 29

Picture 2. Permeable paving in Missouri Botanical Garden parking lot allows water to reach tree roots. <https://www.gardenatoz.com/what's-up!/ensemble-weekly-editions/early-winter/what's-up-168-water-a-pot-seed-for-mildewed-lawn/permeable-paving-grid/>

figure 30

Picture 3. Sourced photograph of a bioswale along a pathway through a park. Project unknown, <https://i.pinimg.com/originals/32/91/93/329193a69205edae1e131084d2a2b971.jpg>

figure 31

Picture 4. Sourced photograph of a bioswale along a road in Seattle <https://nacto.org/publication/urban-street-design-guide/street-design-elements/stormwater-management/bioswales/>

figure 32

Picture 5. Green street systems in Portland, Oregon, <https://www.opb.org/news/article/portland-oregon-environmental-agency-audit-green-streets/>

1



2



3



4



DESIGN STRATEGY BLUE NETWORK STRATEGIES



STORMWATER BIO-RETENTION PONDS

The bio-retention pond areas are to be workshoped and integrated into the landscape strategy. The design team will consider their interfaces with the surrounding landscape and built form.

Retention of water is to occur at multifunctional green spaces such as the road buffer zones. They can be shaped along areas to create linear strips that accentuate the presence of water and biodiversity along roadways or to be integrated with the riparian edge. Retention areas need to be well-considered and designed as delineated features integrated into and complementing the space in which they are located.

At more formal urban interfaces, retention areas need to be well-considered and designed as delineated features integrated and complementing the space in which it is located.

Large existing agricultural ponds are to be made functional for stormwater retention. This allows for ecological systems to thrive and provides a presence of water on the site to be enjoyed as recreational space for the user.

1



2

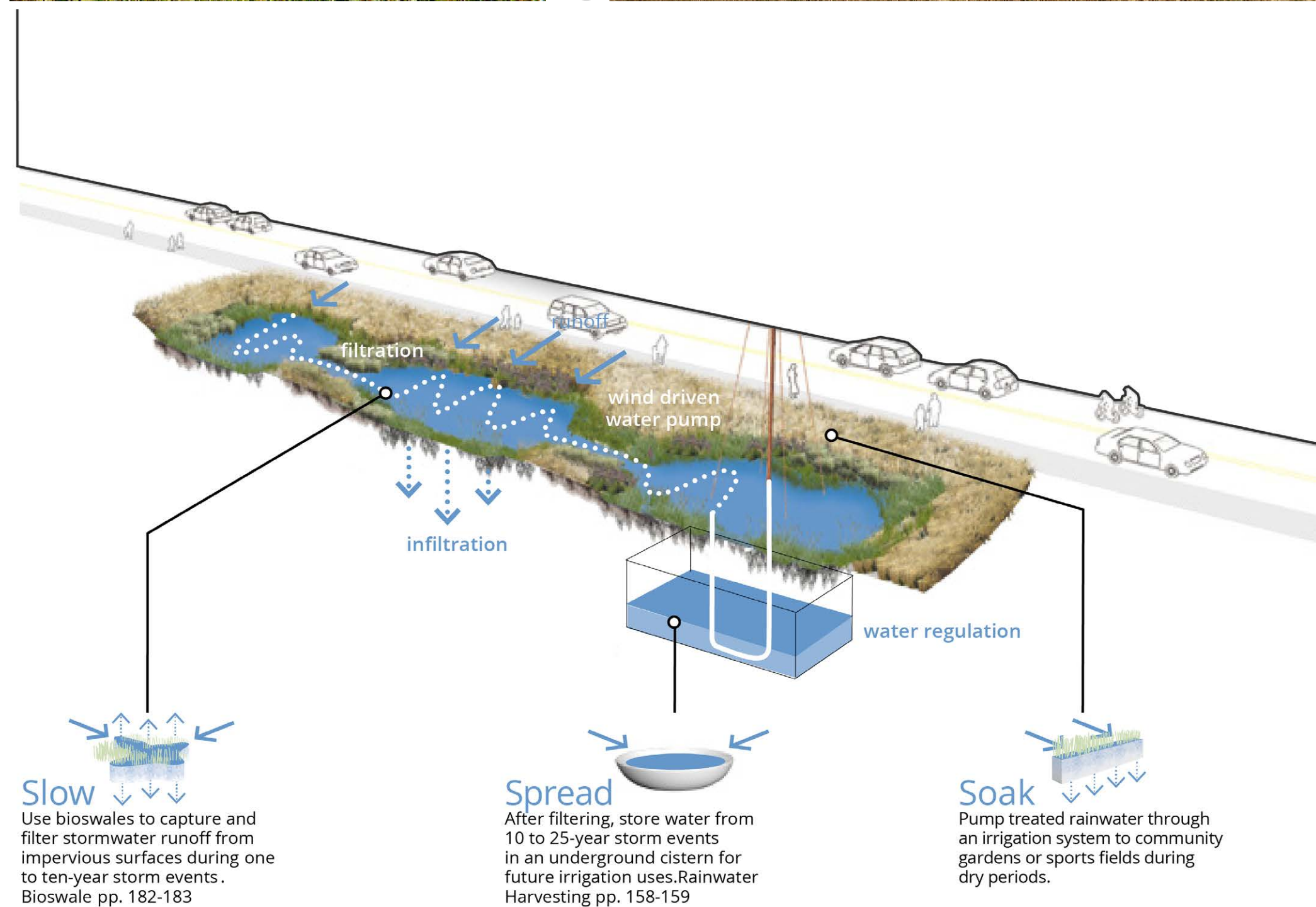


figure 33

Picture 1. Intaka Island / Century City, <https://www.capetownwithkids.com/intaka-island-century-city/>,

figure 34

Picture 2. An existing agricultural pond on site.

figure 35

A SUDS System. Source: Low Impact Development: A Design Manual for Urban Areas, AUCDC, 2010

DESIGN STRATEGY MOVEMENT AND ACCESS



REDISTRIBUTING AND DISPERSING TRAFFIC YIELD

- 1** Traffic demands in the area that will be created by Devonbosch alone will require significant upgrading of the roads and whole intersection. To take some additional pressure off the intersection a secondary road will be required cutting through Devonbosch and joining Bottelary and Koelenhof Road at over 570m away from the intersection.
- 2** The upgrading of Bottelary and Kromme Rhee to class 2 roads will further segregate the three developments from one another. It is proposed that this secondary internal ring road network provides an opportunity to connect all three new developments and also alleviate additional vehicular traffic.
- 3** A bypass to the south of the intersection creating a direct link between Elsenburg Road, (intersecting Koelenhof Road) and Bottelary Road will further ease the centralized traffic yield in the area. These roads A & B are classed as quarter link roads.

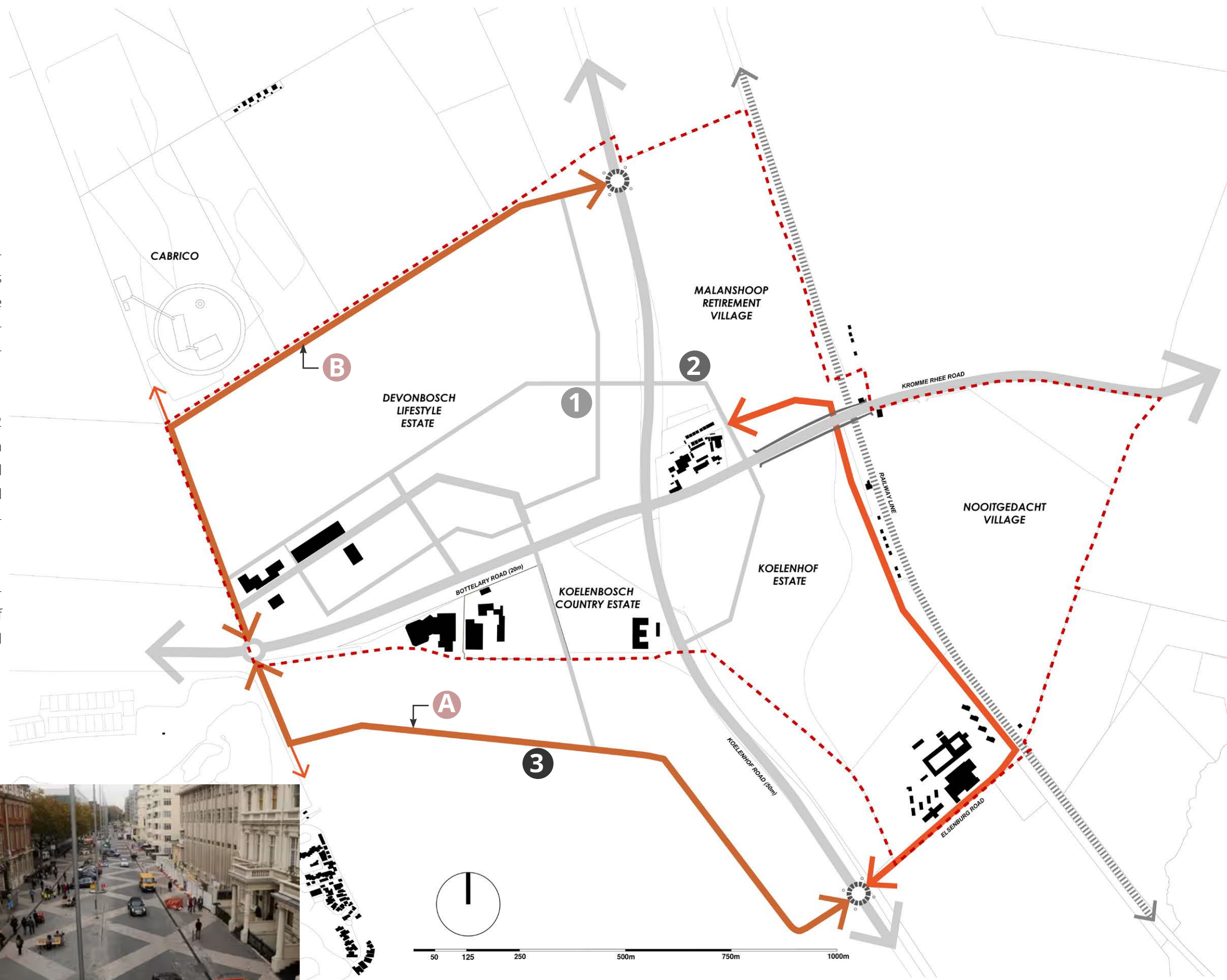
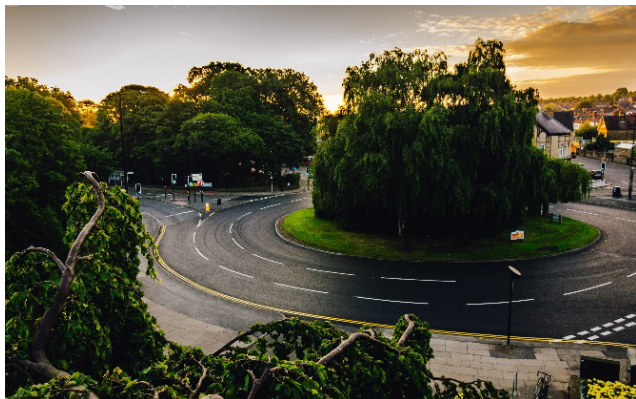


figure 39

Visual representation showing the expression of the dispersion of traffic.



figure 40

Visual representation showing the expression of the dispersion of traffic.

DESIGN STRATEGY MOVEMENT AND ACCESS



TRAFFIC CALMING

- 1 Road and traffic calming measures are implemented within the Koelenhof Consolidated and Integrated Plan area. From the boundary edges of the site, the existing Koelenhof road that connects to the N1 Highway will have signalised intersections, A & C, as one enters the consolidated area, which will signal traffic to slow down upon entering the area. Along the road, there are two other signalised intersections where internal roads cross the main road, further slowing traffic through the site.

Along Bottelary Road, speed is regulated starting with the roundabout at B, with signalised intersections along the road between B & D, facilitating the calming of traffic along this road.



figure 42
Visual representation of traffic calming measures through landscaping and pavements.



figure 43
Visual representation of traffic calming measures with parking and an active pedestrian interface.

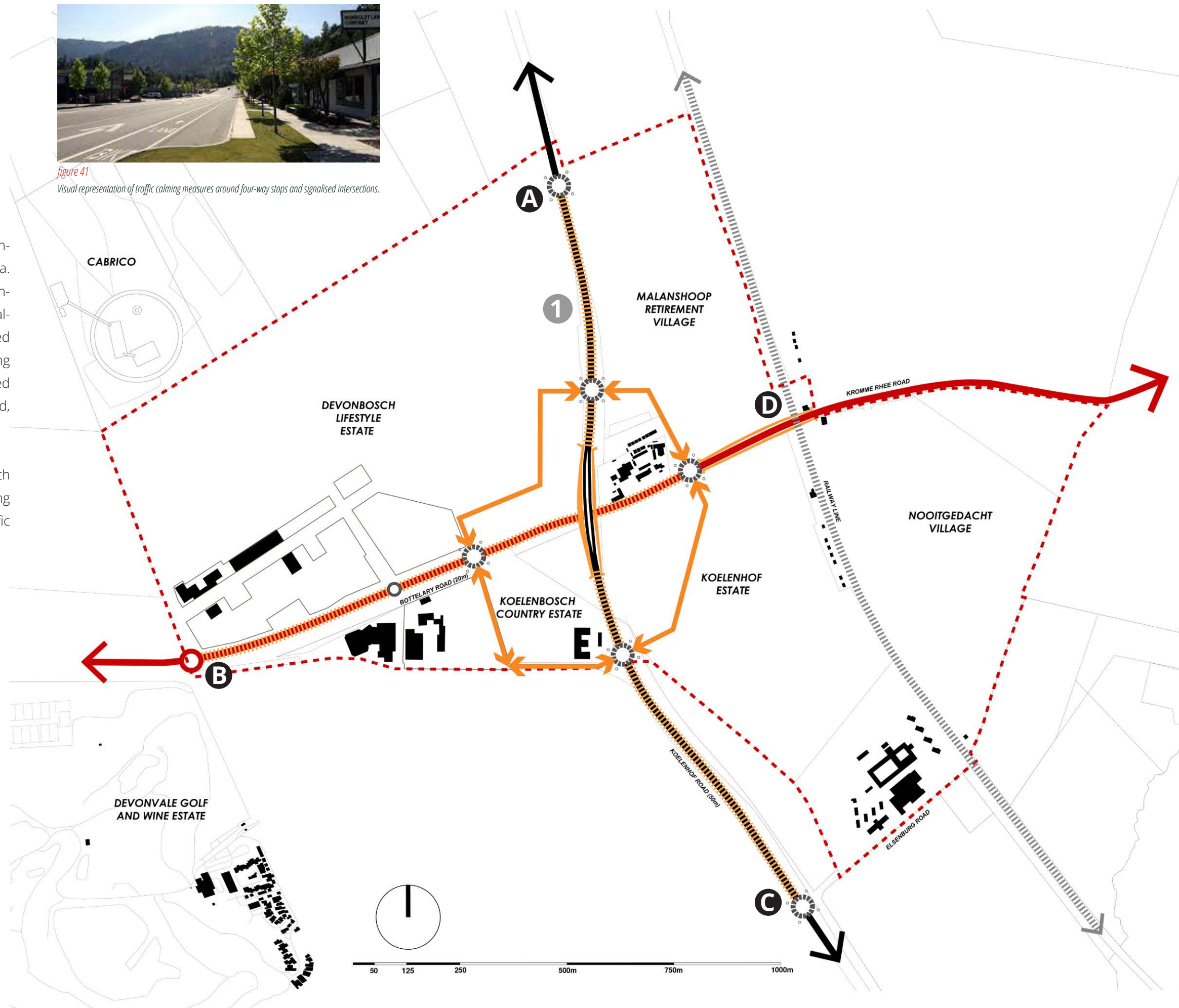


figure 41
Visual representation of traffic calming measures around four-way stops and signalised intersections.

DESIGN STRATEGY MOVEMENT AND ACCESS



ELEVATED CIRCLE INTERSECTION

4a Where Koelenhof road and Bottelary road meet, it is proposed the Koelenhof road be elevated above the crossing in the form of a bridge over, with Bottelary road sunk beneath the elevated intersection.

This would allow the connectivity of Malanshoop and Koelenhof Estate on ground level and support more direct access to the train station.

It is further proposed that the lanes of the bridge be split to let light in in-between. A wishbone bridge as shown in the image below will also help foster a feeling of spatial continuity between the developments.

The link formed between 4a and 4b is imagined to serve as the primary pedestrian link/corridor through a green public open space system that would further reinforce the connectivity between the developments to the north and south of the site.

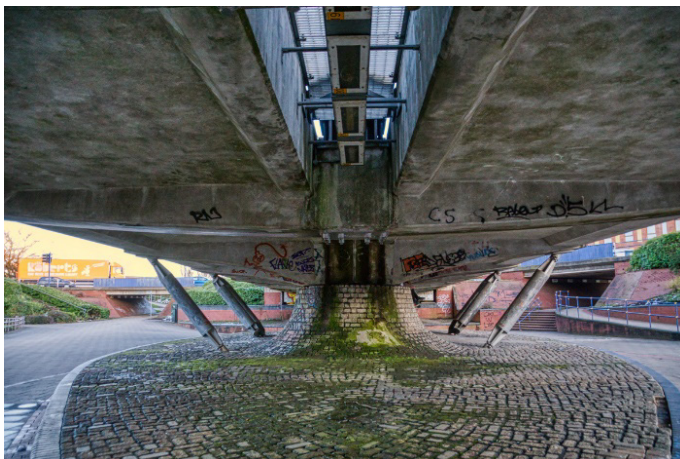
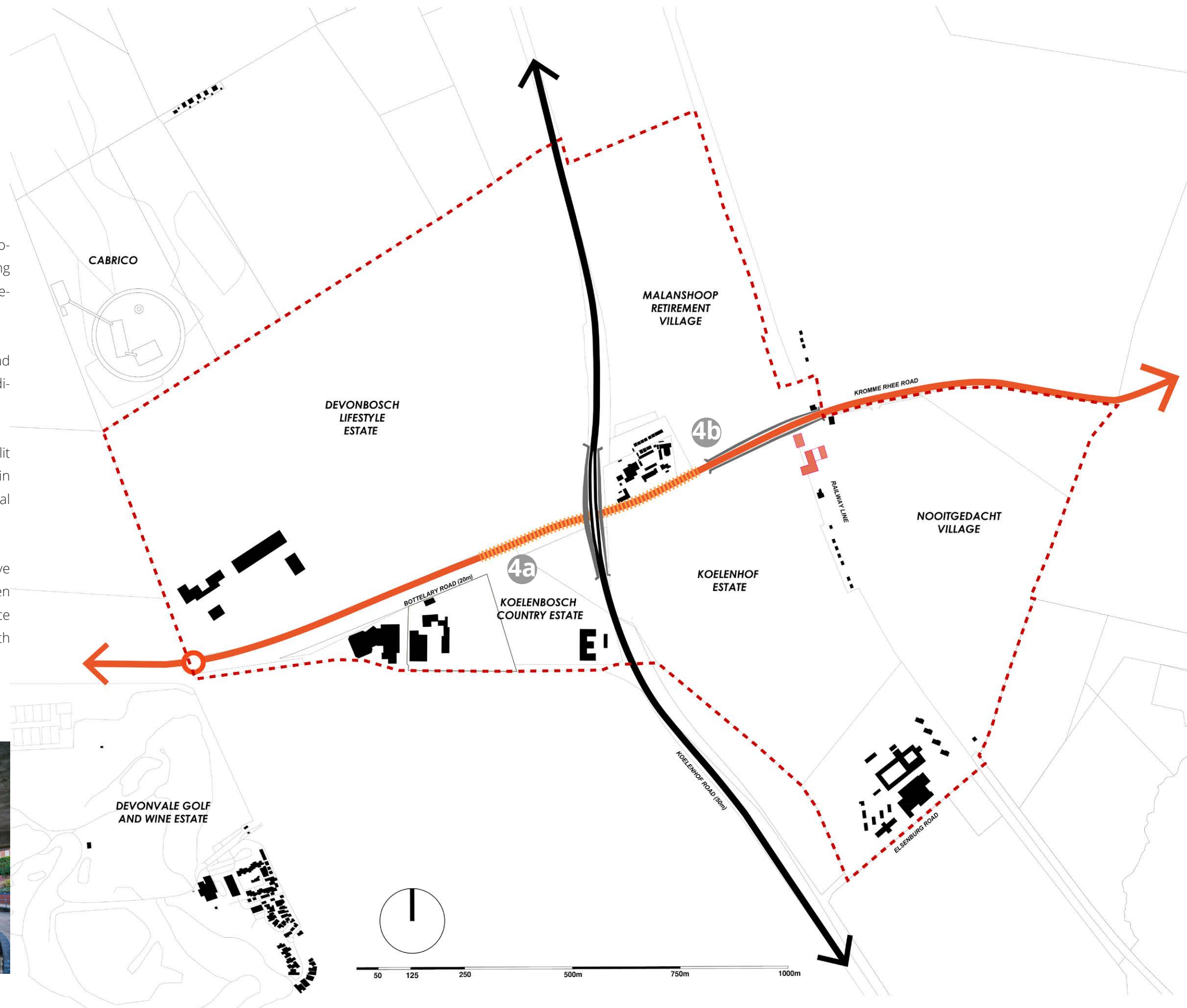


figure 44
An elevated intersection with pedestrianised access underneath



DESIGN STRATEGY MOVEMENT AND ACCESS

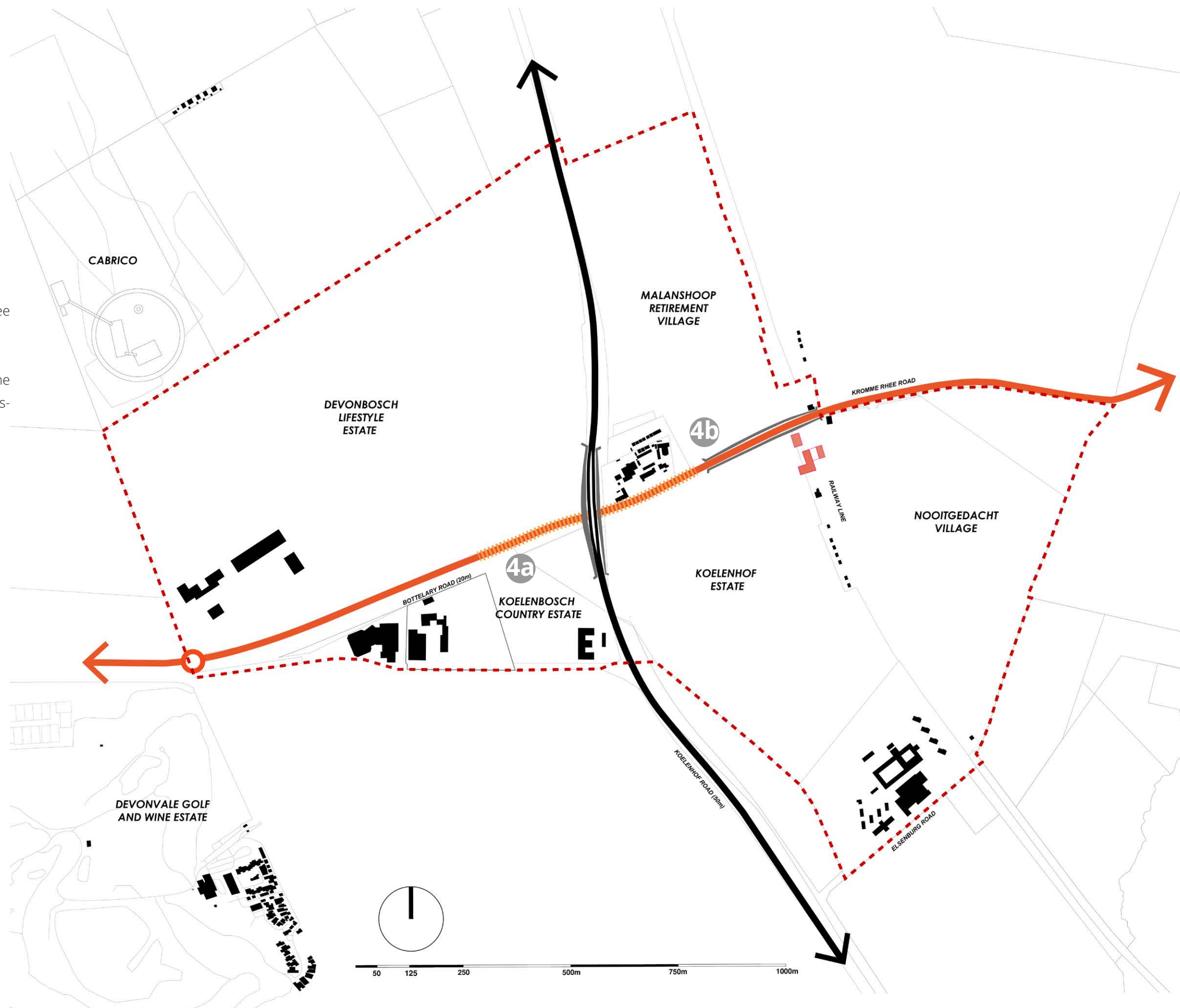


BRIDGE

4b

The upgrading of Bottelary Road and Kromme Rhee Roads to a class 2 road will impact the intersection.

With this upgrade, the road passing over the railway line will need to be formalized and made into a bridge crossing to ensure continuity of access.



DESIGN STRATEGY MOVEMENT AND ACCESS



INTERNAL MOVEMENT NETWORK AND LINKS

5

A tertiary road network is proposed as the internal movement system within the developments alongside pedestrian pathways. The extension of Alberto Drive within Devonbosch to the circle will serve as the entrance to a network of public people-centered streets.

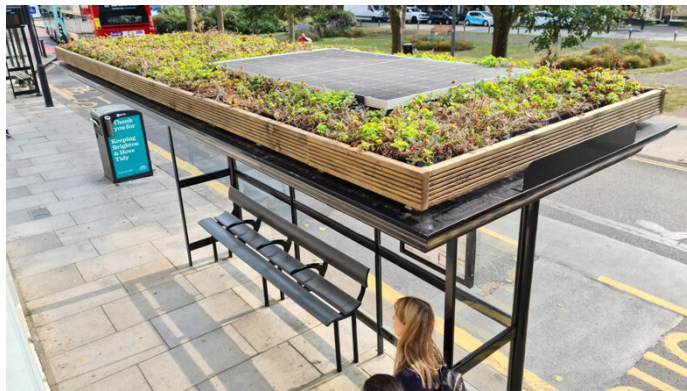


figure 45
An illustration of pedestrian-oriented street design.

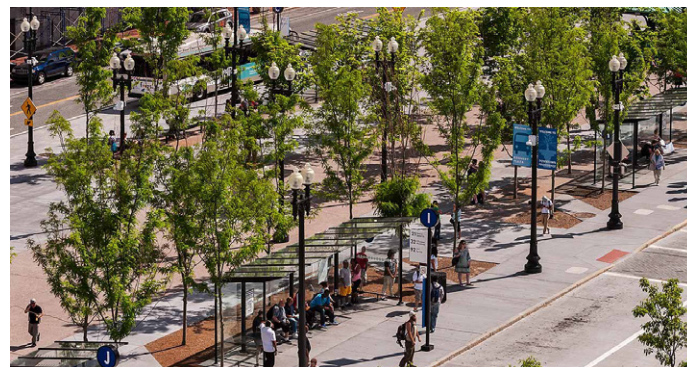
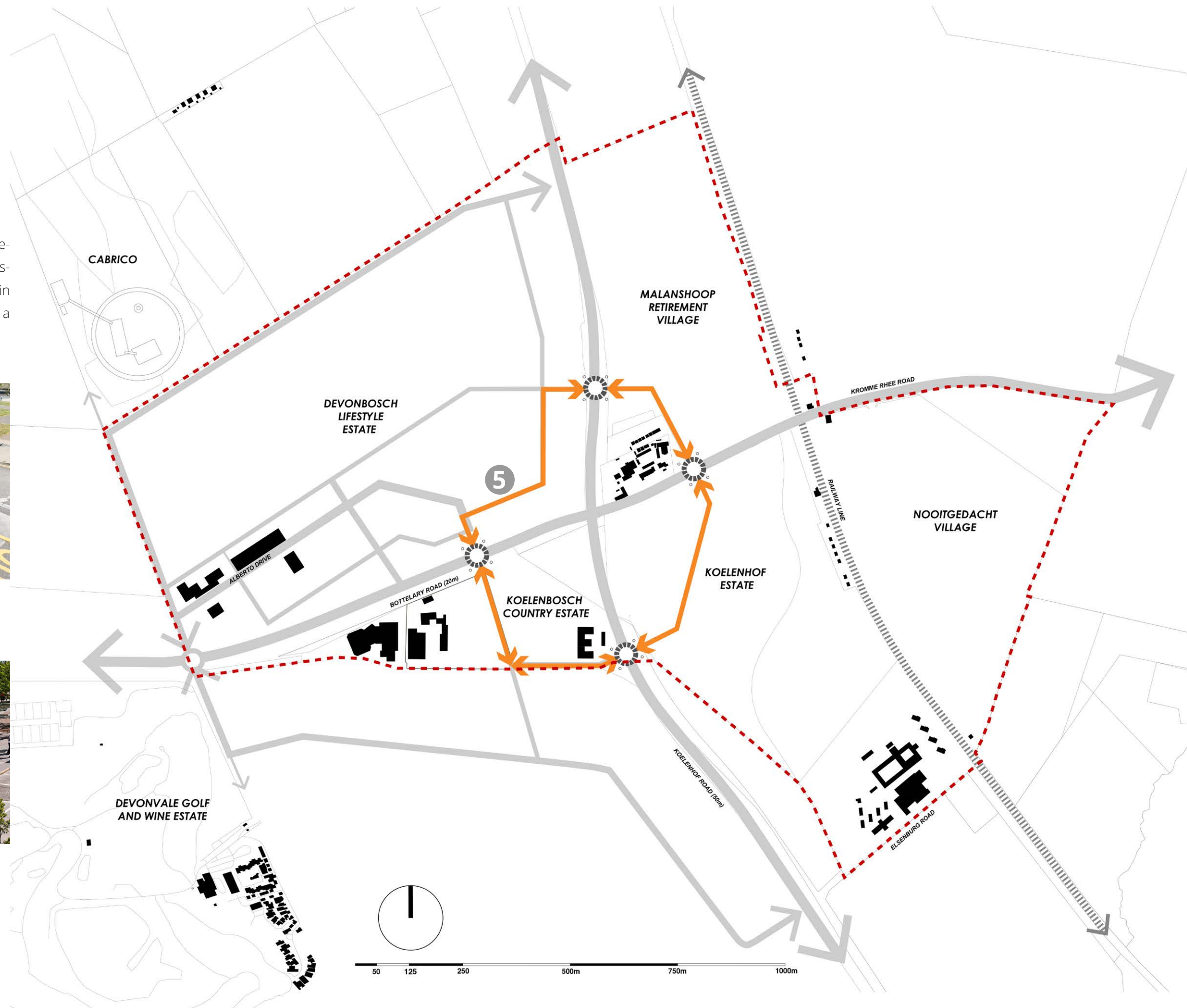


figure 46
An illustration of pedestrian-oriented street design.



DESIGN STRATEGY MOVEMENT AND ACCESS

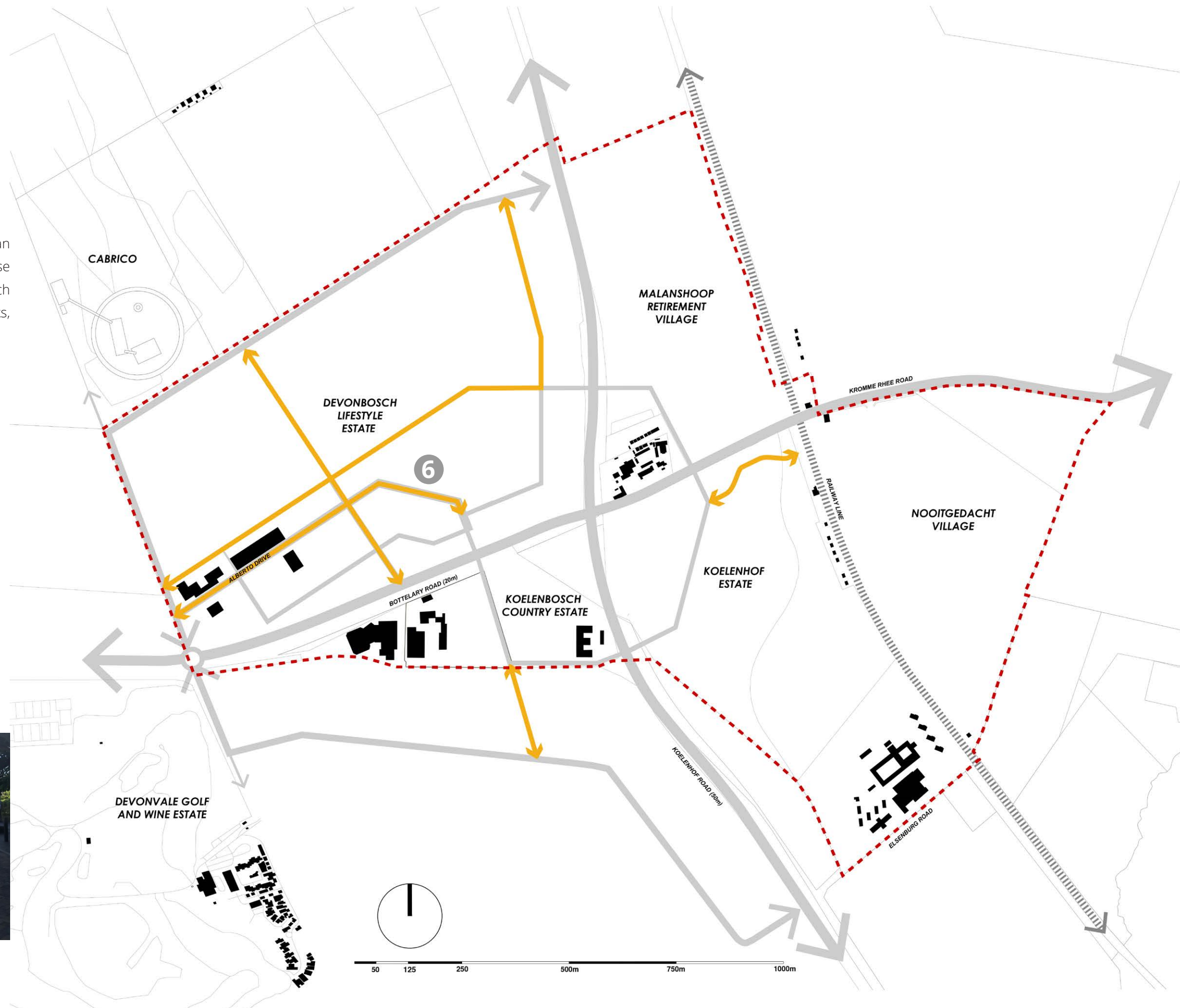


INTERNAL MOVEMENT NETWORK AND LINKS

- 6** The internal streets across all the developments can take precedent from Alberto Drive in Devonbosch. These streets are public (yet secure) and have active edges such as retail, front of houses, spill-out spaces, NMT networks, pedestrian pathways and street furniture.



figure 47
A visual representation of shared street design.



DESIGN STRATEGY

MOVEMENT AND ACCESS

 MOVEMENT AS A STRUCTURING ELEMENT

6 Strengthening and creating movement links between the developments, bridging barriers, encouraging integration and ensuring continuity.

- KEY
- Road - 40m RR Dual Carriageway
 - Road - 40m RR Dual Carriageway
 - Road - 24m Single Carriageway
 - Road - 16m RR Single Carriageway
 - Railway Line
 - Small Loop Road - Single Carriageway
 - Pedestrian/NMT Movement System
 - Proposed connector Street - Single Carriageway
 - Signalised Intersections
 - Traffic Circle
 - Bridge

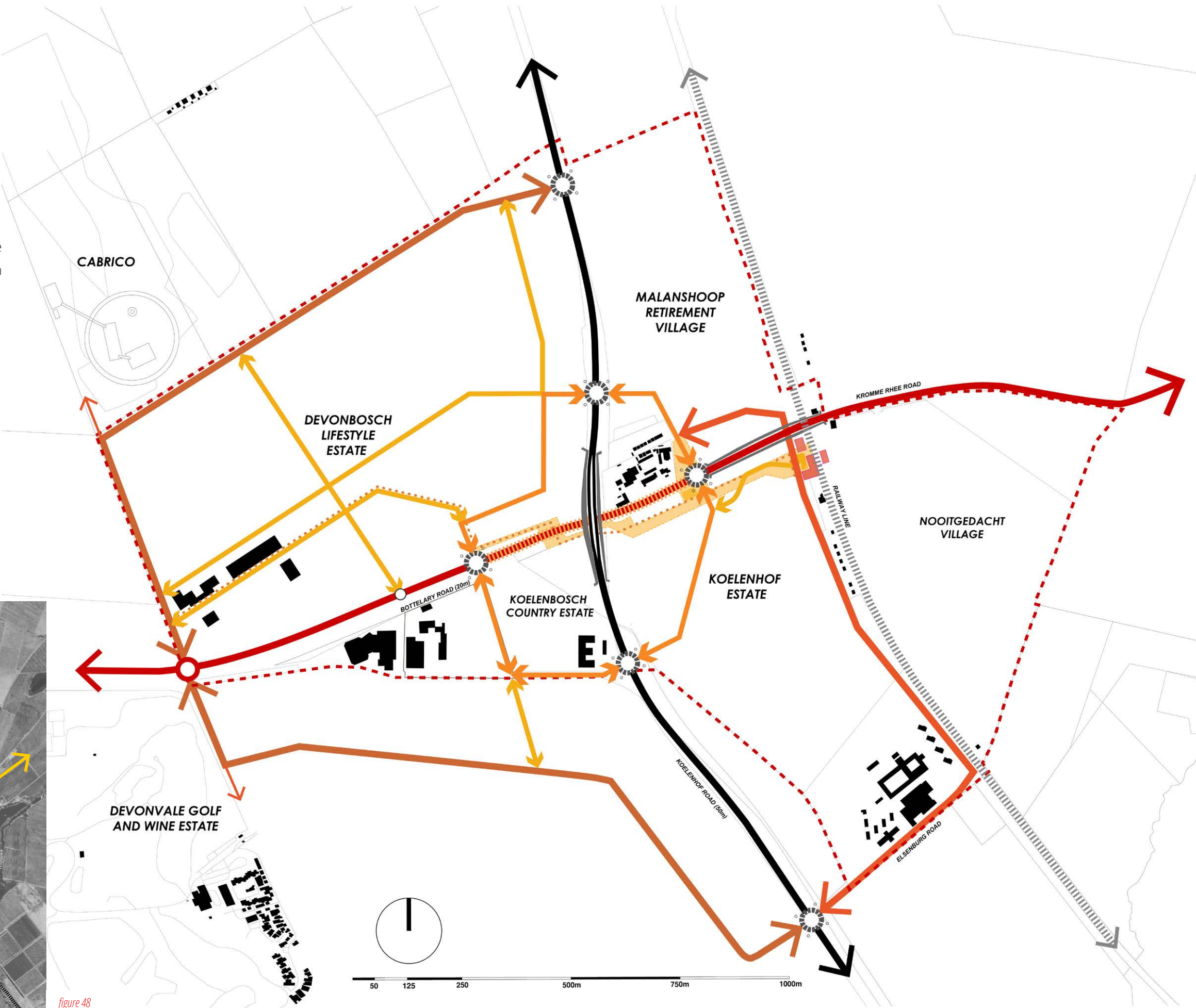
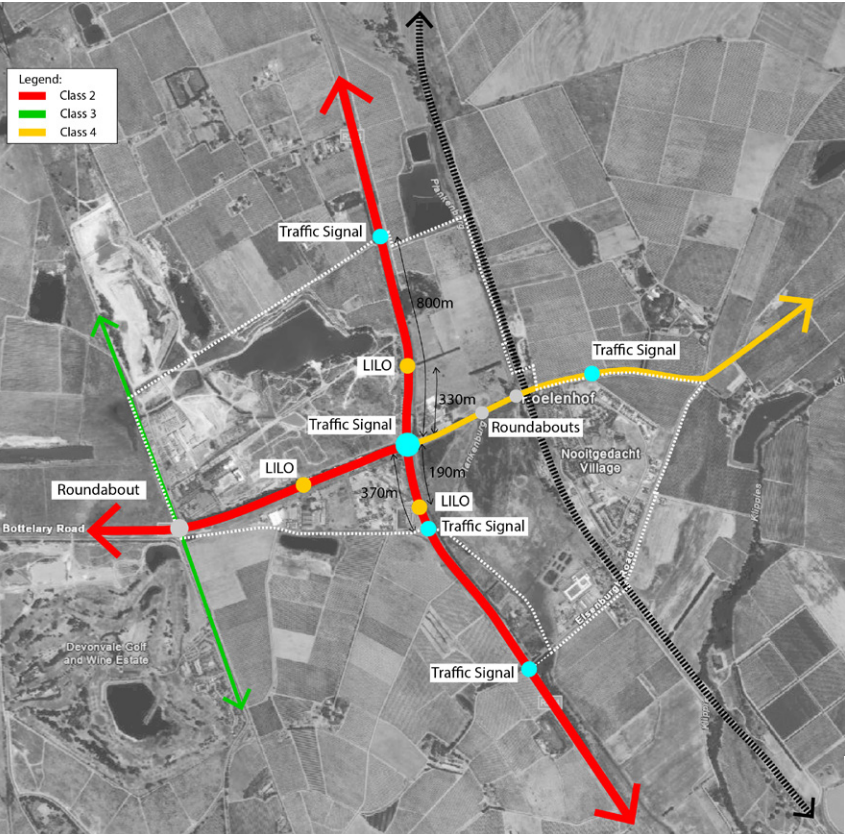


figure 48
ITS Traffic Analysis

DESIGN STRATEGY MOVEMENT AND ACCESS



NMT NETWORK

- 8 The rehabilitation of the train station will assist transit for residents, visitors and workers in and out of Koelenhof. It forms the center of the NMT system which further endeavors to connect all the developments.
- 9 NMT and pedestrian walkways tie into the train station and provide access throughout the developments. Walkways and green and blue systems are interlinked and will form the backbone of the whole development.



figure 49
MyCiti bus network.

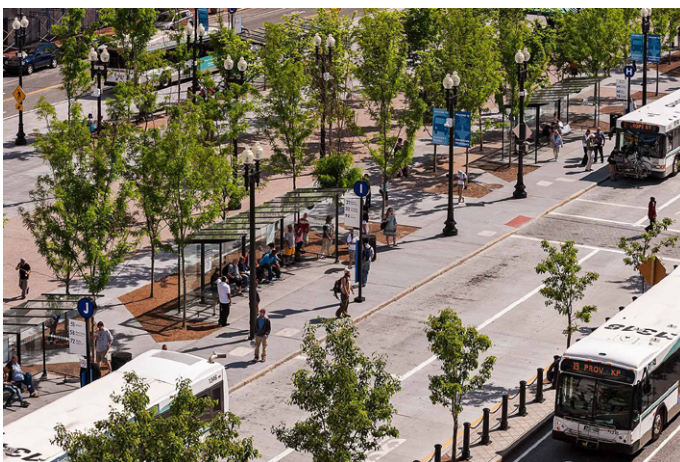
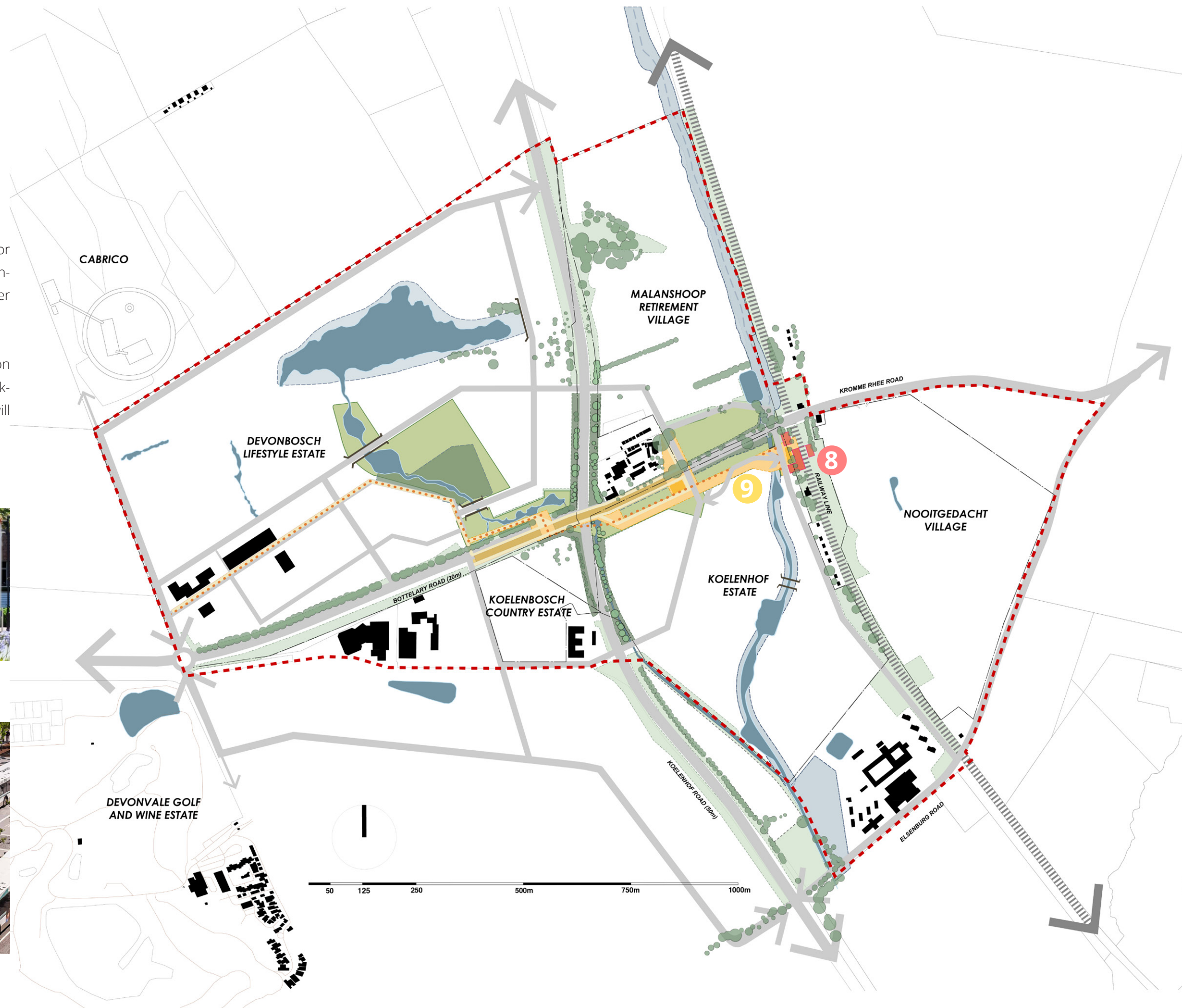


figure 50
Transport (NMT) Interchange.



DESIGN STRATEGY INTERFACE



URBAN SQUARE

Consolidating and enhancing the built environment with public space activation.

- 1 The train station will be supported by a transit orientated hub.
- 2 This public space can be populated with retail and recreational activity. The proposed mall on the North-western Corner of Koelenhof Estate can help contribute to the public realm.
- 3 An urban public forecourt (in yellow) serves to connect all three developments to one another and to the major transit routes

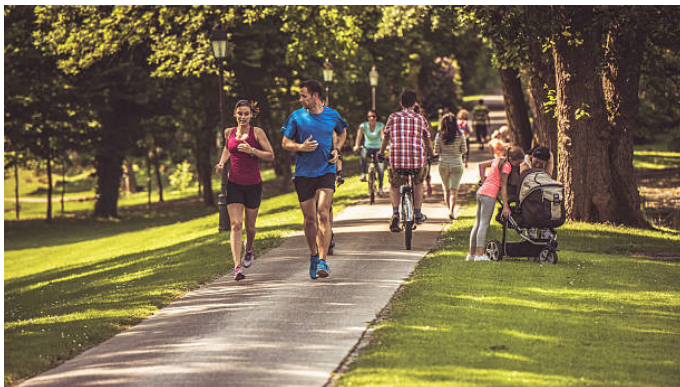
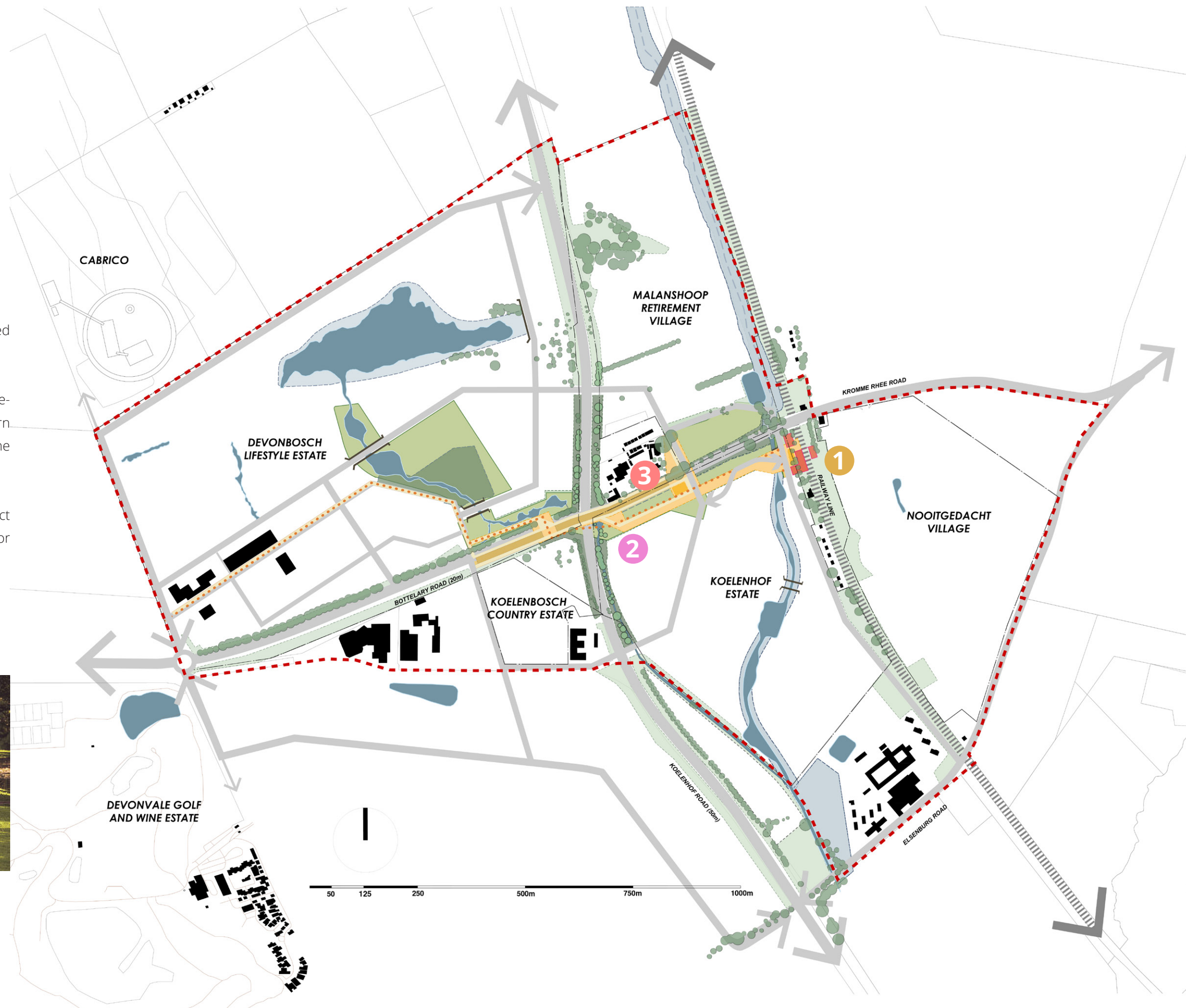


figure 51

Green systems tied into pedestrianised and NMT networks.



DESIGN STRATEGY INTERFACE



URBAN INTERFACE

- 4 Green spaces such as the recreation area in Devonbosch will be activated with street and building interfaces that look onto the space. Pedestrian walkways will follow and cut through the green and blue system.
- 5 A section of the large dam in Devonbosch will have public access and is a prime spot for recreational amenities.
- 6 Interfaces along the river in Koelenhof Estate consist of residential frontages and pedestrian walkways and rest spaces.



figure 52
A visual representation of the urban interface with the built fabric.



figure 53
A visual representation of the expression of urban squares.



figure 54
A visual representation of the expression of urban squares.



DESIGN STRATEGY INTERFACE



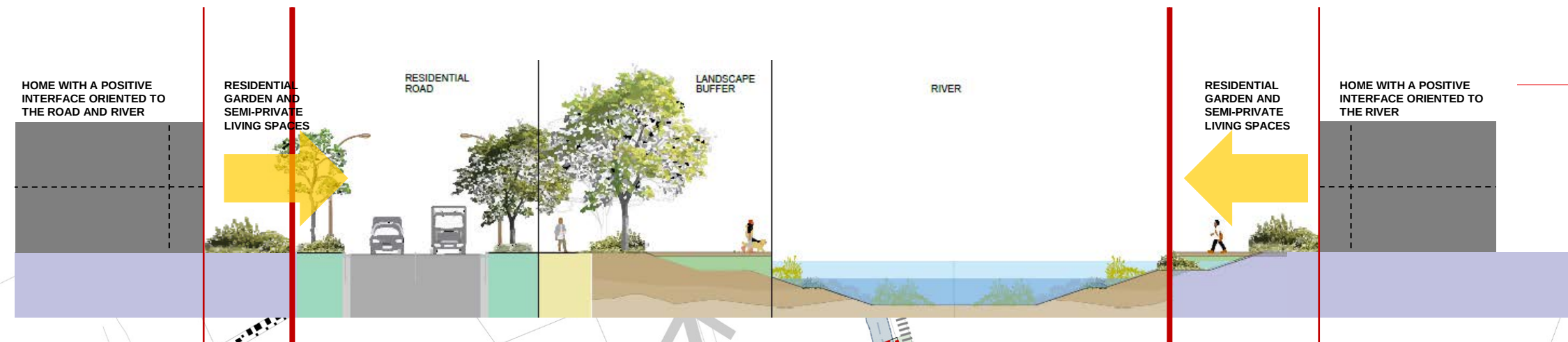
NATURAL INTERFACE

- 6** Interfaces along the river in Koelenhof Estate consist of residential frontages and pedestrian walkways and rest spaces.

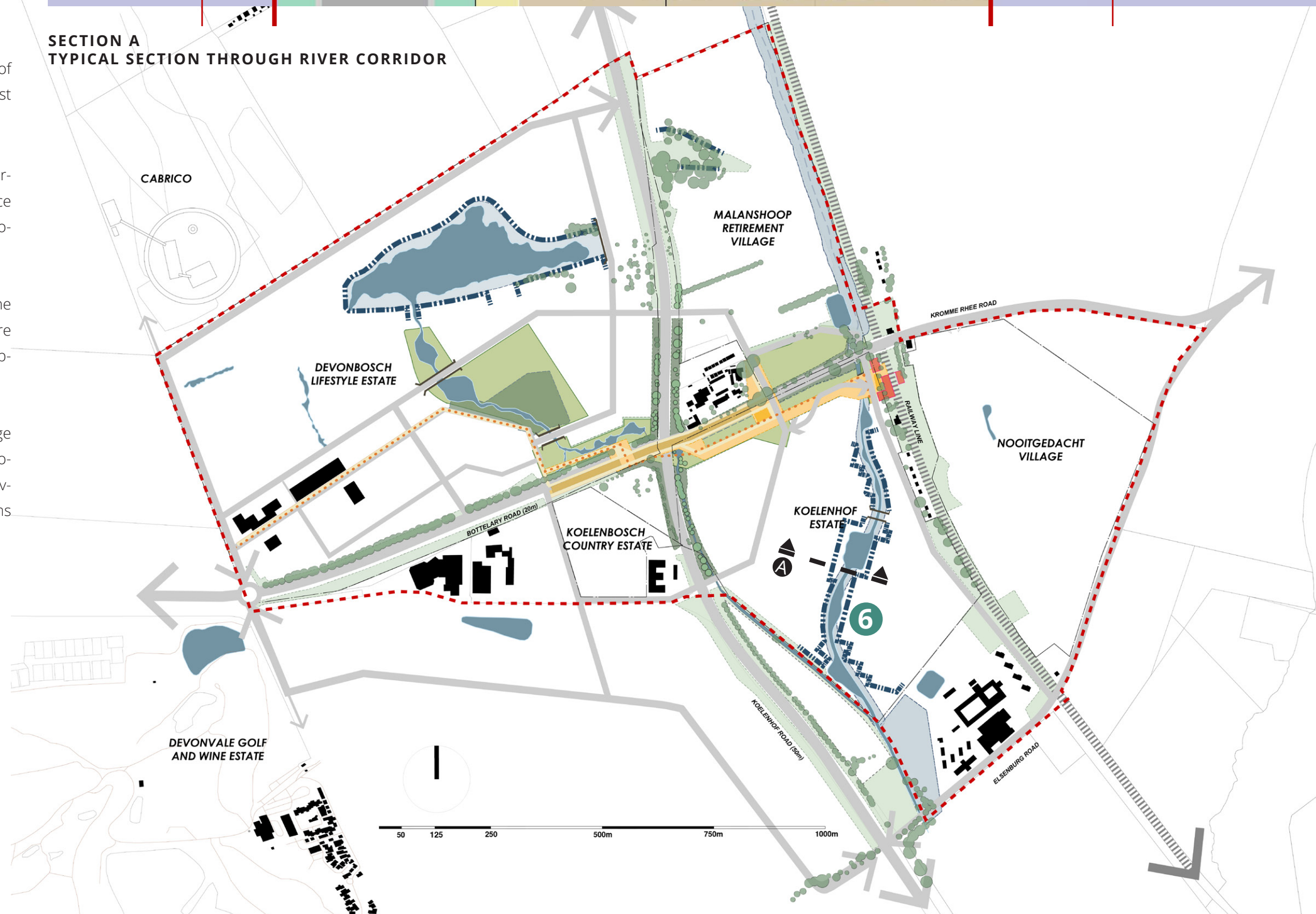
The principle is to establish positive interfaces with the river corridor. Here we encourage a principle of 70% positive interface to maintain continuity of the relationship between active, people-oriented uses to 30% non-people-oriented uses.

Built in the integration of internal movement systems with the river, such as pedestrian walkways and strategic spaces, are made publicly accessible for people living within the development.

Promote the ecological functioning of the river to encourage birdlife, maintain clean water, and support its natural water ecosystems. Locate stormwater detention ponds adjacent to the river corridor and integrate ecological systems with SUDS systems into the stormwater plan.



**SECTION A
TYPICAL SECTION THROUGH RIVER CORRIDOR**



DESIGN STRATEGY INTERFACE



URBAN-RURAL INTERFACE

- 7 With rapid development in a predominantly rural area, it is always important to support gradual transition and allow for transition space that is aware of contrast. Development at the edges of Malanshoop and Devonbosch needs to be responsive to the agricultural landscape adjacent through the use of landscape buffers as well as positive interfaces such as frontages and visually permeable edges.
- 8 This development on the edge needs to respond in two directions. Externally to the landscape as well as internally to the neighbourhood and street.



figure 55
A visual representation of the interface between rural and urban expression.

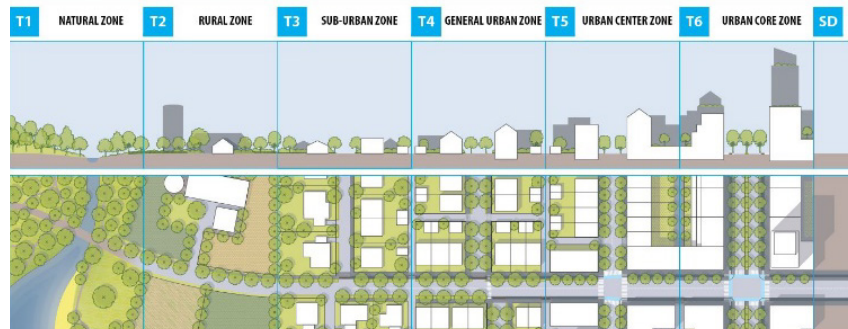
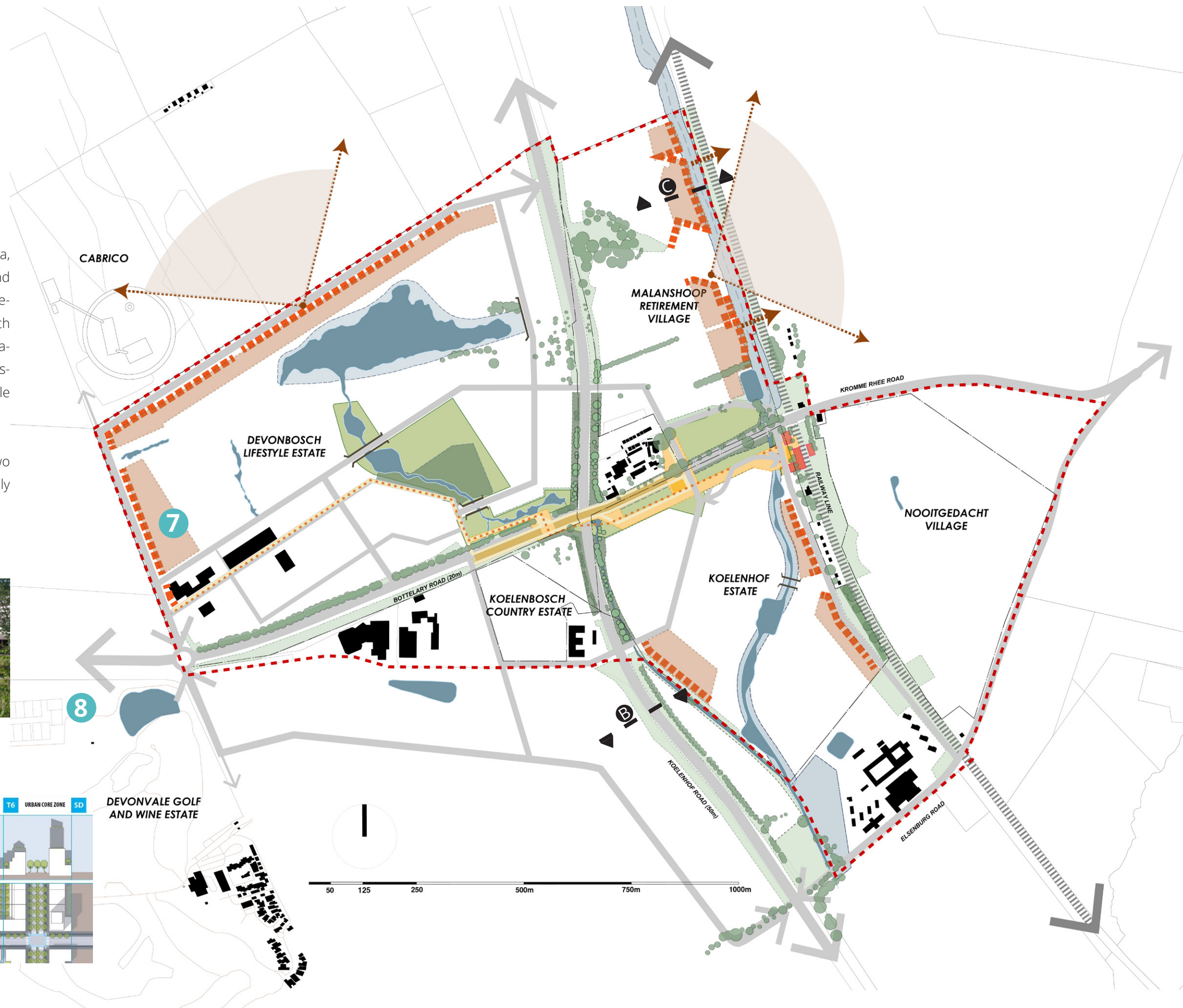


figure 56
Rural-Urban transition.

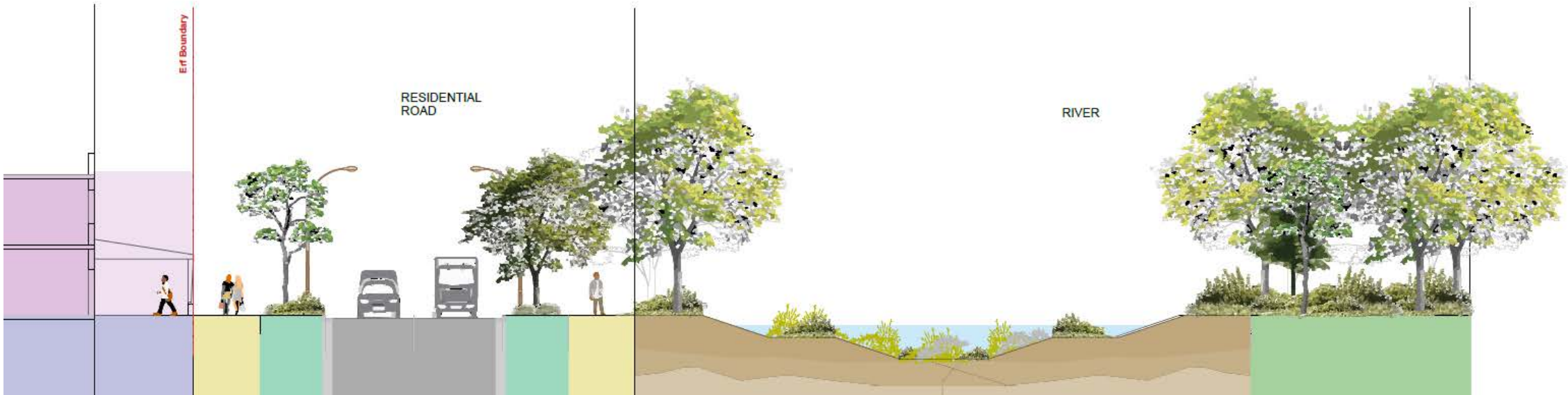


DESIGN STRATEGY INTERFACE

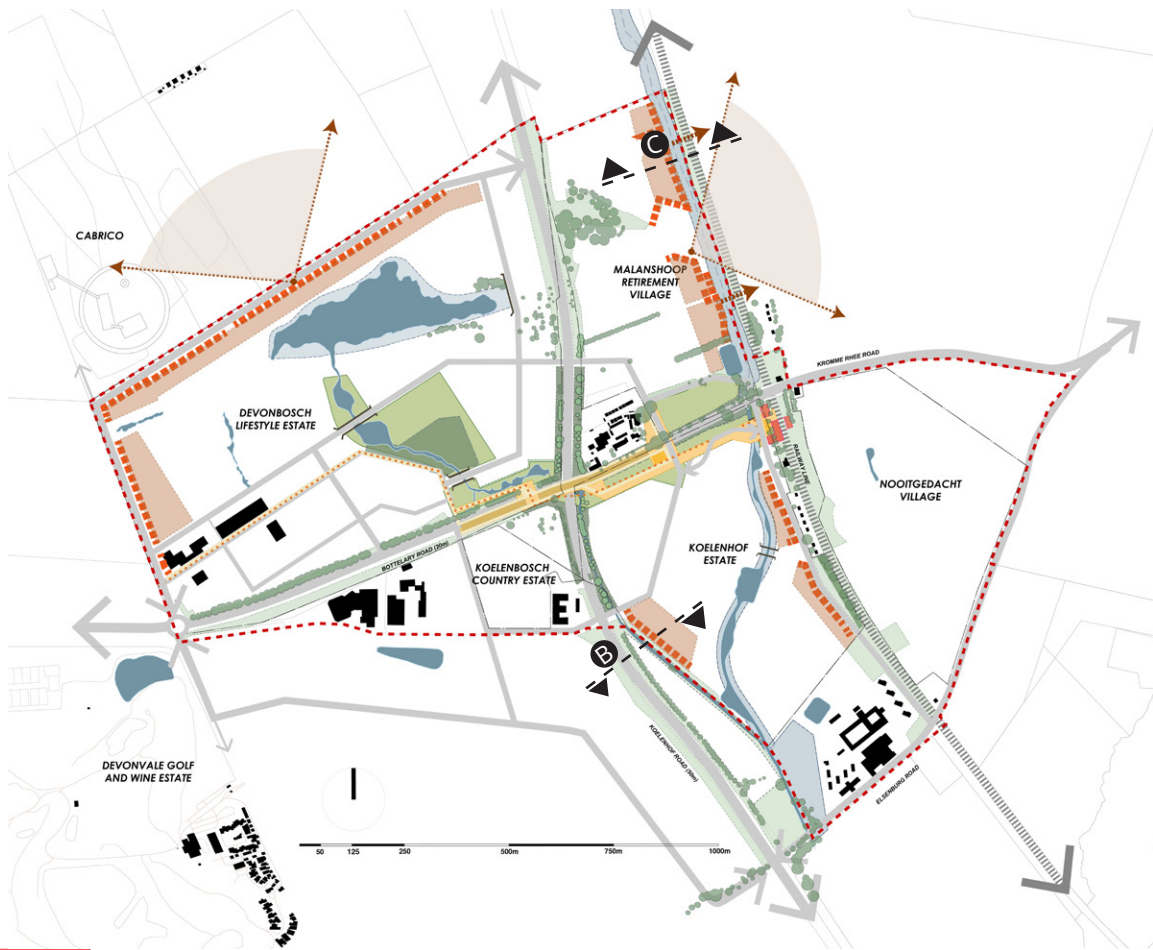


URBAN-RURAL INTERFACE

- B** Section B: Development needs to respond in two directions. Externally to the landscape as well as internally to the neighbourhood or residential street.
- C** Section C: Responsive to the agricultural landscape adjacent through the use of landscape buffers as well as positive interfaces such as frontages and visually permeable edges.



SECTION B

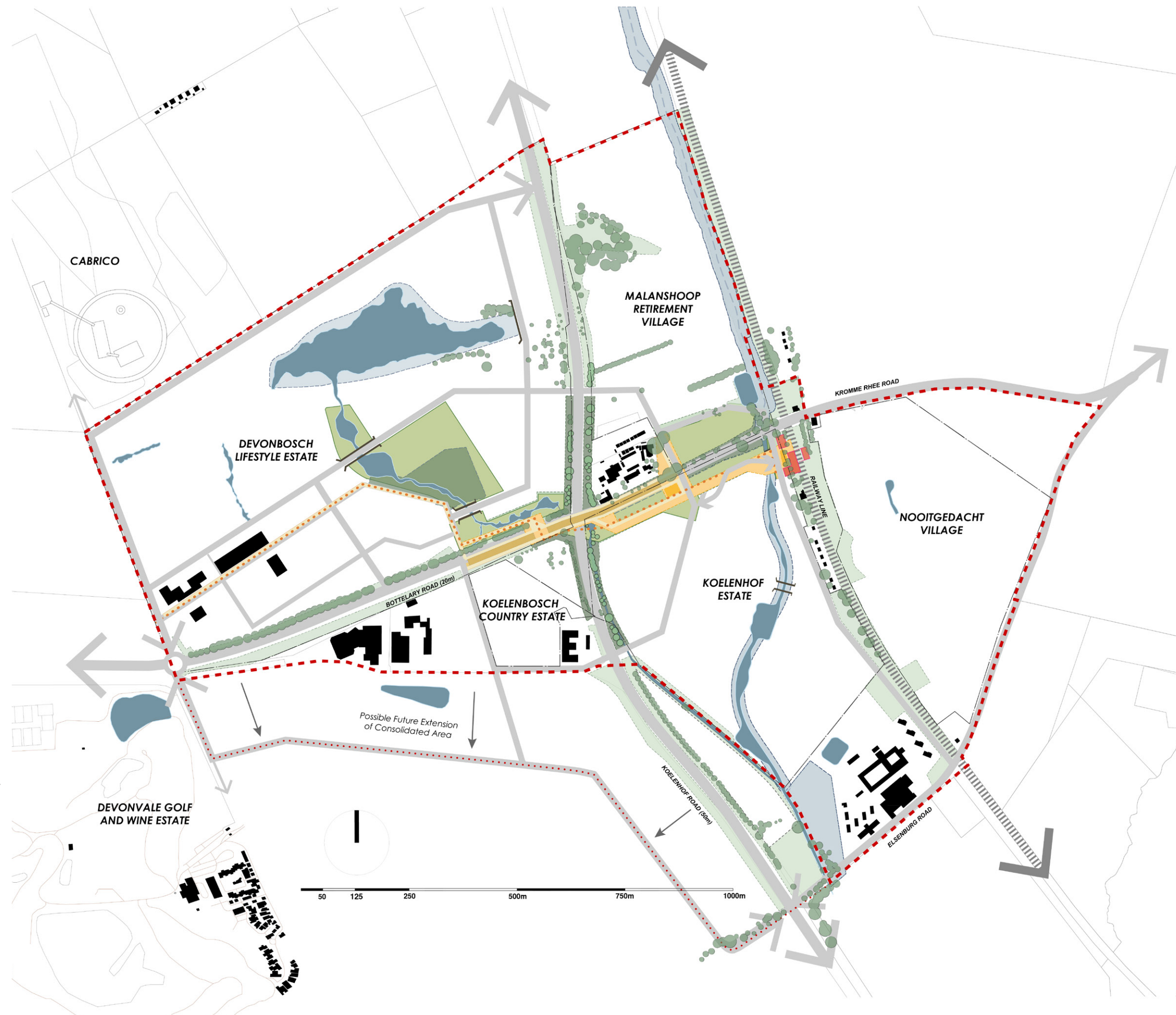


SECTION C

DESIGN STRATEGY COMPOSITE FRAMEWORK PLAN

The composite plan is shaped by three key principles that offer the developments coherence.

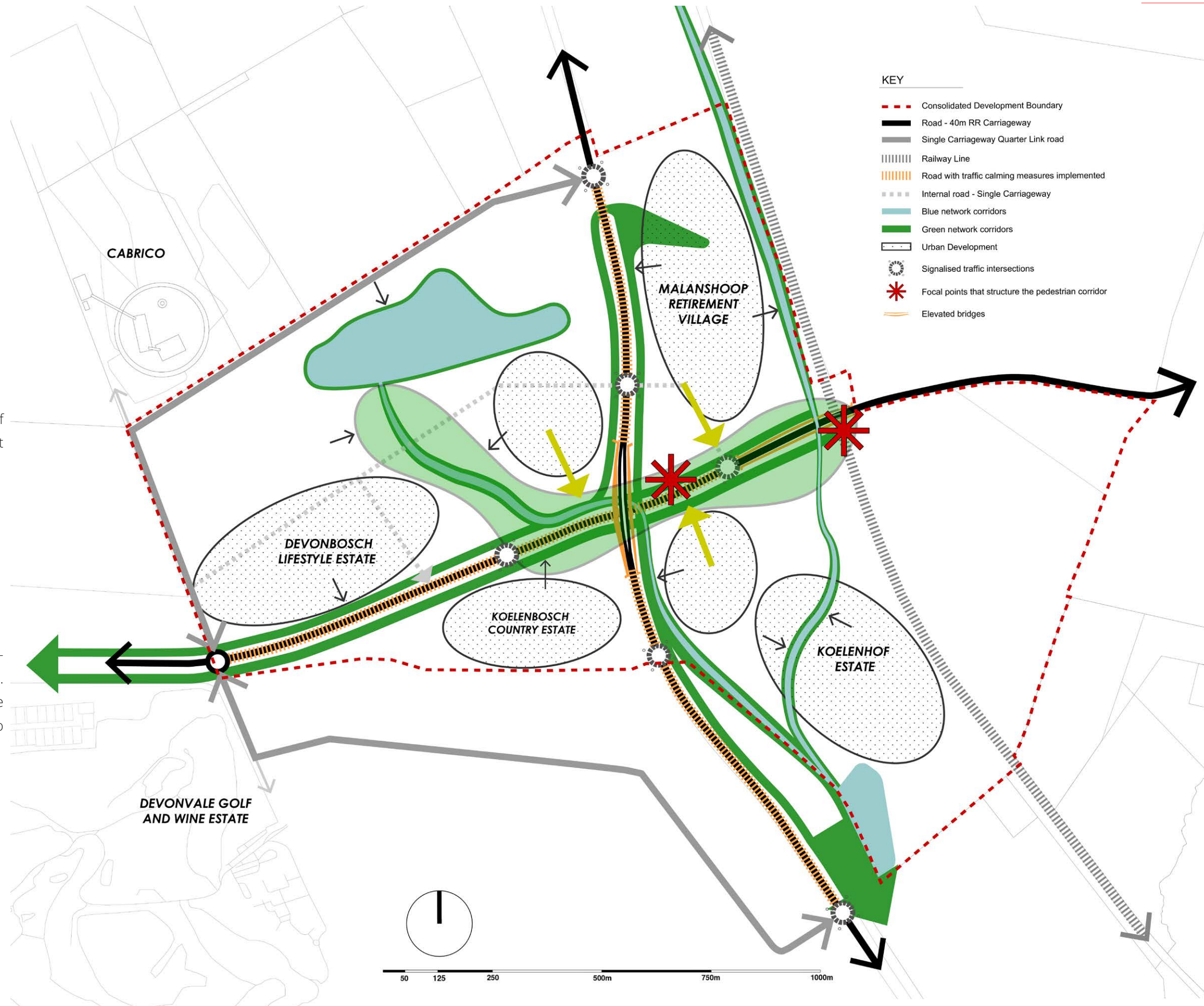
- 1** Consolidate scattered and fragmented development into a coherent and compact footprint that supports a collective identity. This is achieved primarily through shared public space systems and must be viewed as a continuum with the adjacent rural landscape. Build continuity in the ecological systems across the site and ensure a positive interface with it through adding people-oriented activities and building positive interfaces between buildings and these systems.
- 2** Connect the developments with the primary public transport system and node, which is the train station. All mobility systems are then shaped to support this connection, including an NMT system. Over and above the need to provide access to the development parcels, the road network is adjusted to support the lower order of movement. It is grade-separated, and the class of roads is downgraded. This is a key strategy to integrate the development parcels and will function as the heart of the town.
- 3** The town will be implemented incrementally, and its landscape will transform over time, allowing a high-quality town to emerge. The quality of the environment will be a key driver of the town's success. Quality will emerge when the public realm experience is coherent, contiguous, and supports an experiential place for pedestrians.



DESIGN STRATEGY COMPOSITE FRAMEWORK DIAGRAM

Translating these key elements spatially implies the following minimum responses:

- 1** Fix the public realm by making ecological systems contiguous.
- 2** Transform the road into a pedestrian-oriented heart of the new town with a church complex and rail station at its heart. Shape this to act and function as a pedestrian-oriented environment with a focus on landscaping elements.
- 3** Shape building interfaces to orient to these two systems.
- 4** Limit the extent of the new town and consolidate development opportunities through density and diversity of uses. Grade the scale and intensity of development towards the edges of the town and orient development towards it to create a positive interface with the rural.



conclu- sion

CONCLUSION PROCESS AND THE WAY FORWARD

This report is imagined to be describing a portion of the process of establishing a set of design guidelines that can be acted on by those implementing the ideas set out herein. It does however only spell out a set of principles, guides and controls without offering resolution of the building brief [function, viability, circulation, etc]. These controls were established through a series of site visits, the application of our urban design sensibilities and a series of design charrettes with the client and developers and the professional consultant team.

The result described in this document does not necessarily offer an idealised urban design response but is a product of a process of iteration. The expectation is that the professional teams, led by the architects, interpret these into viable architectural propositions using this report to substantiate arguments.

The principles established for this neighbourhood has already enormously benefitted from undergoing an iterative process. In return, developers will adjust their proposals. It is expected that developers will re-submit their applications to the Stellenbosch Municipality for approval and undertake the necessary statutory processes that may arise from complying to these guidelines.



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