Figure 27 illustrates the location of the exiting and proposed primary, secondary / regional and community business nodes identified within Emfuleni. A total of 3 primary business nodes exist within Emfuleni. These primary business nodes comprise the existing Vanderbijlpark CBD, the existing Vereeniging CBD and the emerging Sebokeng CBD. The retail and office space existing within the Vanderbijlpark CBD and the Vereeniging CBD is deemed sufficient, so no additional retail and office space is provided. However, an additional 36,879m$^2$ of retail space and 11,064m$^2$ of office space is allocated to the Sebokeng CBD to further strengthen this emerging Central Business District.

A secondary / regional business nodes and community business nodes have been identified within Emfuleni, of which some of them are newly proposed nodes: Sonlandpark, Boitumelo, Kwaggastroom, Roshnee and Lochvaal. Retail and office space has been allocated to each of these nodes in accordance with the needs of the surrounding urban environment, the nature of its potential consumer base, and the location characteristics of each node. Based on these nodal characteristics, the following regional business nodes need mention:

a. Sonlandpark node

This node is a regional business node located on the urban corridor proposed along the Vereeniging-Johannesburg commuter railway line. Thus, creating a node with a substantial retail and office component can greatly contribute to the establishment of this corridor. A total 36,879m$^2$ of retail space and 5,532m$^2$ of office space is allocated to the Sonlandpark node.

b. Bedworthpark node

This regional business node not only serves the surrounding residential areas, such as Sharpeville, but it also functions as a ‘gateway’ into the Vanderbijlpark area via the K174 (Barrage Road). A large office component was therefore provided to fully utilize the ‘entrance’ characteristics of this node. An additional 13,830m$^2$ of office space is allocated to the Bedworthpark node, which can be allocated along Barrage Road. No additional retail space is allocated to this node due to the large retail centres already existing within this node.

c. Evaton node
This node has the potential to increase its role in serving the northern parts of Sebokeng and Evaton. It is therefore proposed that this node be significantly strengthened to a regional business node. An additional 18,440m$^2$ of retail space and 5,532m$^2$ of office space is allocated to the Evaton Node.

In addition to the above, it is recommended that the granting of additional retail space within Emfuleni also be done based on the recommendations of a detailed retail study that accompanies each individual application for retail rights within Emfuleni. In turn, such a detailed retail study must be conducted in a manner that adheres to the objectives and guidelines set out in this Emfuleni SDF, especially with regard to the distribution of retail space between the various nodes. In other words, a single node should not be allocated a disproportionate amount of retail space that would be to the detriment of other nodes.

### 5.4.3. COMMUNITY FACILITIES

Residential development requires the support of other land use types, such as schools and clinics, in order to create complete and sustainable residential environments. Such community facilities must be located in such a way that they are accessible to the residential communities they serve. This is best achieved using the community nodes proposed for Emfuleni, which will cluster these community facilities in central locations.

#### 5.4.3.1. COMMUNITY FACILITY HIERARCHY

The composition of each community node within the nodal hierarchy must contain community facilities that are suited to the function of that particular node within the nodal hierarchy. The proposed composition of each community node within the nodal hierarchy is depicted in the Table below and should serve as a guideline for the design and development of these nodes.

**a. Municipal community node**

A municipal community node, providing higher-order community services, serves a region within the municipal area. With regard to educational facilities, a municipal node should accommodate a region’s tertiary educational facilities, as well as a number of primary and secondary schools. With regard to health care, the municipal community node should provide the region’s hospital(s), as well as other higher-order and specialized medical facilities. Other community facilities
to be provided in such a node include a large community hall, police station and emergency service centre. These facilities are all highest-order facilities when compared to similar facilities provided in lower-order nodes.

b. Regional community node

A regional community node should serve a number of suburbs and should provide medium-order community services to the suburbs they serve. A regional node should at least comprise a secondary school, 2 primary schools, a community centre and a library. It can also accommodate a day hospital and a police station, only on a slightly smaller scale than those provided in a municipal community node.

<table>
<thead>
<tr>
<th>TABLE 30: COMMUNITY FACILITY COMPOSITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nodal Hierarchy</td>
</tr>
<tr>
<td>-----------------</td>
</tr>
</tbody>
</table>
| Municipal community node | 8km | 30ha | 1 tertiary education facility  
1 secondary schools  
2 primary schools  
hospital  
1 large-scale post office  
1 large-scale library  
1 large-scale community hall  
1 large-scale police station  
1 emergency service centre |
| Regional community node | 4km | 20ha | 2 secondary schools  
3 primary schools  
1 day hospital  
1 medium-scale post office  
1 medium-scale library  
1 medium-scale community hall  
1 small-scale police station |
| District community node | 1-2km | 15ha | 1 secondary schools  
2 primary schools |
The Land Use Budget (Section 3) calculated the number of community facilities required within Emfuleni to support the envisaged population increase within Emfuleni. The regional community nodes should preferably be placed at existing or proposed regional business nodes to allow for the development of a one-stop-shop land use arrangement. The locations of district community nodes must be identified during the township establishment. The guiding principle in this case should be to place district nodes centrally within existing or planned residential neighbourhood to allow these nodes to be within walking distance of the households living within these neighbourhoods. In doing so, these nodes can become the focal points around which residential neighbourhoods can be develop. District community nodes must contain district-level community facilities, such as schools and clinics.

In order to develop the community infrastructure required within Emfuleni, Emfuleni will have to work in close relationship with the Provincial governmental bodies concerned with the development and management of community facilities, such as the Gauteng Department of Health and Welfare, and the Department of Education. The responsibility of the Emfuleni will be to ensure that the necessary stands for community facilities are provided and that these stands are strategically placed within nodal areas. The construction and management of the relevant buildings will be the responsibility of the provincial government departments concerned.
Providing community facilities within small holding areas that are being converted into higher-density cluster developments are often problematic. One of the reasons for this is the fact that individually, the cluster developments do not reach the threshold for providing any community facilities. However, collectively, these cluster developments develop large numbers of housing units, without any of these cluster developments being required to provide stands for schools or stands for other type of community facility. The result is that these small holding areas lack the most basic community facilities, such as schools and clinics.

Considering the fact that much of the land within Emfuleni that is set aside for urban expansion comprises small holding, such as Unitas Park, Lochvaal Barrage and Mantevrede, poses the danger that township establishment on these smallholding do not yield the necessary household thresholds to enforce developers to provide community facilities, such as schools. Should this be the case, it is proposed that Emfuleni pro-actively identifies properties that are suitable for the location of community nodes within these small holding areas. Emfuleni will need to purchase these properties and develop the community facilities on these properties when urban expansion within the vicinity of these properties necessitates the development of such facilities.

To address the situation mentioned above, it is proposed that developers of cluster housing on small holdings be required to provide contributions for the purchasing of stands for community facilities, much in the same way that developers make bulk services contribution. These funds will have to be ring-fenced and used by the municipality to purchase land (small holdings) for the development of community nodes. Because the availability of land for sale is unknown, the exact location of these community nodes can only be determined during the purchasing phase.

### 5.4.4. OPEN SPACE & RECREATION

Open space and recreation within Emfuleni can be divided into 2 categories: passive and active open space. Passive open space consists of land that is unsuitable or undesirable for urban development due to topographical, ecological constraints or for flood protection. Active open space involves the recreational component of the open space system. It provides parks and sport facilities throughout an urban area for use by residents, local sports clubs and schools. Passive open space was dealt with in a previous section of this report and active open space is dealt with below.

#### 5.4.4.1. ACTIVE OPEN SPACE DEVELOPMENT PRINCIPLES
Formulating principles for the development of active open spaces can help ensure that standards of quality and usefulness are achieved in the planning, design and management of such spaces. The following development principles need to be taken into account when developing active open spaces:

a. Linking a use to open space

Active open spaces (or parks) that do not have a deliberate use linked to them are often not of value to a local community and often become dumping ground as a consequence. It is therefore imperative that a use be linked to an active open space to ensure the utilization of these spaces. One of the best ways of utilizing active open spaces within urban areas is to develop recreational facilities or sports facilities on these spaces.

b. Type of facilities provided

When planning active open spaces, it is important that appropriate recreation (or sport) facilities are provided. Often recreational facilities are provided that do not fulfill the needs of the community, usually because they are not the preferred recreational types. To prevent the provision of inappropriate recreational facilities, the recreational preferences of a local community must be established before planning and developing a recreational facility.

c. Maintenance of active open spaces

An important factor in determining the success of active open spaces is the maintenance thereof. Past experience has proved that active open spaces that are not maintained often lose their practical value to local residents. Therefore, it can be argued that larger and fewer active open spaces that are maintained are more useful than smaller, more numerous active open spaces that are not.

d. Accessibility of active open spaces

When locating active open spaces, it is important to ensure that these spaces are accessible to the community it serves. This implies locating an active open space within walking distance of most of the people living within a community. Locating an active open space centrally will also ensure the continued presence of people in the vicinity of such a facility, which would protect such space from vandalism.
e. Urban form and function

In order to enhance the focal function of active open spaces, it is imperative that attention is given to the design of these active open spaces. For example, the planting of trees along the periphery of an active open space will enhance the identity and attractiveness of this space. If active open spaces are integrated through design with surrounding facilities, it will enhance the usage of these spaces. For example, placing an active open space next to or close to a primary school will allow the space to supplement school sport facilities.

5.4.4.2. **Active Open Space Hierarchy**

The limited funds available for the construction of active open spaces necessitate a critical appraisal of the generally accepted standards and norms applicable to active open space development. An approach based on practical considerations rather than on accepted norms should be followed. One of the most practical ways of utilizing open spaces is to use these spaces as sport or recreation facilities. This connects a deliberate use to open spaces, ensuring they serve a specific community need.

**TABLE 31: ACTIVE OPEN SPACE COMPOSITION**

<table>
<thead>
<tr>
<th>Nodal Hierarchy</th>
<th>Service Area Radius</th>
<th>Size</th>
<th>Proposed composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal recreational node</td>
<td>8km</td>
<td>20ha</td>
<td>1 rugby or soccer and athletic stadium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 practice rugby or soccer fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1 cricket oval</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>6 tennis courts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 netball courts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Swimming pool</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Multi-purpose indoor sport centre</td>
</tr>
<tr>
<td>Regional recreational node</td>
<td>4km</td>
<td>15ha</td>
<td>1 rugby or soccer field and athletic track</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 practice rugby or soccer fields</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4 tennis courts</td>
</tr>
<tr>
<td>District recreational node</td>
<td>2km</td>
<td>10ha</td>
<td>1 rugby or soccer field and athletic track</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 tennis courts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Children’s playground</td>
</tr>
</tbody>
</table>
Source: Urban Dynamics Gauteng, 2012

Taking into account the above, a 3-tier recreational node hierarchy is proposed for Emfuleni. The composition of these recreational nodes should serve as a guideline for the design and development of active open spaces within Emfuleni, but can differ depending on the recreational preferences of local communities. The proposed recreational node hierarchy and its composition are depicted in the Table above.

a. Municipal recreational node

A municipal recreational node should provide recreation facilities that are significant on a municipal level, usually with a stadium comprising the central facility within such a node. In addition to the stadium, such a node should contain other highest-order recreations facilities, such as practice rugby or soccer fields, a cricket oval, tennis courts, a swimming pool and a multi-purpose indoor sports centre. Such an active open space must also include a parking area and must be accessible to and from a large bus and minibus taxi terminus. A municipal recreational facility can be the base of citywide sports club.

b. Regional recreational node

A regional recreational node should provide regional sport facilities, typically a number of rugby or soccer fields. The rugby or soccer fields can double as a cricket oval. Such a recreational facility can serve as the base for regional sports clubs.

c. District recreational node

A district recreational node will serve local neighbourhoods and should therefore comprise local recreational facilities, such as a rugby or soccer field and a few tennis courts. These recreational facilities can supplement the recreation facilities of schools and should therefore be located in close proximity of school clusters.

5.4.4.3. Active Open Space Development

Emfuleni has as number of open space, as mentioned in the status quo section (Section 2) of this report. In addition, the Land Use Budget (Section 3) calculated the recreational space required within Emfuleni to support the envisaged population
increase. This additional recreation space need should be accommodated within primary, regional and district recreational nodes, as set out in the Table above.

The regional recreation nodes must occupy central locations within Emfuleni area, which will allow these nodes to be accessible from various residential areas. Where possible, these regional recreational nodes must be located within or next to the open space corridors identified within this report. This will allow synergies between these active (recreational) open spaces and the passive open space corridors proposed for Emfuleni.

Apart from the abovementioned regional recreation node, a number of district recreation nodes have been proposed for Emfuleni. Specific locations for these nodes are not proposed. Instead, the locations of these nodes are left to the township establishment process, whereby such nodes can be included into the layouts drafted for proposed residential areas. The rule of thumb in this case is to (a) place these district recreational nodes in accessible locations and (b) place these nodes next to or within the open space corridor, if feasible.

As with community facilities, urban expansion into small holding areas poses the danger that township establishment on these small holdings do not yield the necessary household thresholds to require developers to provide recreational facilities as part of their developments. Should this be the case, it is proposed that Emfuleni pro-actively identifies properties within small holding areas that are suitable for the location of recreational nodes. Emfuleni will then need to purchase these properties and develop recreational facilities on them when urban expansion within these small holding areas necessitates the development of such facilities.

5.4.5. SEBOKENG CBD DESIGN

In contrast to the Vanderbijlpark CBD and the Vereeniging CBD, the Sebokeng CBD is an emerging CBD. The development of the Sebokeng CBD thus needs to be guided by more detailed precinct design. From the onset it has to be stated that the following precinct design aims to provide a vision for the development of the Sebokeng CBD by applying the various development and design principles set out in this document. It is therefore attempted to illustrate how these principles can be employed within the Sebokeng CBD, rather than proposing a rigid spatial structure that has to be adhered to when developing the Sebokeng CBD. The hope is that this design will influence the manner in which the Sebokeng CBD is ultimately developed.
5.4.5.1. Approach and Precinct Attributes

The Sebokeng CBD is an existing and emerging nodal precinct that is located at the existing Houtheuwel commuter railway station. This precinct is thus highly accessible, not only by means of commuter railway network, but will by bus and minibus taxi, as it is located on Moshoeshoe Road, which links it to the Vanderbijlpark CBD in the south and to the Golden Highway in the north.

The basic approach for the development of the Sebokeng CBD is to concentrate higher-density, mixed-use development around the existing Houtheuwel commuter railway station. On the one hand, the purpose of this higher-density, mixed-use node is to boost the number of commuter using this commuter railway stations, thus increasing the viability of this public transportation facility. On the other hand, close proximity to public transit is needed to enable the households living in this higher-density node to access to employment opportunities and social amenities within the greater Emfuleni region.

Currently, the Sebokeng CBD contains a small regional mall, a small industrial area and a hostel complex, a regional hospital and a teachers training facility. Despite the fact that it contain these existing anchor facilities, the node remain poorly integrated and poorly designed on a pedestrian level, in particular relating to the pedestrian links between the CBD and the neighbouring Houtheuwel commuter railway station. This provides the opportunity to illustrate how the application of certain urban design principles can help improve the land use and pedestrian environment of the Sebokeng CBD.

5.4.5.2. Design Principles

Developing or redeveloping a nodal area, such as the Sebokeng CBD, requires applying a number of urban design principles. These design principles need to address a wide range of issues. For example, it is important to know how the specific design of walkways, public spaces and parks can encourage a rich public life within these nodal areas. It is also important to know how buildings can reinforce key locations within nodal areas. Another key element of nodal development is obtaining a public transportation-oriented spatial structure by focusing on pedestrian movement, rather than on private vehicles. Based on the above, the following urban design principles need to be taken into account when developing or redeveloping a nodal area:
PEDESTRIANS

Principle 1: Include public spaces and parks

Public spaces and parks are the heart of cities and nodal areas in particular, because they are the center of economic, civic, and cultural life and human interaction. Creating public spaces or parks within nodal areas that foster community and civic engagement not only involves the design of these spaces, but also its sensible location of these spaces and the appropriated design of the built fabric around these spaces. A public space and parks can function as a market place, a ceremonial civic stage, a playground for children, and a sport facility.

Principle 2: Create a hierarchy and network of public spaces

The public realm should not apply to only one geographic level, but should rather be developed on a number of geographical levels in order to be most effective. This can be done utilizing a hierarchy of public spaces that can range from a number of public buildings cluster around a public space to a single recreation facility located within the flood plain of a river that flows though a node. What is import is that these public spaces are interconnected to create a network of public spaces within a nodal area. Such a network of public spaces requires an open and accessible township layout, which is best served by a grid road network. It is often useful to orient nodal development around a central pedestrian space, such as a plaza or park. It is also beneficial if nodes include some kind of larger public event space, such as a square on amphitheatre. Such spaces help foster community interaction and can be used for a variety of events with regional drawing power, such as markets and festivals.

Principle 3: Develop a pedestrian network

Public buildings, public spaces and public transit stations must be linked by a continuous network of pedestrian walkways and traffic tamed streets. The goal must be to make the public transit stations accessible by foot, especially for children and the elderly. Pedestrian network design should incorporate sidewalks, seating, lighting and signage. Accommodate pedestrians in a safe manner by separating pedestrian and vehicular movement. Where vehicles cross the pedestrian network within nodal areas, it is the pedestrian who must be given priority using raised crossings at sidewalk height.

Principle 4: Allow pedestrian permeability in nodal areas
A basic requirement for the efficient operation of the public transit system is pedestrian access, because it is pedestrians and not private vehicle owners that use public transportation. It is therefore important that nodal areas are designed in such a way that it would encourage direct pedestrian movement to public transit stations. This is called pedestrian permeability and is best achieved using a grid street pattern (see Diagram above). Pedestrian permeability includes establishing smaller urban block sizes that enables access to public transport facilities, avoiding gated developments which do not provide public access, avoiding long cul-de-sacs with no pedestrian through-linkages, and providing through-site links for pedestrians on larger sites where streets are not practical.

Principle 5: Create pedestrian friendly spaces

Pedestrian life is an integral component of successful nodes and investing in such spaces can help attract pedestrians and increase the viability of local businesses within nodal areas. Comfortable sidewalks, gathering places, tree-lined streets, public art, and street fronting retail are all components of pedestrian friendly spaces. All high pedestrian traffic area, such as pedestrian walkways and urban squares, should be adequately paved. Pedestrian ways, entrances,
parking area, and public open space should be adequately lit to ensure night-time security. Building design within the node should also be pedestrian-oriented by incorporating seating, rain protection and other pedestrian features.

Principle 6: Safety and Security

Public space should be designed as a positive space and integrated with the nodal development by way of landscaping, pedestrian access paths and lighting. Maximise public surveillance public spaces whilst also protecting the privacy of properties. Public surveillance can be increased by maximizing the number of windows and balconies facing onto streets and public spaces. Concealing walls should be avoided along pedestrian routes. Provide lighting and good visibility of entrances, public spaces and pedestrian walkways and provide safe access between parking areas and access to buildings.

TRANSPORT

Principle 7: Multi-modal access

To reduce private vehicle dependency and provide greater transportation choice to residents, visitors, workers and shoppers, successful nodal developments must include a range of public transportation options. Nodal development must therefore not be designed solely for access by the private vehicle, but should accommodate public transport and pedestrian on its streets in a safe and efficient manner. Transit stops must be conveniently placed and pedestrians must be provided with wide sidewalks and safe pedestrian crossings to access public transportation.

Principle 8: Design around public transport

Value is added to the public realm of a nodal area if provision is made for public transport, because the success of nodal areas is largely depended upon these nodes being tied into the existing and planned commuter rail network. Land use density, land use mixed-use and the location of public transit stations within the public realm go hand-in-hand and should be planned as such. Providing pedestrian connections are also essential in this regard. When designing for public transit in nodal areas where good public transit does not yet exist, it is important to provide locations for future bus shelters and minibus taxi ranks to make transit service upgrades easier.

Principle 9: Integrate land use and transportation
Integrate the existing commuter railway stations with the existing and proposed land uses within each nodal area. To enable this, it will be necessary to link these transit facilities with the surrounding land uses through a network of pedestrian walkways. The existing internal road network can be used for this. Different types of paving can be used to separate vehicular and pedestrian movement, making nodal areas pedestrian-safe areas. In addition, these pedestrian walkways need to be extensively landscaped to ensure they attract pedestrian movement.

Principle 10: Create traffic calmed streets

Central to creating a pedestrian and public transit environment within nodal area is the curbing of the excessive use of private vehicle usage within nodal areas. Techniques to reduce the volume and speed of vehicular traffic within nodal areas include traffic calmed streets, where pedestrians are given equal rights to vehicles within a street. Many techniques to calm vehicular traffic on local street exist, giving priority to pedestrian and public transportation, such as roundabouts and raised pedestrian crossing.

Principle 11: Parking layout

Providing parking within a nodal area is an essential part of nodal development. However, the way such parking areas or structures are designed and incorporated into a nodal area can make a big difference to the way that nodal areas are designed and used. Appropriate parking design ensures that parking structures are visually compatible with the character of the nodal development, minimizes the amount of street frontage given over to parking areas or structures. Ways to achieve this is to break up large parking areas with trees, buildings, or different surface treatments, or to provide parking areas underground or in semi-basements where practical.

LAND USE

Principle 12: Provide wide range of land uses

It is important that a land use mix be obtained within each nodal area to ensure a sustainability and vibrant nodal environment. Nodal areas should thus be designed to include a range of mutually supportive uses, including retail, service, offices and residential uses, developed in an integrated manner. This land use mix must be developed around pedestrian accessibility and access to public transit.

Principle 13: Use retail to activate pedestrian movement
Critical to achieving a land use mix within a nodal area is the development of the strong retail component as part of the land use mix of a nodal area. Retail uses at ground level can help activate pedestrian areas, especially in blighted or neglected parts of nodal areas. These retail land uses should be placed in such a manner that it acts as pedestrian anchors, drawing pedestrians throughout the entire nodal area.

Principle 14: Cluster community facilities

Community facilities need to be clustered within node areas, rather than dispersed individually throughout a node. This will stimulate the viability of these facilities, create strong focal points within the node and create a more ordered nodal structure. The type of community facilities provided within each node must take into account the intended function of the node and the population it intends to serves. In other words, a higher-order node must contain higher-order community facilities and a lower-order node must contain lower-order community facilities.

Principle 15: Develop a range of housing typologies

This spatial arrangement of different housing typologies within a nodal area can be applied in such a manner that is contributes to urban form and legibility of the nodal area. For example, higher-density housing can be used to signifying the central parts of a nodal area or the location of a public transportation station. Walk-ups are most suited for nodal areas and best support public transportation facilities. Providing a range of housing typologies within nodal areas can be used to create variety and complexity to the nodal area and, at the same time, cater for the needs of a range of household structures. Successful nodes are dynamic spatial entities that able to accommodate a diversity of residents at varying stages of life (children to aged).

BUILT ENVIRONMENT

Principle 16: Create compact and varied urban fabric

A sustainable and vibrant nodal area contains an urban fabric that is compact, of a pedestrian scale, and has a varied urban fabric, which is achieved through the development of an appropriate land use mix. Such an urban fabric supports pedestrians and promotes walking as a primary means of movement, because its urban fabric contains a diversity of shopping, housing, and social facilities located within walking distance of each other.

Principle 17: Create urban character
Urban character within nodal areas can be created in a number of ways, using building design. Urban character can be obtained by establishing visual connections to landmarks and public facilities within nodal areas, using built form and height to signal gateways into nodal areas, acknowledge the scale and character of existing buildings with the nodal areas, avoid high fences or walls in front of buildings along main streets or pedestrian walkways, encouraging new buildings to front onto public spaces where such space exist, using similar building typologies on both sides of a street to enable a consistent streetscape, and retaining and incorporating historically significant buildings into the development of a nodal area.

Principle 18: Vary building design

There always exists the danger when developing nodal areas that sterile environments are created with no variations in building design, height and orientation. Varying design, height and orientation within nodal areas creates an interesting and aesthetically pleasing nodal environment. Incorporating existing buildings into a planned development helps create a more varied environment and links a node to its historic context. For example, existing farm buildings can be converted into community or recreation facilities.

Principle 19: Create density interface

Step-downs densities must be used to make higher-density nodal areas compatible with neighbouring lower-density residential areas or adjacent natural areas. In addition, a good interface requires architectural compatibility between the building of nodal areas and the buildings of neighbouring residential areas. This requires the appropriate location of entrances, windows and balconies of buildings located within nodal areas, which overlook public spaces, but do not provide direct views through the windows of neighbouring buildings. Site obscuring landscaping may be required to provide visual buffering between nodal areas and neighbouring residential areas.

Principle 20: Well-designed buildings

Good building design not only helps to achieve higher densities within nodal areas, but it also helps to create a livable and vibrant nodal environment, which is a prerequisite for attracting both people and businesses to nodal areas. Building design should be location-specific; in other words, it should aim to create a unique identity for a specific node. Such an identity should be determined in consultation with property owners, businesses, and local residents. Building design must take into account simple design features, such as having storefronts that face the street and overhangs that allow sidewalk activity.
Principle 21: Massing, height and scale

Massing, height and scale are important elements which can effectively be used to create a sense of place and character within a nodal area. To enable the latter, the height and massing of each building within the nodal area must acknowledge and respond to adjacent buildings and public spaces within the nodal area. For example, the height of buildings must respond to the existing context and character of a nodal area. Also, building height and massing should be manipulated to minimise overshadowing of public spaces and pedestrian walkways. Massing and height of buildings should not diminish the human scale at the street level.

Principle 22: Frontages, facades and entrances

Frontages, facades and entrances are important elements which determine the impact (negative or positive) that a building has on the nodal environment. Basic guidelines to be followed include encouraging building facades to respond to street corners and public spaces, allowing building entrances to face streets or street corners, avoid creating inactive street frontages, and clearly articulating entrances with architectural features. Existing buildings of high architectural quality and visual interest (if available) can be used as benchmark developments within nodal areas. Also, contextual cues associated with existing streetscapes can be included into new buildings frontages in terms of roof form, wall treatment, and choice of material.

AESTHETICS

Principle 23: Apply appropriate architecture

In nodal areas, buildings are not freestanding objects in space, but are connected to each other forming blocks of buildings that enclose streets, public spaces and parks. Buildings within such a context must respect neighbouring buildings in its design and create an architectural dialogue that accentuates the public realm. This involves buildings that are linked, open and oriented towards each other, rather than building which are closed off to one another.

Principle 24: Incorporate esthetics and urban art

An aesthetically pleasing nodal environment is one that applies good design and aesthetics on an overarching level, as well as a detailed level. On an overarching level, nodal areas must have clear boundaries, centers and focal points. On
a detailed level, meaningful and accessible public art can play a role in humanizing the nodal environment and express the identity of the nodal area by representing traditional industry and crafts, marking historic connections, and portraying local myths and legends.

Principle 25: Greening and landscapes

Nodal developments must integrate, protect and enhance natural features that traverse the nodal area. Existing trees and notable landforms, such as large boulders, should be maintained and incorporated in the overall design. Such features give a nodal area a unique character and helps create a sense of place. Naturalized storm water management should be encouraged to create multi-purpose open spaces. Plant trees along the pedestrian walkways leading to these urban spaces and open spaces in order to strengthen visual linkages and accentuate pedestrian connections.

5.4.5.3. Design Principles Applied

Pedestrian movement and connectivity is central to the design and development of a nodal area that supports public transportation. The reason for this is simply that pedestrian embark and disembarks trains, busses and minibus taxis and walk to access nodal land uses. This interrelationship between land use development and access to public transportation is enforced by the public realm. Figures 28 to 30 illustrate how the development principles set out above, relating to the land use, public realm and transportation can be applied to the development of the Sebokeng CBD.

The Sebokeng CBD is located at the existing Houtheuwel commuter railway station. The existing Sebokeng Mall and the Sebokeng Hospital are the primary land uses defining this CBD. The urban design framework proposes that this existing land use component be strengthened through infill development and the densification of the Sebokeng CBD. Primarily, this can be done through the development of walk-ups on vacant land within the CBD (see before and after images). These walk-ups will provide the CBD with a greater land use mix, which would benefit the vibrancy of the CBD area and better support the public transportation facilities within the CBD.
FIGURE 28: SEBOKENG CBD REGENERATION

Before

After
FIGURE 29: SEBOKENG CBD STRUCTURE

- Walk-ups
- Retail development
- Public open space
- Pedestrian walkways
- Commuter railway station
- Industrial Area
FIGURE 30: SEBOKENG CBD ELEMENTS
These walk-ups could also potentially provide enough units to accommodate the existing Sebokeng hostel residents (as well as a number of additional households), which could assist in the redevelopment of the hostels site. In addition to the above, the urban design framework proposed the infill and densification of the existing light industrial area, located north of the Sebokeng Mall. This redevelopment can comprise hive-industries, which can be rented out to the local population to support SMME development. The massing and height of the walk-ups and light industrial buildings can effectively be used to create urban form and character within the Sebokeng CBD.

Public space and pedestrian walkways can be used to increase the legibility of the node and provide suitable pedestrian environments. In particular, the urban design framework proposes the establishment of a diagonal pedestrian walkway crossing between the Sebokeng Mall and the Houtheuwel commuter railway station, as well as between the Sebokeng Hospital and the Houtheuwel commuter railway station. This will enable a direct link between the major land uses within the CBD and the Houtheuwel commuter railway station. The proposed walk-ups abutting pedestrian walkways leading to the Houtheuwel commuter railway station can contain a mixed-use component at ground-floor level, to accommodate shops and restaurants. This allows the mix-use component to benefit from the pedestrian traffic passing through these developments and it will help create a more vibrant nodal environment.

Creating a ‘sense-of-place’ within the Sebokeng CBD is important, because Sebokeng has historically been developed as a peripheral area with no particular identity and urbanity. This needs to be changed and can largely be achieved through the proper design of its CBD area. Generally, a ‘sense-of-place’ is defined by elements such as land use mix, spatial layout, building size and orientation, landscaping, and the manner in which pedestrian and pedestrian movement is accommodated; which are all elements mentioned above.

5.5. HOUSING DEVELOPMENT

Housing is a strong form-giving element that can impact substantially of the development of an urban area. For example, housing can be used as an infill land use, which could enable the integration of a fragmented urban area. Also, housing can provide the necessary land use densities to support public transport and retail centre development.
5.5.1. HOUSING TYPOLOGIES

Housing types can be categorised according to level of attachment. Level of attachment refers to the vertical and horizontal attachment of buildings. There is a tendency, when addressing the housing demand, especially for the affordable housing sector of the population, to provide freestanding units with little or no level of attachment. There is little exploration of the benefits of other housing typologies, such as flats, walk-ups, row housing and semi-detached units.

The following discussion on typologies is not exhaustive, but rather focuses on housing and density types that are appropriate for Emfuleni. The Table below provides an easy-reference summary of the attributes of the different housing typologies and how it compares with the attributes of other housing typologies.

a. Detached housing

Detached units are standalone structures situated on a single, individually registered stand. This is the most commonly used housing type within Emfuleni and is used for bonded and well as affordable housing. As a bonded housing typology, detached housing is often used in estate development, with added security fencing and communal facilities to achieve some of the advantages that are usually associated for cluster housing developments. As an affordable housing unit, the design of this housing typology is usually limited to the requirements of the government housing subsidy scheme.

As is evident from the above, the densities of this housing type varies dramatically, depending on its use. As bonded housing, this housing typology is usually located on stands generally 1000m² in size and achieve an average nett density of 10u/ha. As an affordable housing option, this housing typology is usually located on stands of approximately 250m² and achieve nett densities of approximately 40u/ha. Such densities (both bonded and to a lesser extent affordable) do not promote the efficient use of land and do not promote the viable operation of public transportation systems. Consequently, this housing type should not be promoted in close proximity of public transportation routes, but should rather be use in peripheral areas of developments.

In terms of infrastructure costs, this housing typology is the most expensive housing option. The low densities and large stand sizes of this housing type result in large street frontages, which result in long infrastructure runs. This housing type is the least complicated to construct, resulting in relatively low construction costs, when compared to other housing typologies.
## Table 32: Bonded and Affordable Housing Typologies

<table>
<thead>
<tr>
<th>Housing Typology</th>
<th>Gross Density</th>
<th>Net Density</th>
<th>Stand Size</th>
<th>Building Height</th>
<th>Tenure Options</th>
<th>Subsidy Options</th>
<th>Plot layout</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bonded Housing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detached housing</td>
<td>5 u/ha</td>
<td>10 u/ha</td>
<td>1000 m²</td>
<td>2 storey</td>
<td>Full title</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Cluster housing</td>
<td>12 u/ha</td>
<td>25 u/ha</td>
<td>400 m²</td>
<td>2 storey</td>
<td>Full title or sectional title</td>
<td>n/a</td>
<td></td>
</tr>
<tr>
<td>Flats</td>
<td>80 u/ha</td>
<td>120 u/ha</td>
<td>n/a</td>
<td>6 storey</td>
<td>Rental or sectional title</td>
<td>Institutional subsidy</td>
<td></td>
</tr>
<tr>
<td><strong>Affordable Housing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Detached housing</td>
<td>20 u/ha</td>
<td>40 u/ha</td>
<td>250 m²</td>
<td>1 storey</td>
<td>Full title</td>
<td>Project-linked subsidy</td>
<td></td>
</tr>
<tr>
<td>Semi-detached</td>
<td>25 u/ha</td>
<td>50 u/ha</td>
<td>200 m²</td>
<td>2 storey</td>
<td>Full title</td>
<td>Project-linked subsidy</td>
<td></td>
</tr>
<tr>
<td>Row housing</td>
<td>30 u/ha</td>
<td>60 u/ha</td>
<td>160 m²</td>
<td>2 storey</td>
<td>Full title</td>
<td>Project-linked subsidy</td>
<td></td>
</tr>
<tr>
<td>Walk-ups</td>
<td>40 u/ha</td>
<td>80 u/ha</td>
<td>n/a</td>
<td>3 storey</td>
<td>Rental or sectional title</td>
<td>Institutional subsidy</td>
<td></td>
</tr>
</tbody>
</table>

Source: Urban Dynamics Gauteng, 2012
b. Cluster Housing

Cluster housing developments are exclusively used as bonded housing and are characterized by housing units located within a housing complex, which shares communal facilities and a perimeter security wall. These housing units can either be detached or attached to one another, thus sharing at least one wall of the unit. This housing type does not exclude a second and third storey. Ground access, a private garden and on-site parking is possible with the housing typology.

Custer houses are usually located on stands of smaller size than those used for detached housing. These smaller stand sizes are often achieved through the use of shared walls. Stand sizes typically range from 400m² and yield a nett density of approximately 25u/ha. The smaller stand sizes translate to substantial infrastructure cost savings, making cluster housing more cost-effective than detached housing units. Shared walls also reduce the construction costs of the buildings, compared to detached housing units.

The smaller stands and higher densities achieved by this housing typology, compared to that of detached housing units, make it more suitable as a public transport related development. Although it does not create the desired densities that would significantly boost public transport patronage, it is a better option than detached units. In a sense, this housing typology creates a balance between creating detached or semi-detached housing units and achieving higher densities that are more transport related. This housing typology is preferably located along public transport routes, but not is next to public transportation termini, which would require higher-density housing options.

c. Semi-Detached Housing

Semi-detached housing is a suitable affordable housing option and involves 2 housing units attached to one another, thus sharing at least one wall of the unit. This housing type does not exclude a second storey. Ground access, a private garden and on-site parking is possible with the housing typology.

Semi-detached houses are usually located on individually registered stands of smaller size than those used for single detached housing. These smaller stand sizes are achieved through the use of shared walls. Stand sizes are typically 200m² and yield a nett density of approximately 50u/ha. The smaller stand sizes translate to substantial infrastructure cost savings, making semi-detached housing more cost-effective than detached housing units. Shared walls also reduce the construction costs of the buildings, compared to detached housing units.