PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR PRECINCT PLAN: WARDS 4, 5, 7 AND 91

CORRIDOR PLAN AND URBAN DESIGN GUIDELINES FOR MR385 EAST CORRIDOR 1N-30465

The Planning Initiative and Team

June 2018
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1 INTRODUCTION

1.1 OVERVIEW OF PROJECT

The eThekwini Municipality has appointed The Planning Initiative and team to develop a Functional Area Plan and Corridor Plan for the northern part of Mpumalanga and the MR385 east corridor as well as a Draft Scheme for the study area. It is noted that the Mpumalanga Local Area Plan (LAP) has been prepared and it is this document that provides the overall framework under which this project falls.

It is stressed that this project is about strategically assessing the potential of the Study Area and clearly identifying what interventions, investments and land use scheme controls are required in order to ensure that it can respond appropriately, innovatively and sustainably to the pressures and changes affecting the area and local communities, businesses and other stakeholders. The work therefore focuses on:

- Creating a framework at the functional planning level created by the conceptual road and open space framework within which development can infill over time.
- Creating a toolkit of draft Scheme mechanisms from which the Municipality can draw when applications from private developers are submitted.

The purpose of this report is to present the Corridor Plan for the study area. The plan has been prepared by The Planning Initiative team on behalf of the eThekwini Municipality.

The Municipal Systems Act, Act No 32 of 2000 requires Municipalities to prepare a Spatial Development Framework (SDF) as part of their Integrated Development Plan (IDP), which gives guidance on the preparation of a Land Use Management System (LUMS) for the area. In accordance with these requirements the eThekwini Municipality has prepared their IDP and SDF. They have proceeded further to develop a package of plans to assist in land use management and decision making including Spatial Development Plans, Local Area Plans, Functional Area Plans and Land Use Schemes. These are then used to manage development within the Municipality through a number of mechanisms including Schemes as illustrated in the following diagram:
FIGURE 1: PACKAGE OF PLANS AND CITY MANAGEMENT (PRIOR TO BYLAW)

FIGURE 2: PACKAGE OF PLANS AND CITY MANAGEMENT (SUBSEQUENT TO BYLAW)
The project methodology is set out in Table 1. This report covers the completion of the Precinct Plan phase of the project (Phase 3).

**TABLE 1: PROJECT METHODOLOGY**

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### 1.2 PROJECT AIMS AND OBJECTIVES

The primary aim of this project is to take the work that has already been completed, whilst also considering work that is currently in progress, forward in a manner that will ensure that the Municipality is well prepared to facilitate future development opportunities and manage land use in the best interests of the public. To this end the project is essentially aimed at translating the work that has already been undertaken into a tool box of planning, engineering, transportation and environmental information that will allow the Municipality to respond efficiently, effectively and appropriately to development proposals put to them by private developers. It is important to understand that much of the land within the study area is privately owned and as such, the Functional Area Plan cannot create fixed road alignments (other than those already developed or planned) or block layouts – the FAP will give the tool to enable the Municipality to respond to applications that address these.

The final product delivered here is intended to offer a framework of adequate flexibility to allow for future proposals to respond to market trends and shifts over time. The work therefore needs to focus on:

- Working with existing plans and planning processes (such as proposed Provincial Road Alignments, neighbouring Municipal plans) to ensure a product that aligns with other regional plans.
- Creating a framework at the functional planning level created by the conceptual road and open space framework within which development can infill over time.
• Creating a toolkit of draft Scheme mechanisms from which the Municipality can draw when applications form private developers.

The objective of this project is therefore to:

• To propose a conceptual plan and design proposals over parcels of land identified that aligns with broader spatial plans and translates these into more detailed plans, guidelines and projects.
• Consider how and where housing development should be developed in the area, including mixed income, social and GAP housing.
• To evaluate the implications for the environment, services, transport infrastructure and associated phasing of development in consultation with stakeholders.
• To prepare draft land use controls in accordance with the type and intensity of development envisaged through the conceptual framework plan process and translate it into a Draft Scheme tool kit and map. The draft scheme tool kit should consider directives for energy efficiency, use of energy efficient materials for sustainable buildings, rain water harvesting, etc. The process will also include consideration of innovative and best practice mechanisms for Scheme management.
• To undertake a stakeholder engagement and public process throughout the project.

Following the preparation of the FAP, Phase 3 involves the preparation of precinct plans for 2 identified precincts. Subsequent to that, a toolkit of Land Use Scheme mechanisms that would be incorporated into the Outer West Consolidated Scheme will be prepared. In Phase 5 the team will prepare Preliminary Budgets for projects identified and a Phasing Plan to guide investment decisions.

1.3 PLANNING CONTEXT

The Mpumalanga northern functional area and the MR385 east corridor are situated in a strategic location along the N3 corridor (SIP2 national priority corridor) and at the interface with the Mpumalanga town centre, settlement area and the Hammarsdale industrial area. This functional area is under substantial development pressure and also presents significant opportunities for integrating the Mpumalanga/Hammarsdale area with development along the N3 corridor and generating local employment opportunities together with improvements in access, services, housing, amenities and environmental quality, amongst others.

The project falls within the broader Mpumalanga Local Area Plan (LAP) area, which includes the northern functional area extending northwards to the N3 together with a southern functional area extending southwards to the uMlaas River. The Mpumalanga LAP provides the overall land use framework for the area and will accordingly provide a key informant to guide the preparation of the FAP and corridor plan. The Mpumalanga Town Centre Precinct Plan (TCP) prepared for the Mpumalanga town centre precinct will also be a key consideration for the FAP in terms of assessing key linkages with the town centre precinct and developing complementary proposals in the FAP, corridor plan and associated precinct plans.

The eThekwini Municipality has, through the identification of this project, indicated that it recognises that significant development pressure and change is occurring in and around the study area and that it needs
to urgently develop more detailed planning across all built environment sectors so that development can be facilitated in a prioritised and phased manner and in accordance with a clearly articulated development vision and proposals for the Study Area.

**Accordingly, this project is about strategically assessing the potential of the Study Area and clearly identifying what interventions, investments and land use scheme controls are required in order to ensure that it can respond appropriately, innovatively and sustainably to the pressures and changes affecting the area and local communities, businesses and other stakeholders.**

The Municipality needs to be able to balance market forces, natural growth and demand on the one hand, with the realities of servicing limitations, issues relating to sprawl, the impact of new housing developments, amenity and so forth on the other. This can only be done through appropriate planning both at a policy/strategic level and at the scheme level.

There has been considerable work undertaken in and around the study area, which will help in providing much of the base information necessary for the project and provide an overall guiding framework for the plan. These include:

- Mpumalanga Local Area Plan and Implementation Plan, 2014
- Mpumalanga Town Centre Precinct Plan, 2016
- Mpumalanga / Hammarsdale Township Regeneration Strategy, 2009
- Sankontshe Development Framework Plan, 2010
- Outer West Corridor Conceptual Spatial Framework, 2010
- Outer West Spatial Development Plan, 2015
- eThekwini Spatial Development Framework, 2017
- eThekwini Integrated Development Plan, 2017
- Outer West Zoning Scheme
- Hammarsdale Industrial Precinct Road Access Pre-Feasibility Study, 2012
- Cato Ridge Local Area Plan and Precinct Plans, 2012 (and update)
- Shongweni Local Area Plan, 2010

The following figure represents how the plan fits in both at the Municipal and Provincial and National government levels.
1.4 STUDY AREA LOCATION AND CONTEXT

The Mpumalanga Northern Functional Area and MR385 Corridor is located on the south-western side of the N3 in the Outer West region of the eThekwini Municipality. The study area is bounded by Cato Ridge and the N3 to the north, to the east by Shongweni, to the south by Mophela and Mpumalanga South, and the west by Camperdown Rural. Primary access to and through the site is via the N3, on to MR385 which runs through the study area. The study area forms part of the N3 corridor that extends from the Durban CBD and harbour through Pietermaritzburg up to Johannesburg. Major points of interest in close proximity to the site include Cato Ridge, Shongweni, south of Mpumalanga and Camperdown.
FIGURE 4: STUDY AREA LOCATION
2.1 INTRODUCTION

In the previous phase of the project, the Functional Area Plan (FAP) was developed for the Mpumalanga northern functional area, including the following key elements:

- Development Context
- Development Vision and Concept
- Development Framework

The FAP provides the overarching framework for the preparation of the precinct plan and key guiding elements of the FAP have accordingly been outlined below.

2.2 VISION FOR THE STUDY AREA

The vision for the FAP is informed by the Mpumalanga LAP vision and has been formulated as follows:
“Mpumalanga North will have a thriving town centre, with the Industrial node of Hammarsdale being regenerated to meet new demands and provide local employment and fulfil the role of sub-regional development node. The area will provide a quality living environment supporting a range of lifestyle options, and all the necessary services and environmental resources to provide for the residents both within and outside the study area.”

2.3 Spatial Principles

The FAP responds to the vision by identifying the key spatial principles on which the plan rests. In effect these principles are borne in mind when preparing the plan and are a useful means to ensure that the FAP responds to the vision and needs of the area. The four spatial principles as they relate to the study area are:

- A sound Open Space Network
- A functional Movement Network
- A sustainable Land Use and Settlement Pattern
- A vibrant and functional Urban Structure and Public Realm

2.4 Spatial Concept for the Northern Functional Area

The spatial development concept for the northern functional area is focused on the following key aspects:

1. Primary Network / Regional Linkages and Opportunities

Strengthen the primary movement network that provides regional linkages connecting the northern functional area to the broader metro area and associated socio-economic opportunities. Key elements include:

- MR385 and N3 and associated road-based public transport (including the proposed future IRPTN trunk corridor and stations) that connect Mpumalanga to Pinetown and Durban and other key urban and employment centres.
- Rail corridor with its associated stations that connects Mpumalanga to Durban and Cato Ridge.
- Proposed interchange zone at the New Town Centre where the primary network and secondary networks intersect.
2. MR385 Mixed Use Development Corridor and Opportunities

Develop the MR385 as a mixed-use development corridor that structures and integrates the main economic centres and residential areas along the corridor, including the Mpumalanga New Town Centre, Hammarsdale industrial area, Keystone Park investment area and the adjoining residential areas. The MR385 corridor provides the interface between the primary / regional movement network connecting Mpumalanga to the broader metro area and associated opportunities and the secondary / local movement network connecting local residential neighbourhoods to the nodes, facilities and opportunities along the corridor. Key elements include:

- Industrial, logistics and business opportunities associated with Hammarsdale / Sterkspruit, Keystone Park and Cato Ridge.
- Mixed use commercial / residential /social facility opportunities associated with the Mpumalanga New Town Centre / urban hub and the proposed urban development nodes located at key intersections along the corridor.
- Agricultural / agri-industrial opportunities between the industrial and mixed use / residential areas along MR385 west.
3. Secondary Network / Local Linkages and Opportunities

The MR385 development corridor needs to be functionally integrated with the existing settlement areas and future growth potential areas to the north and south of the corridor via a secondary network/local linkage. Key opportunities include:

- Sustainable urban expansion and infill development in the northern areas, which will help to integrate Mpumalanga with the N3 corridor.
- Consolidation, infill and upgrading in the southern residential areas with improved integration and access to the MR385 corridor.
- Industrial/business expansion to the southeast as an extension of the Hammarsdale/Sterkspruit industrial area.
- Consolidation, infill and upgrading of the residential areas to the southwest with improved integration and access to the MR385 corridor.
- Industrial/business expansion to the northwest as an extension of the industrial growth of the Cato Ridge area.
FIGURE 8: SPATIAL DEVELOPMENT CONCEPT FOR NORTHERN FUNCTIONAL AREA
2.5 **Northern Functional Area Plan**

The FAP developed for the northern functional area sets out the land use, transport, infrastructure and services and public space, landscaping and built form proposals. The figure below indicates the key land use and transport proposals set out in the FAP for the functional area.
FIGURE 9: FUNCTIONAL AREA PLAN FOR NORTHERN FUNCTIONAL AREA
3 MR385 EAST CORRIDOR PLAN

3.1 INTRODUCTION

3.1.1 OVERVIEW
Phase 3 of the project focuses on the preparation of a corridor plan for priority action areas identified within the northern functional area. These priority action areas are those parts of the corridor with the greatest development pressure, potential and/or needs. The precinct plans include the identification of projects and phasing for priority action areas to address land use, housing, public facility, urban design, environmental, economic, transport and infrastructure requirements.

The focus of the plan is to develop sustainable settlements based on inclusive principles that prioritise access to opportunity and locally appropriate land use intensity and mix in relation to transport routes, the corridor and activity nodes or centres. The key to developing sustainable settlements is to adopt a holistic approach that integrates housing, transport, infrastructure, food production, etc. systems into the settlement design process.

3.1.2 CORRIDOR PLAN AREA
The corridor plan focuses on the eastern arm of the MR385 corridor, which forms part of the integration zone and prime investment corridor identified for Mpumalanga in the eThekwini SDF and BEPP and part of the future IRPTN link to Mpumalanga. This includes the remainder of Precinct A1 not covered by the Mpumalanga Town Centre Precinct Plan (including Hammarsdale) and Precinct B1, which is the remainder of the eastern arm of the corridor as set out in the Mpumalanga LAP (refer to Figure 10 below).

The corridor plan area adjoins the eastern boundary of the Mpumalanga Town Centre Precinct Plan. The integration between the eastern corridor precinct and the town centre precinct will be essential to ensure the development of a contiguous corridor with complementary land use, transport, urban design, environmental and infrastructural proposals. The corridor plan accordingly provides guidance regarding the appropriate interface uses and linkages between these two important precincts.
FIGURE 10: CORRIDOR PLAN AREA
The following priority action areas have been identified within the above precincts:

- Priority Action Area 1 – MR385 mixed use activity corridor
- Priority Action Area 2 – industrial expansion area west of Hammarsdale and integration with Hammers Estate
- Priority Action Area 3 – industrial expansion area southeast of Hammarsdale
- Priority Action Area 4 – mixed use node and development area along MR385 corridor
- Priority Action Area 5 – residential settlement development area northwest of MR385

**FIGURE 11: PRIORITY ACTION AREAS**
3.2 CORRIDOR PLAN OBJECTIVES AND GUIDELINES

3.2.1 CORRIDOR PLAN OBJECTIVES
The Corridor Plan is guided by the following key objectives:

- Develop an integrated land use and activity pattern that encourages the development of integrated human settlements, provides a range of development opportunities and helps to meet socio-economic needs within the precinct.
- Establish a movement system that facilitates connectivity, accessibility, permeability and walkability and that structures and supports the development of land uses and social and economic opportunities.
- Develop a quality public realm with supportive urban structure, landscaping and built form that reinforces and supports the access and mobility system and the land use and activity pattern.
- Establish an interconnected open space system that protects biodiversity and environmental assets, sustainably delivers ecological goods and services for local communities and that structures and provides visual relief from the built environment.
- Provide an adequate and sustainable level of infrastructure and services to support land use development and meet the socio-economic needs of local communities and businesses.

These objectives have been identified to guide the development of proposals for the precinct. Each of these objectives are unpacked further below in terms of the existing context that impacts on each objective and the guidelines identified to help achieve each objective.

3.2.2 CORRIDOR LAND USE AND ACTIVITY FRAMEWORK

3.2.2.1 INTRODUCTION
The overall objective is to develop an integrated land use and activity pattern that encourages the development of integrated human settlements, provides a range of development opportunities and helps to meet socio-economic needs within the precinct. Key elements include the following:

3.2.2.2 MIXED USE ACTIVITY NODE AND SPINE NETWORK
Develop a mixed-use activity node and spine network to provide opportunities for concentrating more intensive economic and social activities in highly accessible locations.

- Developing intensive mixed uses in activity centres served by public transport hubs and along activity spines connecting to these public transport hubs.
- Encouraging an appropriate mix of commercial and light industrial (including retail, office and small-scale industrial) uses, residential uses and public facilities and amenities in activity nodes and spines.
- Providing high quality public spaces, street and NMT infrastructure to support the intensive use and high traffic and pedestrian use of these activity areas.
• Encouraging higher densities with responsive built form and supportive landscaping within the activity network.

3.2.2.3 SUPPORTIVE PUBLIC FACILITIES AND AMENITIES
Develop supportive public facilities and amenities to provide for economic, social, mobility and recreational needs and create integrated human settlements.

• Support the delivery of public facilities and amenities to address backlogs and cater for new residential growth.
• Develop new schools in suitable, accessible locations to serve surrounding residential neighbourhoods.
• Provide active and passive recreational amenities such as parks and sports fields.
• Structure human settlements around public transport hubs and along public transport routes.
• Increase residential densities and thresholds around public facilities and public transport hubs to support these facilities.
• Promote economic opportunities for the local communities within the nodes and corridor through the provision of appropriate facilities.

3.2.2.4 INTEGRATED HUMAN SETTLEMENTS
Develop integrated human settlements with a range of housing types to accommodate different needs and lifestyles with the area.

• Encourage the development of a range of housing types to cater for different densities, tenure options, income levels, socio-economic needs, etc.
• Encourage medium to higher density residential development around public transport hubs, public facilities and along the main access spines within the area.

3.2.3 PROPOSED LAND USES AND DEVELOPMENT YIELDS
The following table reflects the land uses and development yields within the corridor, based on the Functional Area Plan but specific to the corridor (Figure 12).

TABLE 2: PRECINCT LAND USE SCHEDULE

<table>
<thead>
<tr>
<th>Land Use</th>
<th>NETT Area (ha)</th>
<th>FAR</th>
<th>Max Floor Area (ha)</th>
<th>Probably Floor Area (ha)</th>
<th>Floor</th>
<th>Dwelling Per Ha</th>
<th>Dwelling Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture High Impact</td>
<td>21</td>
<td>0.35</td>
<td>7</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Agriculture Medium Impact</td>
<td>80</td>
<td>0.2</td>
<td>16</td>
<td>13</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Land Use</td>
<td>NETT Area (ha)</td>
<td>FAR</td>
<td>Max Floor Area (ha)</td>
<td>Probably Area (ha)</td>
<td>Floor Per Ha</td>
<td>Dwelling Units</td>
<td></td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------</td>
<td>-----</td>
<td>---------------------</td>
<td>-------------------</td>
<td>--------------</td>
<td>----------------</td>
<td></td>
</tr>
<tr>
<td>Civic and Social</td>
<td>13</td>
<td>0.6</td>
<td>8</td>
<td>6</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Environment Management/Services</td>
<td>665</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Existing Road</td>
<td>242</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Extractive Industry</td>
<td>27</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>General Industry</td>
<td>253</td>
<td>1.5</td>
<td>380</td>
<td>304</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Light Industry</td>
<td>21</td>
<td>0.7</td>
<td>21</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Logistics</td>
<td>89</td>
<td>0.5</td>
<td>63</td>
<td>50</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Mixed Use Low Impact</td>
<td>21</td>
<td>0.5</td>
<td>11</td>
<td>8</td>
<td>40</td>
<td>212</td>
<td></td>
</tr>
<tr>
<td>Mixed Use Medium Impact</td>
<td>20</td>
<td>1</td>
<td>20</td>
<td>16</td>
<td>60</td>
<td>366</td>
<td></td>
</tr>
<tr>
<td>Open Space Amenity</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Railway Reserve</td>
<td>17</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Residential Low Impact</td>
<td>205</td>
<td>NA</td>
<td>18</td>
<td>0</td>
<td>15</td>
<td>2462</td>
<td></td>
</tr>
<tr>
<td>Residential Medium Impact</td>
<td>36</td>
<td>NA</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>855</td>
<td></td>
</tr>
<tr>
<td>Transitional Settlement</td>
<td>29</td>
<td>NA</td>
<td>0</td>
<td>0</td>
<td>30</td>
<td>881</td>
<td></td>
</tr>
<tr>
<td>Utilities and Services</td>
<td>30</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 3: SOCIAL FACILITY REQUIREMENTS WITHIN THE CORRIDOR

<table>
<thead>
<tr>
<th>Land Use</th>
<th>NETT Area (ha)</th>
<th>MAX Floor Area (ha)</th>
<th>Probably Floor Area (ha)</th>
<th>Floor Per Ha</th>
<th>Dwelling Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grand Total</td>
<td>1772</td>
<td>543</td>
<td>420</td>
<td></td>
<td>4775</td>
</tr>
</tbody>
</table>

#### FIGURE 12: PRECINCT LAND USE AND ACTIVITY FRAMEWORK

#### 3.2.4 SOCIAL FACILITY REQUIREMENTS

Based on the land use yields, the following are the social facility requirements within the Corridor. It is noted that these are approximate yields and may be amended based on demand or uptake. Further studies may be necessary by the relevant authorities at the appropriate time.
### Social Facility Type | Standard (1: x people) | Additional Facilities required based on increased population | CSIR standards for Minimum Space | Space requirements based on CSIR standards |
--- | --- | --- | --- | --- |
Primary School | 7,000 | 2 | 2.8 ha | 5.6 |
Secondary School | 12,500 | 1 | 4.8 ha | 4.8 |
Fire station | 60,000-100,000 | 0 | 0.3 ha | |
Community Sports Field | 15,000 | 1 | 0.21 ha | 0.21 |
Community Health Clinic* | between 1:24,000 and 1:70,000 | 0 | 1.5 ha | |
Library | 70,000 | 0 | 0.05 ha | |
Community Hall | 60,000 | 0 | 0.2 ha | |

### 3.3 Corridor Access and Mobility Framework

#### 3.3.1 Introduction

The key features of the Corridor Access and Mobility Framework are:

- Development of a Transport Plan to cater for all modes of public and private transport, including NMT, achieved through the engagement with the ETA. This will identify any transport improvements to address the long-term transport needs within the corridor.
- Undertake a high-level assessment to identify transit services required to accommodate the anticipated public transport component of the MR385 precinct target market. Recommendations will be made regarding the type and route of public transport services between major trip generators, especially relating to residential areas of the local labour force to existing and planned employment opportunities;
- Develop a transport master plan for the area based on existing road and transit infrastructure, with a focus on unlocking the Mpumalanga Local Area by providing connectivity between the nodal areas within the study area and the region in general;
- Recommend non-motorised transport infrastructure to support current and anticipated pedestrian desire lines;
The following sub-sections set out the methodology and findings pertaining to the above requirements.

### 3.3.2 ROAD NETWORK

The Mpumalanga study area is located to the south of the N3 Freeway and is served by Provincial Road MR385 via the N3 Hammarsdale interchange as well as the N3 Cato Ridge interchange. The Provincial Road Network is shown in Figure 13.

![PROVINCIAL ROAD NETWORK (SOURCE: KZN DOT)](image)

The Mpumalanga Town and Hammarsdale area is served by MR385, linking to the N2 Hammarsdale and N2 Cato Ridge interchanges. No alternate access is provided to the corridor. As a result, development is constrained through a lack of access.

Providing a link from MR385 to the south of the N2 Freeway to the planned N2 Cato Ridge Logistics Hub interchange would allow for integration with the anticipated employment opportunities in the vicinity of Cato Ridge as well as provide additional access to the area as a whole.

The provision of a link from MR385 to the south of the N2 Freeway to the planned N2 Cato Ridge Logistics Hub interchange would require the provision of a mobility route, as it commonplace for only an arterial road to join onto a freeway interchange. Should the road link be provided, no direct access should be taken from the route, and intersection spacing of 600 metres should be applied.
3.3.3 Trip Generation

In order to derive the anticipated traffic flows associated with the Corridor, the location and extent of unique land use types were grouped into Traffic Analysis Zones (TAZ), thereby allowing the identification of site-specific traffic generation. The TAZ layout is shown in Figure 14.

FIGURE 14: TRAFFIC ANALYSIS ZONES
The land use bulks forming part of the Mpumalanga Functional Area Plan are shown below.

**TABLE 4: LAND USE BULKS (SOURCE: TPI)**

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Likely Bulks</th>
<th>GLA (sqm)</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial</td>
<td></td>
<td>148 000</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td></td>
<td>437 700</td>
<td></td>
</tr>
<tr>
<td>Agricultural</td>
<td></td>
<td>313 800</td>
<td></td>
</tr>
<tr>
<td>Industrial</td>
<td></td>
<td>598 600</td>
<td></td>
</tr>
<tr>
<td>Residential</td>
<td></td>
<td></td>
<td>6 111</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>1 498 100</td>
<td>6 111</td>
</tr>
</tbody>
</table>

* Industrial FAR = 0.5

The ETA Manual for Traffic Impact Assessments and Site Traffic Assessment was used to obtain the trip generation rates for the respective land use types. This manual also allows for the application of trip reduction factors associated with low car ownership and proximity to a public transport node and/or corridor. Taking the above into consideration, the trip generation potential of the current land use plan is shown in Table 5.

**TABLE 5: TRIP GENERATION**

<table>
<thead>
<tr>
<th>Development Area</th>
<th>Trip Generation (pcph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AM In</td>
</tr>
<tr>
<td>1</td>
<td>76</td>
</tr>
<tr>
<td>2</td>
<td>43</td>
</tr>
<tr>
<td>3</td>
<td>397</td>
</tr>
<tr>
<td>9</td>
<td>62</td>
</tr>
<tr>
<td>12</td>
<td>159</td>
</tr>
<tr>
<td>20</td>
<td>340</td>
</tr>
<tr>
<td>24</td>
<td>62</td>
</tr>
<tr>
<td>28</td>
<td>133</td>
</tr>
<tr>
<td>30</td>
<td>353</td>
</tr>
<tr>
<td>36</td>
<td>611</td>
</tr>
<tr>
<td>37</td>
<td>53</td>
</tr>
<tr>
<td>38</td>
<td>6</td>
</tr>
<tr>
<td>39</td>
<td>2</td>
</tr>
<tr>
<td>40</td>
<td>6</td>
</tr>
<tr>
<td>41</td>
<td>328</td>
</tr>
<tr>
<td>43</td>
<td>322</td>
</tr>
<tr>
<td>Total</td>
<td>2953</td>
</tr>
</tbody>
</table>
It is concluded that the land use bulks associated with the Mpumalanga Functional Area Plan would generate 5438 and 6275 vehicular trips during the respective Weekday AM and PM Peak Hours. The critical peak direction flow in the Weekday AM Peak Hour equals 2 953 vehicles per hour.

3.3.4 ROAD AND STREET NETWORK

In order to ensure proper road infrastructure serving the Mpumalanga area, it is essential that the roads master plan has a hierarchical structure, providing a mobility function to roads serving high traffic flows over longer distances, as well as having an access function for lower order roads where access roads and pedestrians are commonplace.

In order to achieve such a hierarchical structure, different road characteristics and parameters are defined for different road classes. Refer to Table 6.

**TABLE 6: ROAD CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Class Name</th>
<th>Function</th>
<th>Typical cross-section</th>
<th>Road Reserve Width</th>
<th>Intersection Spacing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>District Distributor</td>
<td>Mobility</td>
<td>3 lanes per direction</td>
<td>50m</td>
<td>600m</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2 lanes per direction</td>
<td>40m</td>
<td></td>
</tr>
<tr>
<td>Class 4</td>
<td>District Collector</td>
<td>Access</td>
<td>2 lanes per direction</td>
<td>30m</td>
<td>150m</td>
</tr>
<tr>
<td>Class 5</td>
<td>Access Road</td>
<td>Access</td>
<td>1 lane per direction</td>
<td>20m</td>
<td>100m</td>
</tr>
</tbody>
</table>

It is anticipated that the lands along MR385 east corridor will be incorporated into an urban planning scheme, which in turn would allow a road junction spacing of 600m (+- 20%) for urban areas.

The application of building line restrictions along different types of roads ensure that the inherent function of the road is supported. A wider building lie is therefore applied to higher order roads. Refer to Table 6.

The proposed road network required to provide sufficient capacity to service future land use developments are shown in Figure 15.

With reference to the proposed mixed use node west of Keystone Park, the level traffic assessment undertaken for the project has confirmed that the estimated development bulks within the area could be accommodated through the provision of one signalised intersection at the northern entrance and one left-in, left-out intersection at the southern entrance thereof. Nonetheless, in order to reduce the turning demand and associated turning lanes required, at the northern entrance, and to provide a higher level of access to the proposed mixed use node, it would be advantageous for both the intersections to be signalised intersections instead. It is recommended that a project be undertaken to assess the feasibility, alignment, safety and capacity of the proposed road junctions along the MR385 east corridor. In the event that this assessment indicates that any changes are needed to the road junctions and layout and/or that
this requires changes to the proposed land use bulks, this will need to be addressed as part of a review of the FAP.
FIGURE 15: ROAD AND STREET NETWORK
3.3.5 PUBLIC TRANSPORT NETWORK

3.3.5.1 RAIL NETWORK

Current Rail Operations

Mpumalanga is linked to Durban via the NatCor / New Main Rail Line. In PRASA’s network hierarchy this is a B-Corridor (“rail justified, although with a lower level of service”). The route is 71km long with 22 stops along the route. The train travels at an average speed of 35 km/hr, with the total travel time between Mpumalanga and Durban Station of almost two hours (source: Metrorail timetable, 2016).

There are 3 railway stations in the Mpumalanga study area:

- Georgedale is situated at the edge of low-income residential area, and rural agricultural land north of the station (approx. 1,000 passengers daily);
- KwaTandaza is situated centrally within the same low-income residential area (approx. 2,000 passengers daily);
- Hammarsdale is situated next to an industrial node north of the station, with low-income residential south and west of the station (approx. 2,000 passengers daily).

In total, the whole of the Mpumalanga study area serves approx. 5,000 rail passengers (source: Rail Census, 2008).

PRASA Metrorail currently runs some 15 trains per day per direction, 2 to 3 trains in the busiest peak hour direction, with an irregular 20 to 30 min headways in the AM-peak towards Durban. In contra-peak, towards Mpumalanga and Cato Ridge, the service is very infrequent with less than 1 train trip per hour. Off-peak service is very limited, with 1 train every 2 hours (source: Metrorail timetable, 2016). The infrastructure is owned by Transnet and they coordinate the operations. Generally, passenger trains have a certain level of priority in peak hours, where freight trains have priority off-peak.

There are no short-term possibilities to improve this train service, as additional rolling stock is not available and Transnet states there is limited spare rail capacity to run more trains.

In order to accommodate the New Town Centre, at the southern section of the MR385, it was suggested in the Mpumalanga Town Centre Precinct Plan (approved by council) to move the existing KwaTandaza Station, or develop a new station along the rail line, depending on acceptable station spacing. Developing a new station is technically challenging, as the rail line has a steep geometry, while a station requires a flat rail section.
Planned Medium/Long-term improvements of Rail infrastructure

PRASA has started a modernisation process for the entire rail network in eThekwini, including new rolling stock, upgrade of infrastructure and stations, and improved operations and service.

The first priority is on the A-corridor: Umlazi – Durban – KwaMashu, including Isipingo and the Bridge City rail extension, which coincides with the C2 corridor in eThekwini’s IRPTN plans. Although the modernisation process on the other rail corridors is not planned as yet, it is envisaged it would continue after 2020 on the B-corridors: North and South Coast Lines, the New Main Line to Cato Ridge, and thereafter on the C-corridors. The Cato Ridge Line, however, is owned by Transnet and would require negotiations for implementation of upgrades. As a result, currently, most of the infrastructure upgrades along the Cato Ridge Line are not planned for.

In the long-term, Transnet’s capacity for freight rail is limited, and a new freight corridor is suggested between (south of) Durban Port and the Cato Ridge area, with gentler curves and gradients. This infrastructure is only planned for well after 2030. The existing rail corridor would then function as a back-up route for freight services, and additional container and cargo shuttle trains between the Port and Cato Ridge.

After realising this new freight corridor, it is assumed that the existing rail corridor would come available for passenger service mostly. This would allow for PRASA’s Modernisation program, and ideally, the ownership of the line could then be transferred from Transnet to PRASA. This will be a lengthy and long-term process.

Then, as the corridor would mainly provide passenger rail operations, the maximum allowable gradient can be increased (2 or 3% is not uncommon for passenger trains). Developing a new station would require less of re-alignment, and therefore lower costs. This, however, will only be effective in the (very) long term.

In the interim period, the new Town Centre needs to be accessible by road-based PT (see next section) and improved pedestrian linkage between the existing KwaTandaza station and the new Town Centre (a distance of 1 km).

3.3.5.2 Bus and Taxi Network

Current Public Transport Operations

According to the Current Public Transport Record (source: CPTR, 2012), there is one main public transport facility in Mpumalanga: The Mpumalanga / Hammarsdale Rank (close to the Hammarsdale Railway Station), south of the industrial area. There are plans in place to improve passenger and informal traders’ facilities at this rank.

There are multiple smaller Public Transport facilities in and just outside the study area; in the CPTR called ‘rank’, but not much more than an on-street space as end-points of bus and minibus-taxi services, without any additional passenger facilities.
According to the CPTR there are bus routes, between Mpumalanga (and surrounding residential areas) and Pinetown. Furthermore, minibus-taxis offer services between Mpumalanga and:

- Cato Ridge in the northwest (also by rail), via the western section of the MR385;
- Inchanga, Hillcrest and Pinetown in the northeast, via the eastern section of the MR385;
- Surrounding residential areas in the south.

Each of these routes offers a decent PT service in peak hours, but an infrequent service off-peak. Given the current operations of buses and minibus-taxis, there is little opportunity to improve their service.

Although most areas fall outside of a 500 to 1000m radius from the nearest public transport facility, the PT services do pick-up and drop-off passengers along their route, and most of the study area is within walking distance of a public transport route, and therefore most of the study area is covered by Public Transport services. The area between the Mpumalanga residential development and the N3 is not covered by PT, but there are hardly any activities, apart from some farms.

Currently there are urban and industrial developments, recently implemented or planned, along the southern and eastern sections of the MR385. These are within walking distance of the current PT routes, and additional pedestrian links plus formal PT laybys are recommended in these development plans.

It is anticipated that the current Public Transport operators will increase their service frequency to accommodate the passengers to/from these developments. The relevant Transport Authority should support this service increase with sufficient additional Operating Licenses.

**Future PT Operations**

The eThekwini Transport Authority is planning a comprehensive IRPTN network. One of the corridors- C6-runs to the Outer West region between Durban – Pinetown – Mpumalanga. It is planned in the last phase, currently planned for 2027 (but current phasing is expected to get delayed). From the Mpumalanga Node at the new Town Centre, several Feeder and Complementary PT routes are planned to Cato Ridge and the residential areas in and around Mpumalanga.

It could be suggested to extend the IRPTN (BRT) route beyond the New Town Centre towards Cato Ridge. With this, there is a better connectivity between the existing railway stations and the surrounding residential areas, with the new Town Centre, Hammarsdale and other development areas.

**Proposed PT Lay-Byes**

The COTO TRH 26 – South African Road Classification and Access Management Manual dictates the type and location of public transport infrastructure allowed along different road classes, also taking into consideration road safety measures associated therewith. A summary of the allowable public transport infrastructure is shown in table 7 below.
Taking into consideration the MR385 corridor and surrounding land use parcels, it is envisaged that public transport lay-byes would be required downstream of each intersection along the corridor and serving each direction of travel. Refer to Figure 16 below.

### TABLE 7: PUBLIC TRANSPORT INFRASTRUCTURE

<table>
<thead>
<tr>
<th>Road Class</th>
<th>Direct Access to Property</th>
<th>Public Transport Stops</th>
<th>Pedestrian Walkways</th>
<th>Cycle Lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class 3</td>
<td>Not allowed</td>
<td>Yes, at intersections</td>
<td>Separated multi use pathway</td>
<td>Separated multi use pathway</td>
</tr>
<tr>
<td>Class 4</td>
<td>Yes, larger properties</td>
<td>Yes anywhere</td>
<td>Kerbside multi use pathway</td>
<td>Kerbside multi use pathway</td>
</tr>
<tr>
<td>Class 5</td>
<td>Yes</td>
<td>Yes anywhere, if applicable</td>
<td>Kerbside pedestrian walkway</td>
<td>Use roadway</td>
</tr>
</tbody>
</table>
3.3.6 **NON-MOTORISED TRANSPORT NETWORK**

Complete Streets is defined as roads designed to accommodate diverse modes, users and activities including walking, cycling, public transport, automobiles, nearby businesses and residents. Such street design helps create more multi-modal transport systems and more liveable communities.

The general principles associated with complete streets are as follows:

- Balance the needs of all users of the public right-of-way by providing safe and convenient travel and access for cyclists, public transport users and operators, heavy vehicle and car drivers, and people of all ages and abilities;
- Contribute to liveable communities by providing public open space that integrates amenities including street trees and landscaping, street and sidewalk lighting, public transport facilities, street furniture, water features, and public art work;
- Promote neighbourhood vitality through infrastructural improvements that attract private investment and encourage pedestrian activity;
- Promote active living by providing safe and attractive conditions for walking and biking.
- Provide safe and comfortable access for persons with disabilities;
- Improve local air quality by reducing car use (emissions) and incorporating trees and vegetation.
- Promote the use of public transport modes by improving the efficiency of public transport systems and creating safe, attractive walking environments;
- Enhanced by encouraging adjacent new development to contribute Complete Street amenities through applicable city development standards and incentive programs; and
- Within communities are designed to be integrated with a future comprehensive city-wide network of Complete Streets.

Taking the above into consideration, the proposed pedestrian network is shown in Figure 17 and the bicycle network in Figure 18 below.
FIGURE 17: PEDESTRIAN NETWORK
FIGURE 18: BICYCLE NETWORK
3.3.7 **Overall Precinct Accessibility and Mobility Framework**

The following figure is a summation of the overall Precinct Access and Mobility Framework. It includes the key elements from the previous figures.

![MAP]

**FIGURE 19: ACCESS AND MOBILITY FRAMEWORK**
3.4 Corridor Public Realm, Built Form and Landscaping Guidelines

3.4.1 Introduction

The overall objective is to develop a quality public realm with supportive urban structure, landscaping and built form that reinforces and supports the land use and activity pattern and the access and mobility system. Key elements include the following:

- Develop an integrated public space network that facilitates connectivity, accessibility, permeability and walkability, that structures and supports land use development and economic opportunities and that facilitates social interaction and engagement.
- Develop distinctive local character areas or neighbourhoods within the precinct that have a recognisable character and identity appropriate to their context.
- Encourage the development of responsive built form that engages positively with adjoining public spaces and streets and that provides focal points to improve the imageability and legibility of the urban structure and fabric.
- Promote the establishment of a supportive landscaping structure that reinforces the public space network and local character areas and provides improved legibility, visual and environmental amenity.

3.4.2 Integrated Public Space Network

The public space network is currently poorly developed and there is a lack of public spaces, pedestrian and cycling infrastructure within the precinct. The public space network is a critical backbone for: facilitating mobility, connectivity and accessibility; structuring land use development; and organising economic and social activities. There is accordingly a pressing need to invest in developing, enhancing and extending this network. The objective is to:

Develop an integrated public space network that facilitates connectivity, accessibility, permeability and walkability, that structures and supports land use development and economic opportunities and that facilitates social interaction and engagement.

The following guidelines have been identified with respect to the public space network:

- Protect and respect the existing open spaces and increase the quantity and usability of public open space.
- Provide a clearly defined continuum of open spaces ranging from general public space through to private open space (e.g. public parks to private to communal residential courtyards).
- All local roads and streets, squares, parks, river or stream systems, public transport terminals, ranks and stops should be integrated into an interconnected public space system.
- Develop an interconnected road and street network as the core of the public space network with appropriate pedestrian and cycling facilities.
- Develop focal public spaces within activity nodes and public transport hubs.
• Develop a fine-grained block structure in mixed use and more intensive residential areas to facilitate the permeability and walkability of the public space network.
• Encourage spatial definition along the edges of public spaces and streets to promote enclosure, positive spaces between buildings, etc.
• Parking should generally be provided to the rear of buildings to create a positive building / street interface.

3.4.3 ROAD AND STREET TYPOLOGIES
A number of road and street typologies have been identified as part of the public space and NMT network. These typologies have been informed by the SA Road Classification and Access Management Manual (RCAMM) and eThekwini’s Complete Streets Guidelines and have been refined to respond to the local context within the precinct area. The following street typologies have been identified (as reflected in the figure that follows):

Class U3: Minor Arterial
• Class U3a: Minor Arterial (50m road reserve)
• Class U3b: Minor Arterial (40m road reserve)

Class U4: Collector Street
• Class U4a: Commercial Collector Street (30m road reserve)
• Class U4b: Residential Collector Street (25m road reserve)
• Class U4c: Industrial Collector Street (30m road reserve)

Class U5: Local Street
• Class U5a: Commercial Local Street (20m road reserve)
• Class U5b: Residential Local Street (15m road reserve)
• Class U5c: Industrial Local Street (20m road reserve)

The table below outlines the guidelines for each of these typologies. These guidelines are indicative and road reserves and street configurations may vary along their length to address local conditions and will be subject to detailed design requirements. Road reserves may vary along the length of a route (typically by up to about 5m, or possibly even more, narrower or wider) to accommodate public transport infrastructure, traffic junctions, turning lanes, urban design / landscaping features, etc.

It should also be noted that, where adjustments are made to proposed road and street alignments within the precinct, this may influence the delineation of land use designations, e.g. more intensive uses are proposed along the main street linkages and less intensive uses are proposed adjacent to environmental areas.
## TABLE 8: ROAD AND STREET TYPOLOGIES

<table>
<thead>
<tr>
<th>Guidelines</th>
<th>Class U3a: Minor Arterial (MR385 north of Keystone)</th>
<th>Class U3b: Minor Arterial (MR385 south of Keystone)</th>
<th>Class U4a: Commercial Collector Street</th>
<th>Class U4b: Residential Collector Street</th>
<th>Class U4c: Industrial Collector Street</th>
<th>Class U5a: Commercial Local Street</th>
<th>Class U5b: Residential Local Street</th>
<th>Class U5c: Industrial Local Street</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Route Role, Function and Width</strong></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Linkage (Transport)</strong></td>
<td>Minor arterial providing main mobility, regional connectivity and priority public transport route</td>
<td>Minor arterial providing main mobility, regional connectivity and priority public transport route</td>
<td>Local distributor with a balance between connectivity and accessibility functions</td>
<td>Local distributor with a balance between connectivity and accessibility functions</td>
<td>Local distributor with a balance between connectivity and accessibility functions</td>
<td>Local activity street with a strong accessibility function</td>
<td>Local access street</td>
<td>Local access street</td>
</tr>
<tr>
<td><strong>Place (Land Use and Spatial)</strong></td>
<td>Predominantly economic function including mixed, logistics and industrial uses Gateway to Mpumalanga northern functional area</td>
<td>Predominantly economic function including mixed, logistics and industrial uses Gateway to Hammarsdale industrial area and Mpumalanga town centre precinct and township area</td>
<td>Activity street with commercial/mixed uses (vertical and horizontal) typically with active ground floor uses (retail, public facilities; etc.) and residential and offices on upper floors</td>
<td>Residential collector street with buildings overlooking street and supporting community facilities and amenities</td>
<td>Industrial collector street with general industrial, light industrial and logistics warehousing buildings and street landscaping</td>
<td>Local activity street with commercial/mixed uses (vertical and horizontal) typically with active ground floor uses (retail, public facilities; etc.) and residential and offices on upper floors</td>
<td>Residential access street with buildings overlooking street and supporting community facilities and amenities</td>
<td>Industrial access street with general industrial, light industrial and logistics warehousing buildings and street landscaping</td>
</tr>
<tr>
<td><strong>Typical Road Reserve Width</strong></td>
<td>50m</td>
<td>40m</td>
<td>30m</td>
<td>25m</td>
<td>30m</td>
<td>20m</td>
<td>15m</td>
<td>20m</td>
</tr>
<tr>
<td><strong>Roads, Traffic and Parking</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Traffic Lane Widths</strong></td>
<td>3.5m</td>
<td>3.5m</td>
<td>3.5m</td>
<td>3.5m</td>
<td>3.5m</td>
<td>3m</td>
<td>3m</td>
<td>3.5m</td>
</tr>
<tr>
<td><strong>Traffic Lane Number</strong></td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Typical Traffic Design Speed</strong></td>
<td>70km/hr</td>
<td>70km/hr</td>
<td>60km/hr</td>
<td>50km/hr</td>
<td>60km/hr</td>
<td>40km/hr</td>
<td>40km/hr</td>
<td>40km/hr</td>
</tr>
</tbody>
</table>
### PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR

#### PRECINCT PLAN: WARDS 4, 5, 7 AND 91

<table>
<thead>
<tr>
<th>Guidelines</th>
<th>Class U3a: Minor Arterial (MR385 north of Keystone)</th>
<th>Class U3b: Minor Arterial (MR385 south of Keystone)</th>
<th>Class U4a: Commercial Collector Street</th>
<th>Class U4b: Residential Collector Street</th>
<th>Class U4c: Industrial Collector Street</th>
<th>Class U5a: Commercial Local Street</th>
<th>Class U5b: Residential Local Street</th>
<th>Class U5c: Industrial Local Street</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Minimum Junction Spacing Requirements</strong></td>
<td>600m +/- 20% (urban signals, roundabouts &amp; priority)</td>
<td>600m +/- 20% (urban signals, roundabouts &amp; priority)</td>
<td>200m - 300m (urban signals, roundabouts &amp; priority)</td>
<td>150m - 250m (urban signals, roundabouts &amp; priority)</td>
<td>200m - 300m (urban signals, roundabouts &amp; priority)</td>
<td>150m - 250m (urban signals, roundabouts &amp; priority)</td>
<td>150m (urban signals) 75m - 150m (roundabouts &amp; priority)</td>
<td>150m - 250m (urban signals, roundabouts &amp; priority)</td>
</tr>
<tr>
<td><strong>Parking</strong></td>
<td>None</td>
<td>None</td>
<td>Off-Street</td>
<td>Off-Street</td>
<td>Off-Street</td>
<td>2.5m wide parking lane x 2</td>
<td>Off-Street</td>
<td>2.5m wide parking lane x 2</td>
</tr>
<tr>
<td><strong>Public Transport and NMT</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Public Transport</strong></td>
<td>BRT / bus and taxi trunk route</td>
<td>BRT / bus and taxi trunk route</td>
<td>PT feeder / taxi route</td>
<td>PT feeder / taxi route</td>
<td>PT feeder / taxi route</td>
<td>Taxi</td>
<td>Taxi</td>
<td>Taxi</td>
</tr>
<tr>
<td><strong>Non-Motorised Transport</strong></td>
<td>3m wide pedestrian / cycling multiway x 2</td>
<td>3m wide pedestrian / cycling multiway x 2</td>
<td>5m wide pedestrian / cycling multiway x 2</td>
<td>3m wide pedestrian / cycling multiway x 2</td>
<td>3m wide pedestrian / cycling multiway x 2</td>
<td>4m wide pedestrian / cycling multiway x 2</td>
<td>3m wide pedestrian / cycling multiway x 2</td>
<td>3m wide pedestrian / cycling multiway x 2</td>
</tr>
<tr>
<td><strong>Landscaping</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Central Median Landscaping / Right Turning Lanes</strong></td>
<td>3m wide landscaped central median / right turning lanes</td>
<td>3m wide landscaped central median / right turning lanes</td>
<td>1.5m wide landscaped central median</td>
<td>1.5m wide landscaped central median</td>
<td>1.5m wide landscaped central median</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td><strong>Roadway Edge Landscaping</strong></td>
<td>2m wide planter strip / physical barrier x 2</td>
<td>2m wide planter strip / physical barrier x 2</td>
<td>1m wide planter strip x 2</td>
<td>1m wide planter strip x 2</td>
<td>1m wide planter strip x 2</td>
<td>0.5m wide planter strip x 2</td>
<td>None (can be provided for additional landscaping)</td>
<td>0.5m wide planter strip x 2</td>
</tr>
<tr>
<td><strong>Road Verge Landscaping / Embankments / Left Turning Lanes</strong></td>
<td>8m wide road verge landscaping / left turning lanes x 2</td>
<td>6.5m wide road verge landscaping / left turning lanes x 2</td>
<td>1m wide road verge landscaping x 2</td>
<td>0.5m wide road verge landscaping / left turning lanes x 2</td>
<td>3m wide road verge landscaping / left turning lanes x 2</td>
<td>None</td>
<td>1.5m wide road verge landscaping x 2</td>
<td>0.5m wide road verge landscaping x 2</td>
</tr>
<tr>
<td><strong>Land Use and Built Form</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Guidelines</td>
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<td>Class U5c: Industrial Local Street</td>
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<tr>
<td>Building Typologies</td>
<td>Logistics - 1-3 storey logistics, light industrial and warehousing buildings MUMI - 2-4/5 storey walk-up buildings; vertical or horizontal mix of land uses with a target of 30% residential</td>
<td>Logistics - 1-3 storey logistics, light industrial and warehousing buildings MUMI - 2-4/5 storey walk-up buildings; vertical or horizontal mix of land uses with a target of 30% residential</td>
<td>MUMI - 2-4/5 storey walk-up buildings; vertical or horizontal mix of land uses with a target of 30% residential</td>
<td>RMI - 2-3 storey duplex, row house or townhouse; attached and semi-detached buildings with shared street frontages and private gardens or backyards</td>
<td>GI - medium to large scale general industrial and warehousing buildings</td>
<td>GI - medium to large scale general industrial and warehousing buildings</td>
<td>MUMI - 2-4/5 storey walk-up buildings; vertical or horizontal mix of land uses with a target of 30% residential</td>
<td>RMI - 2-3 storey duplex, row house or townhouse; attached and semi-detached buildings with shared street frontages and private gardens or backyards</td>
</tr>
<tr>
<td></td>
<td>development MUMI - Mixed Use Medium Impact</td>
<td>development MUMI - Mixed Use Medium Impact MULI - Mixed Use Low Impact GI - General Industrial</td>
<td></td>
<td>RMI - 2-3 storey duplex, row house or townhouse; attached and semi-detached buildings with shared street frontages and private gardens or backyards</td>
<td></td>
<td></td>
<td></td>
<td>GI - medium to large scale general and warehousing buildings</td>
</tr>
<tr>
<td>Guidelines</td>
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</tr>
<tr>
<td>Densities</td>
<td>Logistics - 0.7 FAR MUMI - 1 FAR</td>
<td>Logistics - 0.7 FAR MUMI - 1 FAR</td>
<td>Logistics - 0.7 FAR</td>
<td>Logistics - 0.7 FAR MUMI - 1 FAR</td>
<td>Logistics - 0.7 FAR RLI - 0.7 FAR</td>
<td>Logistics - 0.7 FAR</td>
<td>Logistics - 0.7 FAR</td>
<td>Logistics - 0.7 FAR</td>
</tr>
<tr>
<td>Building Lines</td>
<td>5m to 10m</td>
<td>5m to 10m</td>
<td>0m (but with some setbacks to create wider public spaces along the street)</td>
<td>0m to 10m</td>
<td>0m (but with some setbacks to create wider public spaces along the street)</td>
<td>0m to 5m (to encourage street definition and spatial variety)</td>
<td>0m to 10m (to encourage street definition and spatial variety)</td>
<td>0m to 10m</td>
</tr>
<tr>
<td>Street Section Profile / Ratio</td>
<td>1:5 to 1:7</td>
<td>1:4 to 1:6</td>
<td>1:2 to 1:3 (to spatially define streets)</td>
<td>1:2.5 to 1:4 (to spatially define streets)</td>
<td>1:3 to 1:5 (to spatially define streets)</td>
<td>1:1.5 to 1:3 (to spatially define streets)</td>
<td>1:2 to 1:4 (to spatially define streets)</td>
<td>1:3 to 1:5 (to spatially define streets)</td>
</tr>
</tbody>
</table>
FIGURE 20: ROAD AND STREET TYPOLOGIES INCLUDING LOCATIONS OF STREET SECTIONS
FIGURE 21: TYPICAL CROSS-SECTION FOR CLASS U3B – MINOR ARTERIAL (MR385 SOUTH OF KEYSTONE PARK)

FIGURE 22: TYPICAL CROSS-SECTION FOR CLASS U4A – COMMERCIAL / MIXED USE COLLECTOR STREET
FIGURE 23: TYPICAL CROSS-SECTION FOR CLASS U4B – RESIDENTIAL COLLECTOR STREET

FIGURE 24: TYPICAL CROSS-SECTION FOR CLASS U4C – INDUSTRIAL COLLECTOR STREET
FIGURE 25: TYPICAL CROSS-SECTION FOR CLASS U5A – COMMERCIAL / MIXED USE LOCAL STREET

FIGURE 26: TYPICAL CROSS-SECTION FOR CLASS U5B – RESIDENTIAL LOCAL STREET
FIGURE 27: TYPICAL CROSS-SECTION FOR CLASS USC – INDUSTRIAL LOCAL STREET
3.4.4 DISTINCTIVE LOCAL CHARACTER AREAS

The different land use areas within the precinct tend to have a relatively uniform character with limited variation and differentiation. The objective is accordingly to:

*Develop distinctive local character areas or neighbourhoods within the precinct that have a recognisable character and identity appropriate to their context.*

The following guidelines have been identified with respect to local character areas:

- Develop distinctive local character areas with a supportive urban structure and recognisable character and identity appropriate to their context.
- Develop recognisable and distinctive neighbourhoods in residential areas structured around public spaces, facilities and amenities.
- Develop intensive mixed-use areas structured around public transport hubs and along activity spines.
- Develop accessible and well-serviced industrial areas and business estates with a range of site sizes to support a suitable diversity of industrial, logistics and business uses appropriate to the context.

The development of future residential areas, mixed use nodes and/or industrial/business parks in different parts of the study area as set out under the Land Use and Activity Framework will need to be guided by appropriate urban design guidelines to ensure that both the built form and landscape can be designed to facilitate the creation of human-scale, attractive, safe and integrated human settlements.

3.4.4.1 RESIDENTIAL AREAS

**Layout and Character (Block and Subdivision Layout and Land Use)**

1. Residential areas should be designed as *neighbourhoods that form part of an identifiable “village”* (urban or suburban) and which has a distinctive character. The character should be determined by the type and scale of streets, mix of building typology, landscaping, and by a mix of residential densities.
2. The character of residential areas/neighbourhoods or parts thereof should reflect the location of the neighbourhood in the precinct in which it is situated, and it should display clearly its urban and/or suburban features.
3. Residential areas should be structured by a hierarchical road and pedestrian network.
4. The structure of residential areas should be articulated by the location of community facilities and public places in central and / or accessible locations that provide landmarks and legibility to the neighbourhood.
5. The structure of residential areas should be articulated by the shape, extent and potential use of the proposed open space network of the precinct within which it falls, i.e. active open space or natural open space.
6. Higher density areas should be located in and around mixed-use nodes and along public transport routes. Lower density areas should be located adjacent to rivers, streams and valleys, on steeper slopes, i.e. adjacent to the proposed open space system. Densities should align with the Land Use and Activity Framework and be sensitive to the local context, available infrastructure and services, etc.

7. The layout of residential areas should respond clearly to important view sheds and vistas.

8. Wherever possible existing vegetation or distinctive site features should be incorporated into the layout of the area. Landscaping should be indigenous in keeping with the sub-tropical character of the area.

Public Realm

1. Streets, squares and parks should generally be treated as part of the overall open space system to provide linkage and structure to neighbourhoods.

2. Lower order streets and streets serving higher densities should be designed as multifunctional spaces to accommodate parking, play spaces, etc.

3. Streets and spaces should accommodate pedestrian activity in accordance with the role of the road/street in the overall precinct movement network.

4. Streets and public spaces should incorporate facilities for public transport and provision for disabled persons.

5. Landscaping should provide protection from climatic conditions of wind and sun and create street character and identity.

6. Lighting should be commensurate with the function of a street and/or public space.

7. Access and circulation networks and infrastructure for pedestrians and vehicles should be clearly differentiated.

8. Pedestrian route design should be integrated with overall neighbourhood design to ensure comfort and convenience for pedestrians and appropriate linkage with surrounding neighbourhoods.

Built Form

1. Building massing, and hence density, should conform to the density distribution guidelines in the Land Use and Activity Framework and the Built Form Typologies and be responsive to local circumstances.

2. Built form in higher density areas should be medium rise in accordance with location to other uses and activities in the area and should be used to define the character of the neighbourhood.

3. Building frontages, particularly in medium and higher density typologies, should contribute to the public nature of the streetscape. This can be accomplished through locating entrances at street level and through ensuring maximum surveillance of the street from units facing the street.

4. Building forms (in conjunction with the use of appropriate material, colours and textures) should be articulated and modulated to ensure a human scale and to merge in with the surrounding landscape.
5. Built form in low density areas should be conceived of as “elements in the landscape” and should be unobtrusive in terms of massing, colours and materials.

3.4.4.2 MIXED USE ACTIVITY NODES AND SPINES

Layout and Character (Block and Subdivision Layout and Land Use)

1. Nodes should be designed and developed as “village or town centres” that display an integrated and cohesive character including a “high street”, public squares and spaces, fine grain block and subdivision pattern, fine grain building scale, identifiable townscape/landscape character, extensive tree planting, high levels of pedestrian orientation, mixes of building type and activity, including residential, and provision for public transport. The character should reflect its role in the municipal area and/or the surrounding settlement, i.e. urban, local, etc.

2. Node developments should include a landmark element(s) that indicates its location in the district or neighbourhood in which it is located. This could be in the form of an appropriately scaled tower building, flagpole or gateway structure/feature.

3. Node gateways/entrances should be clearly visible and celebrated through the use of landmark landscaping elements (planting or structural) and/or through the appropriate siting of buildings.

4. Node edges should include interfaces that are integrated with and sympathetic to surrounding residential areas in terms of access and movement, scale of built form and scale and type of landscaping.

5. Edges and interfaces with limited access roads should be landscaped and/or architecturally treated to contribute to the experience of the road users. No service areas should face on to these roads unless adequately and appropriately screened.

6. Service areas should be hidden from view and should not impact on public spaces or on adjacent development or roads by way of noise, visual intrusion, smell, etc.

7. Views lines in and out of the node onto landmark features or of special features/viewsheds of the node or of its surroundings should be accommodated in the layout of the node so as to encourage integration with the surroundings.

8. Land use mixes should reflect the role and hierarchy of the node.

9. Wherever possible existing vegetation or distinctive site features should be incorporated into the layout of the node. Landscaping should be indigenous in keeping with the sub-tropical character of the area.

Public Realm

1. Streets, squares and parks should generally be treated as part of an integrated open space system to provide “linkage and structure” to the node, but also as the spaces in which public life occurs.

2. Streets and spaces should accommodate pedestrian activity in accordance with the role of the road/street in the overall precinct movement network.
3. Streets and public spaces should incorporate facilities for public transport and provision for disabled persons.

4. Hard (square) and soft (parks) public spaces and parking areas should be designed as focal points within the open space system linked together with streets as part of the overall public space system.

5. Street and public place design including landscaping should reflect a community/public character and scale.

6. Landscaping should provide protection from climatic conditions of wind and sun and create street character and identity.

7. Lighting should be commensurate with the function of a street and/or public space.

8. Access and circulation networks and infrastructure for pedestrians and vehicles should be clearly differentiated. Pedestrian routes should be designed to ensure comfort and convenience for pedestrians and should not be provided as an afterthought.

9. Pedestrian movement should be integrated with surrounding areas and landscaping should contribute to movement hierarchy and to protection from sun and wind and should contribute to safety and security through lighting and appropriate route location.

10. Parking areas should be integrated with the node fabric as public space. They should be landscaped to prevent heat build-up, to attenuate storm water and to integrate building clusters.

**Built Form**

1. Built form in nodes should be concentrated and compact so as to define public spaces and places between them and so as to convey their public status in the landscape.

2. Built form should be fine “grain” and human scale – either as a collection of small buildings grouped tightly together or as larger buildings with fine grain modulation of facades and elevations.

3. Buildings should accentuate the role and character of the node with respect to scale and building typology.

4. Building massing and its articulation should be used to integrate nodes with surrounding residential areas. There should be no “back of building” conditions.

5. Built form should be used to articulate and/or celebrate gateways and intersections and should provide landmark features within the overall settlement fabric.

6. Ground floor uses of buildings should be pedestrian oriented uses that provide interest, generate street activity and ensure surveillance of the street or public place onto which they face.

7. Roofs should be integrated with surrounding buildings and environments in terms of shapes and sizes, elevations, colours and textures so as to create an unobtrusive but interesting contribution to the landscape/streetscape.
3.4.4.3 **Industrial Areas/Business Parks**

**Layout and Character (Block and Subdivision Layout and Land Use)**

1. Industrial areas/business parks should be designed and developed to display an integrated and cohesive character. The character should reflect its role in the municipal area and/or the surrounding settlement, i.e. urban, local, etc.

2. Although industrial areas/business parks will predominantly consist of general industrial, light industrial, warehousing, logistics and office uses, it should also accommodate other support uses, including commercial, recreation, social and high density residential components, to create an environment that meets a range of employees’ needs (e.g. restaurants, shops, child care facilities, gyms/recreation centres), facilitates a more vibrant atmosphere, and allows for 24 hour use of the area, improving security and safety.

3. Industrial area/business park layout should provide for human-scale public squares and spaces, a fine grain block and subdivision pattern, fine grain building scale, identifiable townscape/landscape character, extensive tree planting/landscaping, high levels of pedestrian orientation, mixes of building type and activity, including residential, and provision for public transport.

4. Industrial area/business park developments should include a landmark element(s) that indicates its location in the district or neighbourhood in which it is located. This could be in the form of an appropriately scaled tower building, flagpole or gateway structure/feature.

5. Industrial area/business park gateways/entrances should be clearly visible and celebrated through the use of landmark landscaping elements (planting or structural) and/or through the appropriate siting of buildings.

6. Wherever possible existing vegetation or distinctive site features should be incorporated into the layout of the industrial area/business park. Landscaping should be indigenous in keeping with the sub-tropical character of the area.

7. Industrial area/business park edges should be integrated with, and sympathetic to, surrounding and internal residential areas and developments in terms of access and movement, scale of built form, and scale and type of landscaping.

8. Site design should ensure compatible transition from light industrial/warehousing uses to less intensive land uses, using streets, landscape features, open space/recreation areas or landscaping to effectively buffer uses.

9. Sites used for light industrial and warehousing purposes should be orientated towards access roads and should not be accessible through residential streets.

10. Edges and interfaces with limited access roads (e.g. N3/MR385) should be landscaped and/or architecturally treated to reduce visual impact and contribute to the experience of the road users. No service areas should face on to these roads unless adequately and appropriately screened.

11. Service areas should be hidden from view and should not impact on public spaces or on adjacent development or roads by way of noise, visual intrusion, odour, etc.
12. Views lines in and out of the industrial area/business park onto landmark features or of special features/viewsheds of the industrial area/business park or of its surroundings should be accommodated in the layout of the industrial area/business park so as to encourage integration with the surroundings.

13. A mix of site sizes should be provided to allow for a range of development options.

14. A land use mixes on large sites should be encouraged to blend industrial, warehouse and office uses with supporting uses creating a more human-scale and employee-friendly environment (multi-purposed facilities).

**Public Realm**

1. Streets, squares and parks should generally be treated as part of an integrated open space system to provide “linkage and structure” to the node, but also as the spaces in which public life occurs.

2. Streets and spaces should accommodate pedestrian activity in accordance with the role of the road/street in the overall precinct movement network.

3. Streets and public spaces should incorporate facilities for public transport and provision for disabled persons.

4. Hard (square) and soft (parks) public spaces and parking areas should be designed as focal points within the open space system linked together with streets as part of the overall public space system.

5. Street and public place design including landscaping should reflect a community/public character and human scale.

6. Landscaping should provide protection from climatic conditions of wind and sun and create street character and identity.

7. Lighting should be commensurate with the function of a street and/or public space.

8. Access and circulation networks and infrastructure for pedestrians and vehicles should be clearly differentiated. Pedestrian movement should be integrated with surrounding areas, and pedestrian routes should be designed to ensure comfort and convenience for pedestrians and should not be provided as an afterthought.

9. Landscaping should contribute to the movement hierarchy, to protection of pedestrians from sun and wind and should contribute to safety and security through lighting and appropriate route location.

10. Public parking areas should be integrated with the industrial area/business park developments as public space. They should be landscaped to prevent heat build-up, to attenuate storm water and to integrate building clusters. Extensive parking areas in front of buildings should be broken up into smaller components and/or placed behind buildings to improve the human scale and the integration of elements within the industrial area/business park.
**Built Form**

1. Built form in industrial areas/business parks should be as concentrated and compact as possible (within the limitations of the type of use) so as to define public spaces and places between them, and to create a human scale.

2. Built form should be fine “grain” and human scale – either as a collection of small buildings grouped tightly together or as larger buildings with fine grain modulation of facades and elevations.

3. Buildings should accentuate the role and character of the industrial area/business park through building design, scale and typology.

4. Built form should be used to articulate and/or celebrate gateways and intersections and should provide landmark features within the overall settlement fabric.

5. Building orientation and massing should be used to integrate the industrial area/business park with surrounding residential areas and other uses. Large and bulky industrial buildings and ancillary structures should be oriented away from residential development/areas to avoid a negative visual impact.

6. A back-to-back relationship between light industrial and residential buildings is preferable where transitional uses are not in place but may require substantial screening of unsightly views to ensure compatibility.

7. Buildings (including main entrances and pedestrian access) should be oriented towards the street. There should be no “back of building” conditions, or if this is unavoidable appropriate screening should be used to ensure no negative visual impact to adjacent uses.

8. Any ground floor uses of commercial or mixed-use buildings should be pedestrian oriented uses that provide interest, generate street activity and ensure surveillance of the street or public place onto which they face.

9. Roofs should be integrated with surrounding buildings and environments in terms of shapes and sizes, elevations, colours and textures so as to create an unobtrusive but interesting contribution to the landscape/streetscape.

**3.4.5 Responsive Built Form**

Built form currently tends to be developed to meet internal site and development requirements and generally does not engage positively with adjoining public spaces and streets. Examples include the significant setback of buildings from street edges, parking areas and security fencing along streets and the resulting poor definition and quality of the public realm. The objective is accordingly to:

*Encourage the development of responsive built form that engages positively with adjoining public spaces and streets and that provides focal points to improve the imageability and legibility of the urban structure and fabric.*

The following guidelines have been identified with respect to built form:
• Provide for a range of housing, community and business needs within buildings that accommodate these needs and can adapt to changing needs over time.
• Provide for a diversity of built form typologies, boundary treatments and streetscapes to create legible, varied and attractive streetscapes and urban environments.
• Ensure efficiency in the use of urban land and services, including higher densities, narrower frontages, short service runs, medium rise building heights (i.e. lifts and associated costs not required), etc.
• Encourage buildings to spatially define adjoining streets and enclose public space to make them vibrant, safe and secure.
• Promote responsive ground floor uses along street edges, including active uses such as retail in mixed use areas, and passive surveillance from upper floors.
• Provide pedestrian access to buildings from the street.
• Promote high quality building frontage design, including materials, façade articulation, etc.
• Establish gateways, landmarks and focal points in the precinct and priority action areas that structure space and provide imageability, legibility, orientation and meaning.
• Future public facilities should be sited and designed to create new landmarks and focal points through the use of appropriate building heights/accents, materials, changes in landscaping treatments, more generous public spaces at entrances, etc.
• Respond appropriately to the topography to ensure that buildings relate to the street level and avoid substantial embankments that increase development costs and create barriers to spatial integration.
• Encourage developments and buildings to integrate sustainable features into their design to minimise energy use, resource consumption, waste generation and maintenance requirements and to optimise the use of natural sunlight, daylight, rainwater, etc. Such approaches include solar water heaters, passive solar design, energy efficient lighting, rainwater harvesting tanks, sustainable drainage systems, on-site food gardens, etc.
• Encourage buildings to be adaptable to changing land uses and socio-economic needs, particularly in mixed use nodes and along activity spines.
• Avoid the use of security fencing along building frontages, particularly in mixed use areas.
• Provide on-site parking to the rear of buildings.

3.4.5.1 BUILT FORM TYPOLoGEs
A number of built form typologies have been identified for the precinct. These typologies have been informed by the typologies identified in the Mpumalanga FAP and have been refined to respond to the local context within the precinct area. The following built form typologies have been identified:

Residential Typologies:
• Residential Medium Impact
• Residential Low Impact

Mixed Use Typologies:
- Mixed Use Medium Impact
- Mixed Use Low Impact

Industrial Typologies:
- General Industry
- Light Industry
- Logistics

Table 9 outlines the guidelines for each of these typologies. These guidelines are indicative and a range of built form types and conditions should be encouraged that respond to the local context and site-specific features. This variety should, however, be encouraged without undermining the creation of a desirable spatial form and local character for each area and public street.
### TABLE 9: BUILT FORM TYPOLOGIES

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>AREAS / LOCATION</th>
<th>NET DENSITY RANGE</th>
<th>BUILT FORM TYPOLOGY AND GUIDELINES</th>
<th>POTENTIAL BUILT FORM RESPONSES</th>
<th>TARGET USER GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural/Traditional Residential</td>
<td>Sankontshe (western) Mophela (north)</td>
<td>1 to 15 du/ha</td>
<td><strong>1-2 storey detached</strong> single residential houses. Larger sites for agricultural use. <strong>Serviced plots for incremental housing</strong> – extendable or adaptable units. In-situ upgrading; flexible layout; various typologies; multi-family units. Cluster units where possible and integrate with landscape context.</td>
<td>A range of income groups from R1,500pm upwards. BNG, GAP, middle income. Mostly existing population, including new household formation.</td>
<td></td>
</tr>
<tr>
<td>Transitiona l Settlement</td>
<td>Mpumalanga, Ezintendeni, Thandaza Georgedale Sankontshe (eastern)</td>
<td>15 to 40 du/ha</td>
<td>**1-2 storey detached, semi-detached and row house type single residential houses with frontage onto the street, or panhandle, and private backyard. <strong>Serviced plots for incremental housing</strong> – extendable or adaptable units. Ongoing upgrading of settlements by providing access roads, sidewalks, public spaces and facilities, infrastructure, etc.</td>
<td>A range of income groups from R1,500pm upwards. BNG, GAP, middle income. Mostly existing population, including new household formation, new households from the broader Mpumalanga area.</td>
<td></td>
</tr>
<tr>
<td>LAND USE</td>
<td>AREAS / LOCATION</td>
<td>NET DENSITY RANGE</td>
<td>BUILT FORM TYPOLOGY AND GUIDELINES</td>
<td>POTENTIAL BUILT FORM RESPONSES</td>
<td>TARGET USER GROUP</td>
</tr>
<tr>
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</tr>
<tr>
<td>Residential Low Impact</td>
<td>Mpumalanga, Hammarsdale, Moya Georgedale, Hammers Estate Priority Action Area 5</td>
<td>10 to 20 du/ha</td>
<td><strong>1-2 storey detached and semi-detached</strong> single residential houses. Medium to wide frontage onto street, or panhandle, with private backyard. Buildings to integrate with landscape and streetscape context in terms of siting, design, landscaping, etc.</td>
<td>![Image of built forms]</td>
<td>A range of income groups from R1,500pm upwards. BNG, GAP, middle income, high income. New household formation from existing settlements, new households from the broader Mpumalanga area, new Mpumalanga residents from outside the area attracted by local job opportunities.</td>
</tr>
<tr>
<td>Residential Medium Impact</td>
<td>Mpumalanga Town Centre, Hammarsdale Mini Town Camperdown Rural, including Bartlett Estate and</td>
<td>20 to 40 du/ha</td>
<td><strong>2-3 storey duplex, row house or townhouse.</strong> Attached and semi-detached buildings with shared street frontages and private gardens or backyards. Buildings to respond positively to the adjoining streets by creating spatial definition, street access and activity, passive</td>
<td>![Image of built forms]</td>
<td>A range of income groups from R1,500pm upwards. BNG, GAP, middle income, high income. New household formation from existing settlements, new households from the broader Mpumalanga area, new Mpumalanga residents from outside the area attracted by local job opportunities.</td>
</tr>
<tr>
<td>LAND USE</td>
<td>AREAS / LOCATION</td>
<td>NET DENSITY RANGE</td>
<td>BUILT FORM TYPOLOGY AND GUIDELINES</td>
<td>POTENTIAL BUILT FORM RESPONSES</td>
<td>TARGET USER GROUP</td>
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<tr>
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</tr>
<tr>
<td>Residential High Impact</td>
<td>Mpumalanga Town Centre</td>
<td>40 to 80 du/ha</td>
<td>2-4/5 storey walk-up apartments. Buildings to respond positively to the adjoining streets by creating spatial definition, street access and activity, passive surveillance, quality street frontages, etc.</td>
<td></td>
<td>A range of income groups from R1,500pm upwards, including BNG, social, GAP, middle income.</td>
</tr>
<tr>
<td>Mixed Use Low Impact</td>
<td>Mpumalanga Town Centre Mixed use areas along MR385 corridor Priority Action Area 4</td>
<td>0.5 FAR 20 to 60 du/ha</td>
<td>2-4 storey walk-up buildings with minimum 50% residential. Buildings to respond positively to the adjoining streets by creating spatial definition, street access and activity, passive surveillance, quality street frontages, etc.</td>
<td></td>
<td>A range of income groups from R1,500pm upwards, including social, GAP, middle income. Local shops, retail services, offices, etc. providing skilled, semi-skilled and unskilled jobs to the local and surrounding areas.</td>
</tr>
<tr>
<td>LAND USE</td>
<td>AREAS / LOCATION</td>
<td>NET DENSITY RANGE</td>
<td>BUILT FORM TYPOLOGY AND GUIDELINES</td>
<td>POTENTIAL BUILT FORM RESPONSES</td>
<td>TARGET USER GROUP</td>
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</tr>
<tr>
<td>Mixed Use Medium Impact</td>
<td>Mpumalanga Town Centre Mixed use hubs along MR385 corridor Priority Action Area 4</td>
<td>1.0 FAR 40 to 80 du/ha</td>
<td>2-4 storey walk-up buildings. Vertical or horizontal mix of land uses with a target of 30% residential. Buildings to respond positively to the adjoining streets by creating spatial definition, street access and activity, passive surveillance, quality street frontages, etc.</td>
<td>A range of income groups from R1,500pm upwards, including social, GAP, middle income. Local shops, retail services, offices, etc. providing skilled, semi-skilled and unskilled jobs to the local and surrounding areas.</td>
<td></td>
</tr>
<tr>
<td>Mixed Use Core</td>
<td>Mpumalanga Town Centre</td>
<td>1.5 FAR 60 to 100 du/ha</td>
<td>2-4 storey walk-up buildings with vertical mix of land uses with commercial on ground level and office space and mix of up to 25% residential above. Buildings to respond positively to the adjoining streets by creating spatial definition, street access and activity, passive surveillance, quality street frontages, etc.</td>
<td>A range of income groups from R1,500pm upwards, including social, GAP, middle income. Local shops, retail services, offices, etc. providing skilled, semi-skilled and unskilled jobs to the local and surrounding areas.</td>
<td></td>
</tr>
</tbody>
</table>
### PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR
**PRECINCT PLAN: WARDS 4, 5, 7 AND 91**

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>AREAS / LOCATION</th>
<th>NET DENSITY RANGE</th>
<th>BUILT FORM TYPOLOGY AND GUIDELINES</th>
<th>POTENTIAL BUILT FORM RESPONSES</th>
<th>TARGET USER GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Light Industry</strong></td>
<td>Hammarsdale industrial area Light industrial area along MR385 western corridor Priority Action Area 3</td>
<td>1.0 FAR</td>
<td>Low to medium impact industrial and business development, including low impact manufacturing and warehousing ranging from small to medium scale industrial buildings. Well-structured and landscaped developments integrated with landscape / streetscape and open space system context. Use of built form articulation, colour, materials, etc. to break up the building mass together with well-designed street frontages and clear entrance treatments. Sustainable design approaches, such as passive solar, rainwater harvesting, SuDS, etc.</td>
<td><img src="image" alt="Diagram" /></td>
<td>Local manufacturers, mini-factories, business incubator units, etc. providing skilled and semi-skilled jobs to the local and surrounding areas.</td>
</tr>
<tr>
<td>LAND USE</td>
<td>AREAS / LOCATION</td>
<td>NET DENSITY RANGE</td>
<td>BUILT FORM TYPOLOGY AND GUIDELINES</td>
<td>POTENTIAL BUILT FORM RESPONSES</td>
<td>TARGET USER GROUP</td>
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</tr>
<tr>
<td>General Industry</td>
<td>Hammarsdale and Sterkspruit industrial areas Priority Action Area 2 and 3</td>
<td>1.5 FAR</td>
<td>Medium to high impact industrial development, including general, light and service industry and business buildings ranging from medium to large scale industrial buildings. Well-structured and landscaped developments integrated with landscape/streetscape and open space system context. Use of built form articulation, colour, materials, etc. to break up the building mass together with well-designed street frontages and clear entrance treatments. Sustainable design approaches, such as passive solar, rainwater harvesting, SuDS, etc.</td>
<td><img src="image1.png" alt="Image" /> <img src="image2.png" alt="Image" /> <img src="image3.png" alt="Image" /> <img src="image4.png" alt="Image" /> <img src="image5.png" alt="Image" /> <img src="image6.png" alt="Image" /> <img src="image7.png" alt="Image" /> <img src="image8.png" alt="Image" /> <img src="image9.png" alt="Image" /> <img src="image10.png" alt="Image" /></td>
<td>Local manufacturers, mini-factories, business incubator units, etc. providing skilled and semi-skilled jobs to the local and surrounding areas.</td>
</tr>
<tr>
<td>Logistics</td>
<td>Keystone Park logistics area</td>
<td>0.7 FAR</td>
<td>Low impact logistics, light industrial and warehousing development ranging from large to very large warehousing buildings. Well-structured and landscaped developments integrated with landscape/streetscape and open space system context.</td>
<td><img src="image11.png" alt="Image" /> <img src="image12.png" alt="Image" /> <img src="image13.png" alt="Image" /></td>
<td>Local, regional and national logistics and distribution warehousing providing skilled and semi-skilled jobs to the local and surrounding areas.</td>
</tr>
<tr>
<td>LAND USE</td>
<td>AREAS / LOCATION</td>
<td>NET DENSITY RANGE</td>
<td>BUILT FORM TYPOLOGY AND GUIDELINES</td>
<td>POTENTIAL BUILT FORM RESPONSES</td>
<td>TARGET USER GROUP</td>
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<tr>
<td></td>
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<td>streetscape and open space context. Use of built form articulation, colour, materials, etc. to break up the building mass together with well-designed street frontages and clear entrance treatments. Sustainable design approaches, such as passive solar, rainwater harvesting, SuDS, etc.</td>
<td><img src="image1.jpg" alt="Images" /> <img src="image2.jpg" alt="Images" /></td>
<td></td>
</tr>
</tbody>
</table>
3.4.6 SUPPORTIVE LANDSCAPING STRUCTURE

Landscaping is the physical modification of the outdoors to serve the needs of people (EPCPD, 2009). There is limited landscaping within the precinct. In addition, natural systems within and flowing through the precinct are in a poor condition and not effectively integrated into the living and working environment in any meaningful way. This situation impacts negatively on legibility, visual, amenity and recreational amenity value of the precinct. The objective is to reverse this situation by giving effect to the following objective:

To enhance the living and working environment by establishing a landscaping structure that improves and integrates the natural open space systems into the public space network, serves to emphasize local character areas and provides improved legibility, visual and recreational amenity.

Key considerations in landscaping include the creation of aesthetically pleasing, cost effective, functional, low maintenance and environmentally sound landscapes. The following guidance draws on the Green Landscaping Guideline (EPCPD, 2009). In the interests of sustainability, the guidance promotes maintenance, efficiency and environmental functionality through the following principles and supporting objectives. The EPCPD guidelines provide more detailed approaches, methods, products to implement the following guiding principles and are therefore a key resource. Specific recommendations are provided for each in terms of the Precinct context:

- **Ecosystem Design** – Involves designing landscapes so that the functional ecosystems are created and/or enhanced. To do so, the landscapes must principally include: 1. Core Areas – largely natural, functional in terms of ecosystem service supply e.g. a conservation area in a macro landscape or a wetland in a micro landscape or a wetland in a micro scale landscape; 2. Greenway Corridors – linear or linking zones between core areas. In the precinct the core areas are the grassland and bushveld areas and the corridors are Sterkspruit River and associated stream and wetland systems running through and across the precinct. The EPCPD (2009) provide additional guidance for identifying and integrating these systems as well as their rehabilitation and maintenance.

- **Design with Nature for People** – Avoid degrading or altering existing functional natural systems – natural systems should be the foundational feature (starting point) and be used to positively add value to the landscaping framework. Integrate natural systems into design to promote and make use of the services they provide such as storm water attenuation and water quality amelioration, rather than using hard infrastructure and services. This is particularly relevant given the likely increase in hardened surfaces (such as the Mr price logistics facility) and effluent in the area arising from increased urban development, and the river streams associated with the Sterkspruit River running across and through the precinct. These rivers and associated wetlands provide options for mitigating these impacts. Harnessing these services requires the application of Sustainable urban Stormwater Design (SuDS) principles and techniques. Landscaping should

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2 The national SSuDS policies and guidelines are available from www.wsud.co.za. Relevant references include: Sustainable u Technology for Stormwater management: Report and South African Case Studies (WRC Report No. 1826/1/13)
also be designed to spatially define adjoining public spaces and streets, provide a human scale, to ameliorate the local climate and to screen service areas, parking areas, etc.

- **Minimize Maintenance** – Maximise coverage of natural/constructed/natural habitats as they have limited maintenance requirements and limit lawned areas and garden beds with high edge ratios. Limit exotic, formal landscaping with high labour, fertilisation and pesticide requirements. Select vandal proof, hard wearing (preferably recycled) materials for street furniture and surfaces. Replicate natural habitat management regimes where possible (annual burning instead of manual weed control).

- **Focus on Local** – By using indigenous plant species and sourcing plants locally to minimize introduction of new genes and limit the carbon foot print of the landscaping. The Precinct includes the ‘Dry Valley’ and ‘Above Scarp’ planting zones identified in the EPCPD guideline. Appropriate species are listed for these planting zones in the guidelines along with locations where these can be purchased. When selecting species avoid the use of species with damaging tree roots, very large tree canopies, etc. where this will interfere with sidewalks, underground services, built structures, etc. in public spaces.

- **Water Wise** – Include rainwater harvesting in the design of infrastructure (tanks), particularly in urban (industrial areas) where there is significant roof area. Use permeable surfaces in the design of parking and other hardened areas to increase infiltration and reduce stormwater runoff and flood risk downstream. The SuDS design principles and approaches should again be applied. Use water efficient irrigation systems such as drip irrigation where needed and include appropriate timing.

- **Utilize Green Energy technologies** – Use solar powered street and landscaping lighting, photovoltaic-driven service facilities and low wattage lighting (LED lights).

- **Use Green Products** – Use eco-labelled or green certified products (FSC, Energy Star, Fair Trade) and well as recycled products and organic/biodegradable herbicides and pesticides.

- **Educate** – Use appropriate signage and information users about biodiversity (tree and plant species, ecosystems and their value) and guide people to optimize their experience and limit their impact.

- **Optimize Recreational, Visual and Amenity Value** – Of natural systems by creating pedestrian access routes as well as recreational opportunities via walk, bike and running trails along or overlooking natural features like waterways, locate benches and viewing sites overlooking wetlands and valleys (for bird watching). Enhance the value of commercial and residential development by designing layout to optimize green viewscapes. Within the precinct these generally include: the elevated (green areas) in the north of the precinct; south towards the Umlaas River valley; and Sterkspruit and associated river valleys draining through the precinct in a northwest-south/east direction. utilise natural systems (river corridors, forest/woodland) to buffer air, noise and visual impacts of industrial areas from residential and commercial uses, and appropriate landscaping within and adjacent industrial areas to screen and soften hard industrial areas.

- **Landscaping for Security** – The concept of Crime Prevention through Environmental Design (CPTED) is an internationally recognized approach to landscaping. The EPCPD (2009) provides
specific approaches and design guidelines for achieving CPTED in terms of; Surveillance (Use of features and facilities to create a perception of increased risk of detection of criminal activity and increased safety for users); Access Control (designing features to deny access to criminals); Territorial re-enforcement (using physical features to confirm access and control; Target Hardening (physical securing of buildings against access from criminals); Management and maintenance (to ensure continued use of the space for intended purposes and increased sense of safety for users).

3.5 CORRIDOR ENVIRONMENTAL AND OPEN SPACE FRAMEWORK

The precinct contains a number of important biodiversity and open space assets that are locally and regionally significant but are under pressure from human activities. The objective is accordingly to:

*Establish an interconnected open space system that protects biodiversity and environmental assets, sustainably delivers ecological goods and services for local communities and that structures and provides visual relief from the built environment.*

The following guidelines have been identified with respect to the open space system:

- Protect existing biodiversity assets and linking them via open space, riverine and landscape corridors to create an interconnected and ecologically functional open space system.
- Strengthen the capacity of the open space assets to deliver environmental services and benefits for local communities.
- Establish appropriate buffer land uses along the edges of the open space system to protect biodiversity assets and reduce edge effects.
- The guidelines set out under Section 3.4.6 above are also relevant for this framework.
FIGURE 28: OPEN SPACE SYSTEM
3.6 Corridor Service Infrastructure Framework

3.6.1 Introduction

In general, the level of existing services and infrastructure established is sufficient to provide services of good quality and consistency to the existing developments. Nevertheless, capacity is at its limits and there is little spare capacity to service any future expansion requirements.

This section presents infrastructure demands generated by proposed land uses and development yields, and provides a high-level analysis on demands, capacities, phasing requirements and improvements for the study area. Section 3.7 identifies the projects required as a result of the development implications.

3.6.2 Wastewater Disposal

3.6.2.1 Infrastructure Network

Waste water disposal has been tagged as the most significant challenge of the study area. The existing sewerage infrastructure includes the Hammarsdale Wastewater Treatment Works (WWTW) along the Sterkspruit River, the Mpumalanga WWTW along the Upper uMlazi River and Waterborne sewers in the main town areas.

Refer to Table 10 below for wastewater generation parameters, and Table 11 for future water and wastewater demands based for the entire FAP (Ultimate Scenario).

Table 12, reflects the water and Wastewater generation based on the land use bulks for the corridor only.

It is stressed that this section must be read with section 3.7.

**Table 10: Wastewater Generation Parameters**

<table>
<thead>
<tr>
<th>Landuse Type</th>
<th>Wastewater Generation per Landuse Type</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Residential</td>
<td>750 ℓ/day/du</td>
<td></td>
</tr>
<tr>
<td>Industrial General/Heavy/logistics</td>
<td>45 000 ℓ/day/ha floor area</td>
<td></td>
</tr>
<tr>
<td>Industrial Light</td>
<td>20 000 ℓ/day/ha floor area</td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>15 000 ℓ/day/ha floor area</td>
<td></td>
</tr>
<tr>
<td>Social</td>
<td>40 000 ℓ/day/ha floor area</td>
<td></td>
</tr>
<tr>
<td>Educational</td>
<td>40 000 ℓ/day/ha floor area</td>
<td></td>
</tr>
</tbody>
</table>
### TABLE 11: FUTURE WASTEWATER GENERATION AND WATER DEMANDS WITHIN THE PRECINCT (ULTIMATELY FOR THE FAP)

<table>
<thead>
<tr>
<th>Land use</th>
<th>Max Floor Area (Ha)</th>
<th>No. Dwellings</th>
<th>Total Wastewater Generated ML/Day</th>
<th>Likely: Total Wastewater Generated ML/Day</th>
<th>Total Water Demand ML/Day</th>
<th>Likely: Total Water Demand ML/Day</th>
<th>Total Water Demand Based On 48hr Storage ML</th>
<th>Likely: Total Water Demand Based On 48hr Storage ML</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic and Social</td>
<td>25.4</td>
<td></td>
<td>1.014</td>
<td>0.812</td>
<td>1.268</td>
<td>1.014</td>
<td>2.536</td>
<td>2.029</td>
</tr>
<tr>
<td>Education</td>
<td>8.3</td>
<td></td>
<td>0.332</td>
<td>0.266</td>
<td>0.415</td>
<td>0.332</td>
<td>0.830</td>
<td>0.664</td>
</tr>
<tr>
<td>General Industry</td>
<td>379.7</td>
<td></td>
<td>17.085</td>
<td>13.668</td>
<td>21.356</td>
<td>17.085</td>
<td>42.712</td>
<td>34.169</td>
</tr>
<tr>
<td>Light Industry</td>
<td>71.5</td>
<td></td>
<td>3.216</td>
<td>2.573</td>
<td>4.020</td>
<td>3.216</td>
<td>8.041</td>
<td>6.433</td>
</tr>
<tr>
<td>Logistics</td>
<td>62.5</td>
<td></td>
<td>2.813</td>
<td>2.250</td>
<td>3.516</td>
<td>2.813</td>
<td>7.032</td>
<td>5.626</td>
</tr>
<tr>
<td>Mixed Use Core</td>
<td>20.3</td>
<td>406</td>
<td>0.609</td>
<td>0.548</td>
<td>0.761</td>
<td>0.685</td>
<td>1.522</td>
<td>1.370</td>
</tr>
<tr>
<td>Mixed Use Low Impact</td>
<td>22.2</td>
<td>443</td>
<td>0.554</td>
<td>0.510</td>
<td>0.693</td>
<td>0.637</td>
<td>1.385</td>
<td>1.274</td>
</tr>
<tr>
<td>Mixed Use Medium Impact</td>
<td>44.7</td>
<td>805</td>
<td>1.230</td>
<td>1.066</td>
<td>1.538</td>
<td>1.333</td>
<td>3.075</td>
<td>2.665</td>
</tr>
<tr>
<td>Residential High Impact</td>
<td>0.0</td>
<td>494</td>
<td>0.412</td>
<td>0.412</td>
<td>0.515</td>
<td>0.515</td>
<td>1.029</td>
<td>1.029</td>
</tr>
<tr>
<td>Residential Medium Impact</td>
<td>0.0</td>
<td>2842</td>
<td>2.629</td>
<td>2.629</td>
<td>3.286</td>
<td>3.286</td>
<td>6.573</td>
<td>6.573</td>
</tr>
<tr>
<td>Rural/Traditional Settlement</td>
<td>0.0</td>
<td>1126</td>
<td>0.845</td>
<td>0.845</td>
<td>1.056</td>
<td>1.056</td>
<td>2.112</td>
<td>2.112</td>
</tr>
<tr>
<td>Transitional Settlement</td>
<td>0.0</td>
<td>13398</td>
<td>10.048</td>
<td>10.048</td>
<td>12.561</td>
<td>12.561</td>
<td>25.121</td>
<td>25.121</td>
</tr>
<tr>
<td><strong>Grand Total</strong></td>
<td><strong>708.8</strong></td>
<td><strong>23535</strong></td>
<td><strong>45.143</strong></td>
<td><strong>39.965</strong></td>
<td><strong>56.428</strong></td>
<td><strong>49.957</strong></td>
<td><strong>112.856</strong></td>
<td><strong>99.913</strong></td>
</tr>
</tbody>
</table>
NOTES:

- Parameters applied: Water Demand is 125% of Wastewater Generation
- Above table is including developed areas
- standard demand parameters have applied to developed areas

### TABLE 12: LANDUSE BREAKDOWN FOR THE ENTIRE FAP

<table>
<thead>
<tr>
<th>Land use</th>
<th>Max Floor Area (Ha)</th>
<th>Likely Floor Area (Ha)</th>
<th>Max: Commercial (Ha)</th>
<th>Likely Commercial (Ha)</th>
<th>Max: Social (Ha)</th>
<th>Likely: Social (Ha)</th>
<th>No. of Dwellings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic and Social</td>
<td>25.362</td>
<td>20.290</td>
<td>0.000</td>
<td>0.000</td>
<td>25.362</td>
<td>20.290</td>
<td>0</td>
</tr>
<tr>
<td>Education</td>
<td>8.304</td>
<td>6.643</td>
<td>0.000</td>
<td>0.000</td>
<td>8.304</td>
<td>6.643</td>
<td>0</td>
</tr>
<tr>
<td>General Industry</td>
<td>379.658</td>
<td>303.727</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Light Industry</td>
<td>71.473</td>
<td>57.178</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Logistics</td>
<td>62.508</td>
<td>50.007</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0</td>
</tr>
<tr>
<td>Mixed Use Core</td>
<td>20.296</td>
<td>16.237</td>
<td>12.178</td>
<td>9.742</td>
<td>0.000</td>
<td>0.000</td>
<td>406</td>
</tr>
<tr>
<td>Mixed Use Low Impact</td>
<td>22.164</td>
<td>17.731</td>
<td>8.865</td>
<td>7.092</td>
<td>2.216</td>
<td>1.773</td>
<td>443</td>
</tr>
<tr>
<td>Mixed Use Medium Impact</td>
<td>44.709</td>
<td>35.788</td>
<td>25.081</td>
<td>17.325</td>
<td>6.245</td>
<td>5.056</td>
<td>805</td>
</tr>
<tr>
<td>Residential High Impact</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>1.029</td>
<td>1.029</td>
<td>494</td>
</tr>
<tr>
<td>Residential Low Impact</td>
<td>18.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>33.502</td>
<td>33.102</td>
<td>4020</td>
</tr>
<tr>
<td>Residential Medium Impact</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>12.443</td>
<td>12.443</td>
<td>2842</td>
</tr>
<tr>
<td>Rural/Traditional Settlement</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>1126</td>
</tr>
<tr>
<td>Transitional Settlement</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>0.000</td>
<td>13398</td>
</tr>
<tr>
<td>Grand Total</td>
<td>708.801</td>
<td>552.720</td>
<td>46.124</td>
<td>34.159</td>
<td>92.146</td>
<td>82.772</td>
<td>23535</td>
</tr>
</tbody>
</table>

### TABLE 13: FUTURE WASTEWATER GENERATION AND WATER DEMANDS WITHIN PRECINCTS B1 AND A1 (FOR THE CORRIDOR)
The likely demand is based on likely potential development being constructed, and reduced FARs. In the residential areas we expect less water reuse initiatives. In the residential areas we expect less water reuse initiatives, therefore little or no reduction of water demand.

From the above table, the infrastructure required to service the FAP in the Ultimate is 112.9Mℓ (48 hour storage) and in the likelihood of 99.9Mℓ (includes developed areas).

The Corridor falls within Precincts B1 and A1. From the table above, the total 48 hour storage required is 65.269 Mℓ and likely 54.363 Mℓ. This includes the developed areas and the undeveloped areas of the FAP. Although the storage requirements for the corridor are less than the storage required for the entire FAP study area stated in Table 10, most infrastructure options (bulks only) provided in this report are for the ultimate, entire FAP scenario. This is based on the expectation that the costs of installing upgrades at a later stage may ultimately cost more than installing the ultimate infrastructure; and the development period is likely to be shorter than the services life span.
e.g. A basic scenario: A 250mm diameter water pipe may be sufficient to cater for the developments in the corridor, in the short term, should there be more developments that proceed and need water within a short time, this pipe will then need to be upgraded to 500mm diameter. The additional cost for provision of space excavation, removal of 250 line and rehabilitation will be required, resulting in additional expenditure when compared with installing the 500mm diameter pipe during the first phase. There is little to no salvage value in recovering the pipe due to the cost of hand excavation required to remove the pipe. The only value lies in the recovery of valves and fittings.

From the above table, the total wastewater generated for the entire FAP study area including developed areas is approximately 45.1Mℓ/day based on a maximum density and most likely to be at 39.9 Mℓ/day. The water storage including developed areas, based on eThekwini’s 48-hour storage requirement, is estimated at 112.9Mℓ (includes developed areas) however is likely to be 99.9Mℓ.

From Table 13, the corridor, Precincts B1 and A1, generates 26.1 Mℓ/day of wastewater, inclusive of the developed and more likely to only generate 21.7 Mℓ/day of wastewater. The water demand for the corridor only, based on eThekwini’s 48-hour storage requirement, is estimated at 65.2Mℓ (includes developed areas) with the likelihood of only 54.3Mℓ.

Agriculture utilises water from natural resources rather than from reticulated potable bulk water supply systems. For Irrigation, it is encouraged that sustainable systems such as the use of greywater or rainwater collection should be promoted for the irrigation of commercial and residential areas.

**TABLE 14: MPUMALANGA AND HAMMARSDALE WWTW**

<table>
<thead>
<tr>
<th>WWTW</th>
<th>DESIGN CAPACITY</th>
<th>EFFECTIVE CAPACITY</th>
<th>CURRENT LOADING</th>
<th>SPARE CAPACITY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mpumalanga WWTW</td>
<td>6Ml/day @ 750mg/l COD</td>
<td>4.5Ml/day @ 1 000mg/l COD</td>
<td>3.6Ml/day @ 1 000mg/l COD</td>
<td>0.9Ml/day @ 1 000mg/l COD to 1.3Ml/day @ 700mg/l COD</td>
</tr>
<tr>
<td>Hammarsdale WWTW</td>
<td>27Ml/day @ 815mg/l COD</td>
<td>11Ml/day @ 1 992mg/l COD</td>
<td>11Ml/day @ 1 992mg/l COD</td>
<td>0Ml/day</td>
</tr>
<tr>
<td>TOTAL</td>
<td>33Ml/day</td>
<td>15.5Ml/day</td>
<td>12.3Ml/day</td>
<td>0.9Ml/day – 1.3Ml/day</td>
</tr>
</tbody>
</table>

*Note: Current COD concentration for Mpumalanga WWTW is unknown and has been estimated using an assumed COD concentration to reduce design capacity to the effective capacity. As stipulated in 2012 Mpumalanga LAP, it has been confirmed by eThekwini officials in July 2017 that the WWTW’s are currently operating at these capacity levels and are very much still strained today due to the nature of the effluent being predominately industrial. Despite the closing of Rainbow Chickens, the inflow to the Hammarsdale WWTWs has not changed.*
The city plans to regionalise the Hammarsdale WWTW, and convert the Mpumalanga WWTW to a pump station and transfer its load to Hammarsdale WWTW, which will be upgraded by 15Mℓ/day to have a total capacity of 42Mℓ/day, the then upgraded facility will be able to cater for the likely flow of 39.9 Mℓ (Ultimate FAP), assuming that the COD design inefficiencies are resolved. Further upgrades to a larger capacity may be required that will be able to accommodate flows from other developments such as Cato Ridge Areas and other outer lying areas not included in this study.

It has been recognized by the city that for a long while the outer lying communities in the Mpumalanga FAP study area has had little or no sewer removal and are generally served by pit latrines. Efforts are underway to provide these communities with an improved level of service by means of projects such as the SAN3 project. This incorporates the installation of community ablution facilities which will be upgraded/extended to serve all the sites in the area with a water-borne sewerage system. In the ultimate, the city plans to transfer of all this sewer to the regional works, Hammarsdale WWTW.

3.6.2.2 PERFORMANCE/ CAPACITY
Refer to Estimated Water & Wastewater Demands calculated above for further detail.

Details of the Hammarsdale WWTW are as follows:

- Design Capacity - 27 Mℓ/day
- Operational Capacity - 11 Mℓ/day; Due to nature of Effluent-Industrial
- Current Usage - 11 Mℓ/day
- Spare Capacity - 0 Mℓ/day

The required capacity from the high-level analysis is 39.9 Mℓ (this includes the flow from the areas that currently transfers load to Mpumalanga WWTW).

Infrastructure is required to be installed to service the upper portions of the study area. Plans are in place to install trunk sewers and upgrades to the Hammarsdale WWTW.

3.6.2.3 FUTURE PLANNING
Whilst the spare capacity of the wastewater treatment plants is limited, plans are in place by eThekwini to increase this.

It should be noted that the flows into the Hammarsdale WWTW will include the Mpumalanga WWTW flow as this will be converted to a pumping system as part of the EThekwini’s regionalisation strategy.

Key projects and initiatives include:

- Hammarsdale Wastewater Pollution Reduction - due to the nature of the effluent, this aims at reducing the loads and concentration of industrial discharges the WWTW's.
- Upgrading of the Hammarsdale WWTW – an additional capacity of 15Ml/day will be added as part of the WWTW’s regionalisation studies of eThekwini.
3.6.3 WATER SUPPLY

3.6.3.1 INFRASTRUCTURE NETWORK (BULK AND RETICULATION)

Bulk Water Network

The information in this table reflects the existing water usage, estimated daily demand and spare capacity of the Georgedale system

Existing Water Usage Georgedale system:

**TABLE 15: CAPACITY OF EXISTING SYSTEM (GEORGEDALE)**

<table>
<thead>
<tr>
<th>Reservoir Zone</th>
<th>Total Capacity (Storage) (Mℓ)</th>
<th>Existing Water Usage (Mℓ/day)</th>
<th>Spare Capacity (Ml)</th>
<th>Capacity for the proposed developments of the undeveloped areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgedale HL</td>
<td>22.73</td>
<td>0.21</td>
<td>11.73</td>
<td>17.5</td>
</tr>
<tr>
<td>Georgedale LL</td>
<td>5.29</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mpumalanga 1</td>
<td>7.8</td>
<td>2.04</td>
<td>3.80</td>
<td></td>
</tr>
<tr>
<td>Hammarsdale LL</td>
<td>20</td>
<td>5.70</td>
<td>8.60</td>
<td>40</td>
</tr>
<tr>
<td>Hammarsdale HL</td>
<td>9</td>
<td>1.80</td>
<td>5.40</td>
<td></td>
</tr>
<tr>
<td>Total:</td>
<td>59.53</td>
<td>15.04</td>
<td>29.53</td>
<td>57.5</td>
</tr>
</tbody>
</table>

eThekwini is currently facing supply limitations i.e. supply versus demand is currently strained. The recent commissioning of the Phase 2b of the Mooi-Mgeni Transfer Scheme (MMTS-2) is sufficient to service the Outer West Areas of eThekwini in the short to medium term. However, in the medium to long term the uptake on demand to the outer west area is dependent on the commissioning of the western aqueduct as well as the completion of Umgeni Water’s Umkhomazi project which will transfer water from the Umkhomazi catchment to further augment supply.

From Table 15 it can be seen that the Functional undeveloped Area requires a max of approximately 57.5Mℓ likely maximum based on 48-hour storage, and thus an additional reservoir storage of 27.97 Mℓ approximately 28Mℓ for 48 hour storage is required (for the entire FAP study area).

**TABLE 16: ULTIMATE WATER USAGE OF THE FAP STUDY AREA**
PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR PRECINCT PLAN: WARDS 4, 5, 7 AND 91

<table>
<thead>
<tr>
<th>Reservoir</th>
<th>Existing Capacity Mℓ (48hr)</th>
<th>Existing Water Usage Mℓ/day (24hr)</th>
<th>Existing Water Usage Mℓ 48hr</th>
<th>Spare Capacity (48hr)</th>
<th>Ultimate Water Usage of FAP study area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Georgedale HL</td>
<td>22.73</td>
<td>0.21</td>
<td>0.42</td>
<td>11.73</td>
<td>22.73</td>
</tr>
<tr>
<td>Georgedale LL</td>
<td>5.29</td>
<td>10.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mpumalanga 1</td>
<td>7.8</td>
<td>2.04</td>
<td>4.08</td>
<td>3.72</td>
<td>7.8</td>
</tr>
<tr>
<td>Hammarsdale LL</td>
<td>20</td>
<td>5.70</td>
<td>11.4</td>
<td>8.60</td>
<td>20</td>
</tr>
<tr>
<td>Hammarsdale HL</td>
<td></td>
<td>1.80</td>
<td>3.6</td>
<td>5.40</td>
<td>9</td>
</tr>
<tr>
<td>Proposed OW3</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>20</td>
</tr>
<tr>
<td>Proposed OW2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>59.53</strong></td>
<td><strong>15.04</strong></td>
<td><strong>30.08</strong></td>
<td><strong>29.45</strong></td>
<td><strong>87.53</strong></td>
</tr>
</tbody>
</table>

From the above Table 16, the ultimate water storage for the entire FAP area is indicated by 87.5Mℓ. This differs from the 112.2Mℓ requirement reflected previously. This difference amount to factors which were applied to developed land parcels with regards to standard water demand design principles.

The city is also considering other methods of water saving, initiatives such as water conservation water demand management (WC/WDM) initiatives.

The city is faced with ageing infrastructure and there are programmes in place to replace infrastructure as part of eThekwini’s maintenance programme. It would be appropriate to upgrade pipe diameters to meet future demands as part of the replacement programme.

**Water Reticulation Network**

The existing internal water infrastructure involves a network of mPVC pipes ranging in diameter from 50 mm to 375 mm. The pipes sizes should comply with the required standard instantaneous peak flows and velocities of 0.6 – 1.2 m/s (as per the Guidelines for Human Settlement Planning and Design/CSIR Red Book). During the detailed design phase, a model will need to be developed in order to simulate fire flow, and peak minimum pressure scenarios. This model can be used to optimise the internal pipe infrastructure to ensure efficient water supply and minimal pressure losses. The positioning of the pipes should be to avoid pipe clashes with other services, which will need to be finalised during the detailed design phase. It is recommended that a concept Master Plan Model of the Network be generated which will assist with future planning of the system.

Future bulk watermains have also been shown in Figure 32 and are based on a high-level analysis of 5m contour heights. During detail design and when additional survey is available, a detailed analysis can be carried out for each project area. It is recommended that in the detailed design phases, the above-mentioned guideline as well as the eThekwini Standards are applied to provide efficiency and optimisation of designs. Further to this, collaboration between adjacent developments is required to ensure that the network is designed holistically and that the system is optimised using the primary network loops.
3.6.3.2 Performance/Capacity

Refer to Estimated Water & Wastewater Demands calculated above for further detail.

Whilst the bulk water supply system in the Upper uMgeni catchment is constrained, there is sufficient bulk water supply capacity to service future development within the Mpumalanga study area over the short term, subject to some planned infrastructure upgrades. The extension/upgrades of the water supply network to service new developments and settlement upgrades. New developments and settlement upgrades will still need to be considered on their merits and will require consultation with eThekwini Municipality and, where appropriate, Umgeni Water. In the medium to long term, the bulk water supply infrastructure will need to be substantially upgraded to service future development within the area and to cater for significant growth in the Cato Ridge and other surrounding areas.

eThekwini regularly engage with Department of Water and Sanitation (DWS) and Umgeni Water and have plans in place to ensure supply to the Mpumalanga and Cato Ridge Areas, since Cato Ridge has been earmarked as a logistics hub and catalytic project.

3.6.3.3 eThekwini’s Future Planning

In light of the limitations on water supply, emphasis should be placed on water conservation, reuse and recycling, as well as measures to reduce water losses. Items such as water efficiency and reduction in water loss can be addressed at the scale of the Functional Area, however issues such as water recycling and alternative sources such as desalination are best addressed at a more regional scale in close conjunction with Department of Water Affairs and Umgeni Water.

With reference to Figure 32, it should be noted that the proposed reservoir that is located just outside of the upper end of the study boundary will be key to unlock the zones within Precinct B1. Looking at a high-level analysis of Top Water Levels, it can be seen that the Command Reservoir Georgedale reservoir will not be able to supply developments with ground levels greater than 660m within this precinct.

Augmentation off the Western Aqueduct is proposed and this will further enable supply to the study area.

Further to above, there are 2 proposed reservoirs situated outside the study area proposed to service portions of the study area.

3.6.4 Roads and Stormwater

3.6.4.1 Infrastructure Network

The Mpumalanga area was inherited by eThekwini. The storm water infrastructure in the area is considered to be basic, with the bulk of the infrastructure likely to be designed according to the “Red Book”, (Guidelines for Human Settlement Planning and Design)/ eThekwini stormwater design manual and its predecessors. There are a number of river and drainage crossings of Provincial and National Roads that will not accommodate increased runoff rates, any new crossings and attenuation facilities, will have to be designed in accordance with KwaZulu-Natal Department of Transport Standards and are unlikely to accommodate increased flow rates.
3.6.4.2 Performance/Capacity

The current stormwater drainage system is working adequately at present, however as development increases this will affect surface runoff and will be required to be looked at further at the precinct plans phase of the project.

The following guidelines should be applied when dealing with provision of stormwater drainage systems:

- All internal stormwater reticulation should be designed according to an approved Stormwater Management Plan (SWMP) per development and relevant eThekwini Municipality Coastal, Stormwater and Catchment Management guidelines.
- The use of the proposed municipal road network will act as the primary stormwater collector, with organized discharge into attenuation ponds.
- Piping and channels will be designed to accommodate the 1:5-year peak flow, as per eThekwini standards.
- Attenuation ponds will be used to restrict runoff into the natural drainage system to the pre-development 1:10 year flood flow event capacity, with any increased runoff attenuated on site. Sizing of the ponds will cater for the 1:50 year flood flow, as per eThekwini standards.
- To cater for stormwater runoff generated by the proposed developments, it is necessary that attenuation ponds be constructed at suitable positions.
- The use of sustainable urban drainage mechanisms to reduce the required stormwater attenuation pond volumes is encouraged.
- Detailed analysis should be carried out and presented for approval to the relevant authorities at the detailed design stages.

It should be noted that infrastructure requirements for surface water (stormwater) drainage is highly sensitive to site characteristics and should be analysed from site to site per development proposed and hence comments and proposals at this stage can only be at a very broad high level and will require to be further investigated and confirmed at detail design phases during the development of the study area.

3.6.4.3 Future Planning and Phasing

Any future developments will be required to have a Storm Water Drainage Plan approved by the Coastal and Drainage Section.

All new developments will need to be designed in accordance with eThekwini Stormwater design guidelines. In particular, stormwater facilities will be required to prevent increased runoff and associated flooding of lower lying areas. For major systems the return periods are 1:50 or 1:100, and minor systems 1:5 to 1:20, depending on importance.

There are 2 rivers, Umlazi and Sterkspruit in the study area. The slopes are relatively steep and will result in fast flowing water courses with limited flood plains.
3.6.5 Electrical

The eThekwini Electricity area of supply in Mpumalanga is currently supplied from the Mpumalanga Main Intake Substation, a 132/11 kV substation which Eskom owns the 132kV side and eThekwini Electricity owns the 11kV side. The available capacity at the Substation is 20MVA. In 2014 the usage was approximately 18MVA, with a proposed new mall that was expected to use the spare 2MVA. Currently the proposed mall is built; conclusion at this stage is that the 2MVA has been tapped into.

Figure 29 shows the service infrastructure work frame, highlighting the area of study and listing the legend the infrastructure positioning and location. The areas in the study area fall into the following categories:

- Hammarsdale – Not constrained, capacity is available for development – minor improvements may be required.
- Mophela – Constrained.
- Sankontshe – Not constrained.

The existing bulk electricity infrastructure capacity is accordingly sufficient in Hammarsdale and Sankontshe but is constrained in Mpumalanga, and Mophela. The planned provision of the new Royal Substation currently on hold would significantly boost capacity and will accordingly provide adequate capacity for the future development of the area over the short to medium term; this is currently in the EIA stage. Additional capacity will need to be provided to service the medium to longer term growth of the area. Until such time as the new substation is available, each project will need to be considered on its merits.

According to Eskom’s infrastructure plan the new Royal Substation comprising of 2x 40 MVA transformers is on hold. It will provide an additional capacity of 40MVA after commissioning. The status or construction progress of this substation is to be confirmed.
FIGURE 29: ELECTRICAL SERVICE INFRASTRUCTURE FRAMEWORK
3.6.6 Solid Waste Management

3.6.6.1 Infrastructure Network
All solid waste from the existing Mpumalanga area is transported to the Marion Hill Landfill Site. The Marion Hill Site is currently strained with approximately 12 months of lifespan left, since the Bisasar Road Landfill Site is reaching capacity with approximately 2 years’ life left.

The existing Hammarsdale Transfer Station (TS) is serving the west area, with no upgrades/modifications in terms of capacity planned (other than maintenance/refurbishments etc.). The TS is at present handling roughly 60 cubic meters of waste per day, with Wednesdays achieving roughly 120 cubic meters of waste. Hence, the Hammarsdale Transfer Station has the capacity to handle 120 cubic meters per day. The Transfer Station has a remaining lifespan of 10 years.

3.6.6.2 Performance/Capacity
In communicating with eThekwini, there are major capacity constraints of the Mariannhill Landfill site, which are not sufficient to cater for additional waste, and is soon nearing its lifespan. Alternatives and timing of the precinct plans phasing needs to be carefully looked at and should be workshoped with eThekwini.

3.6.6.3 Future Planning
It was planned that there would be a new Shongweni Landfill site, which was to be up and running by 2018. This has unfortunately still not been approved. In reality the delay is going to negatively impact waste disposal for the west as waste will then have to be hauled to the North Buffelsdraai Landfill. eThekwini officials informed that they can realistically see Shongweni Landfill only coming on board in a minimum 4 years from the date of the Approval of Appeal for a waste management license and environmental assessment. A further factor that should be considered is that the community in the west are also reluctant to have another landfill in the area, following the odour and other issues associated with the existing Shongweni Landfill Site.

3.7 Corridor Implementation and Phasing Plan

3.7.1 Introduction
The following section presents the phasing within the corridor. It is noted that this phasing may change depending on market demand, and when and how certain developments happen. It is thus not binding. It does however provide an overview of what is required to enable development within the corridor.

3.7.2 Corridor Phasing Plan
As per the precinct phasing plan below, the corridor effectively should develop in the short to medium term. The proposed consolidation around the existing development (Precinct A1) is in essence a short to medium term implementation, and this depends on market take-up. Precinct B1 should develop in the medium term, although this may shift to short term or long term depending on the landowner’s intentions. Effectively, the phases for the Corridor Plan can be understood as follows:
• Short Term: Years 2019 – 2025;
• Medium Term: 2025 – 2035;
• Long Term: 2035 – 2045

However, it is stressed that these phases may be flexible and each development application must be considered carefully.

**FIGURE 30: CORRIDOR PHASING PLAN**

### 3.7.3 Corridor Infrastructure Implementation Projects

The following section demonstrates the infrastructure projects that are required for the development of the Corridor.

#### 3.7.3.1 Waste Water Projects

**3.7.3.1.1 Wastewater Network Improvements Required**

Refer to Figure 31 which illustrates the additional infrastructure needed to service the study area. The study area falls within 4 drainage catchments. ETHekwini’s is planning to regionalise the Hammarsdale Wastewater treatment works and convert the Mpumalanga WWTW into a Sewer pump station.
Infrastructure for Precinct B1, should include a rising main and gravity pipework to divert flow from new developments in the Precinct to Hammarsdale Wastewater Treatment Works in the Ultimate. The portions of A3 and A1 which fall with the Mpumalanga WWTW catchment, will drain to the wastewater treatment works. eThekwini Wastewater division is planning to convert this treatment works to a sewer pump station and this flow will then be diverted to Hammarsdale WWTW. Infrastructure requirements for this system includes, conversion of Mpumalanga WWTW to pump station, Rising Main and Gravity pipe.

3.7.3.1.2 WASTEWATER OPTIONS
The Hammarsdale WWTW currently has no spare operational capacity. This is due to the chemical overloading, which reduces the efficiency of the facility. The city is currently looking at upgrading this to cater for an additional 15 Mℓ/day. To further reduce the chemical loading from industrial areas, developers can be encouraged to do onsite pre-treatment before discharge to the treatment works. The city can install automatic sampling to monitor at the sites and penalties thereof can be applied.

New developers may be encouraged to incorporate the reuse and recycling methods to limit the amount of wastewater, by implementing onsite pre-treatment and reduce the associated costs. This will limit the amount of wastewater transferred and treated. Infrastructure such as pipework and pumps can be installed during the construction phase to allow the greywater to be separated, treated to a level that it can be reused in the toilet system for flushing, and also directed into the sprinkler system for irrigation for landscaping.

3.7.3.1.3 CAPACITY AND PHASING REQUIREMENTS
The following Ultimate costs have been applied.

### TABLE 17: WASTEWATER DISPOSAL COSTS FOR THE CORRIDOR (TOTAL)

<table>
<thead>
<tr>
<th>Item</th>
<th>Pipe Diameter &amp; Type</th>
<th>Length</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mm</td>
<td>m</td>
<td>R</td>
</tr>
<tr>
<td>Gravity on Precinct B1</td>
<td>450mm HDPE</td>
<td>2 010</td>
<td>9 246 000.00</td>
</tr>
<tr>
<td>Rising Main in B1</td>
<td>500mm HDPE</td>
<td>1 190</td>
<td>6 861 000.00</td>
</tr>
<tr>
<td>Gravity on Precinct B1</td>
<td>500mm HDPE</td>
<td>750</td>
<td>4 324 000.00</td>
</tr>
<tr>
<td>Gravity in Precinct A1</td>
<td>500mm HDPE</td>
<td>1 650</td>
<td>9 513 000.00</td>
</tr>
<tr>
<td>Rising main in Precinct A1</td>
<td>500mm HDPE</td>
<td>2 750</td>
<td>15 855 000.00</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>45 799 000.00</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>WWTW/PS capacity</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>ML/day</td>
<td>R</td>
</tr>
<tr>
<td>Upgrade of Hammarsdale WWTW</td>
<td>15</td>
<td>180 000 000.00</td>
</tr>
<tr>
<td>Convert Mpumalanga WWTW to Sewer Pump Station</td>
<td>6</td>
<td>24 000 000.00</td>
</tr>
<tr>
<td>Precinct B1: New Sewer Pump Station</td>
<td>6</td>
<td>24 000 000.00</td>
</tr>
</tbody>
</table>
### Precinct A1: New Sewer Pump Station

**Description:** Develop a pump station and rising main in Mpumalanga central to service Mpumalanga central, east and south and discharging via the Sterkspruit River sewer to Hammarsdale WWTW.

- **Units:** 5
- **Sub-total:** R 20 000 000.00

### Mpumalanga Central Pump Station and Rising Main

**Description:** Develop a pump station and rising main in Mpumalanga central to service Mpumalanga central, east and south and discharging via the Sterkspruit River sewer to Hammarsdale WWTW.

- **Cost:** R 46 000 000.00

### Hammarsdale Industrial Wastewater Management

**Description:** Continue and strengthen monitoring and reduction of industrial wastewater discharge to the Hammarsdale WWTW to reduce COD loading and improve water quality in Sterkspruit River.

- **Cost:** In-house

| Sub-Total | R 249 000 000.00 |
| Total (Corridor) | R 294 799 000.00 |

**Note:** The above costs include only diameters greater than 450mm considered as bulk infrastructure, and excludes cost of infrastructure for reticulation.

Also, the table above only shows the infrastructure required for the Corridor and not the entire FAP study area. Refer to the report titled “Budget, Implementation and Phasing Plan including Monitoring and Evaluation Framework”, the deliverable for Phase 5, this report incorporates the ultimate infrastructure costs for the entire FAP study area.

*It is suggested that the user pays penalty for sewer that does not comply with the city’s specification for compliance on the COD loading limits, and thus this will encourage onsite separation and pre-treatment, and possibility of reuse methods at the source itself.*

The above costs have been rearranged as per the phasing, Short, Medium and Long Term, according to phasing periods of: Short Term: Years 2019 – 2025; Medium Term: 2025 – 2035; Long Term: 2035 – 2045

### 3.7.3.1.4 Phasing Costs

#### Short Term

<table>
<thead>
<tr>
<th>Item</th>
<th>WWTTW/PS capacity ML/day</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upgrade of Hammarsdale WWTW</td>
<td>6</td>
<td>R 60 000 000.00</td>
</tr>
<tr>
<td>Mpumalanga Central Pump Station and Rising Main</td>
<td></td>
<td>R 46 000 000.00</td>
</tr>
</tbody>
</table>
### Hammarsdale Industrial Wastewater Management

**Description:** Continue and strengthen monitoring and reduction of industrial wastewater discharge to the Hammarsdale WWTW to reduce COD loading and improve water quality in Sterkspruit River.

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>In - house</td>
<td>R 106 000 000.00</td>
</tr>
</tbody>
</table>

**SUBTOTAL:** R 106 000 000.00

### Wastewater Disposal Cost for the Corridor (Short Term)

**Total:** R 106 000 000.00

### Medium Term

<table>
<thead>
<tr>
<th>Item Description</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gravity on Precinct B1</td>
<td>R 9 246 000.00</td>
</tr>
<tr>
<td>Rising Main in B1</td>
<td>R 6 861 000.00</td>
</tr>
<tr>
<td>Gravity on Precinct B1</td>
<td>R 4 324 000.00</td>
</tr>
<tr>
<td>Gravity in Precinct A1</td>
<td>R 9 513 000.00</td>
</tr>
<tr>
<td>Rising main in Precinct A1</td>
<td>R 15 855 000.00</td>
</tr>
</tbody>
</table>

**SUB-TOTAL**

R 45 799 000.00

### Long Term

The long term infrastructure requirements are addressed in the Budget and Phasing Plan report for the Ultimate FAP, which will cater wastewater disposal of Precinct B2 and Precinct A3.
3.7.3.2 Water Supply Projects

3.7.3.2.1 Water Supply Network Improvements Required

EThekwini is currently planning to provide an offtake from the Western Aqueduct to the Hammarsdale High Level Reservoir, and currently in the EIA process. The pipe capacity and timing are to be confirmed by the department. Although this will increase capacity to the Hammarsdale HL and LL reservoir zone, the residential land use in Precinct B1 will require its own storage reservoir. Proposals for an offtake from the future Link to cater for these developments in Precinct B1 shown in Figure 32.

Additional infrastructure is required to service the upper portion of Precinct B2, via an offtake from the Georgedale System. It is proposed that Georgedale reservoir be upgraded.

3.7.3.2.2 Capacity and Phasing Requirements

The following costs have been applied for the corridor along MR385.
**TABLE 18: WATER INFRASTRUCTURE REQUIREMENT TO SERVICE THE CORRIDOR**

<table>
<thead>
<tr>
<th>Item</th>
<th>Pipe Diameter &amp; Type (All material types)</th>
<th>Length m</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 1 Offtake from Western Aqueduct to Hammarsdale HL</td>
<td>700mm Steel</td>
<td>5 526</td>
<td>R 44 208 000.00</td>
</tr>
<tr>
<td>ID 2 Offtake from OW3</td>
<td>700mm Steel</td>
<td>5 038</td>
<td>R 40 304 000.00</td>
</tr>
<tr>
<td>ID 5 Precinct B1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>500mm Steel</td>
<td>1 216</td>
<td>R 7 296 000.00</td>
</tr>
<tr>
<td>ID 6 Precinct B1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>500mm Steel</td>
<td>1 686</td>
<td>R 10 116 000.00</td>
</tr>
<tr>
<td>ID 7 Precinct A1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>315mm mPVC</td>
<td>1 780</td>
<td>R 3 382 000.00</td>
</tr>
<tr>
<td>ID 8 Precinct A1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>100mm mPVC</td>
<td>1 107</td>
<td>R 1 329 000.00</td>
</tr>
<tr>
<td>ID 10 Bulk pipe to Elevated Tank in Precinct B1</td>
<td>315mm mPVC</td>
<td>1162</td>
<td>R 2 204 000.00</td>
</tr>
</tbody>
</table>

**Bulk Water Supply Modelling**
- Ethekwini: In-House

**SUB-TOTAL**
- R 108 839 000.00

<table>
<thead>
<tr>
<th>Item</th>
<th>New Reservoirs ML</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precinct B1: New OW 3 Reservoir</td>
<td>20</td>
<td>R 70 000 000.00</td>
</tr>
<tr>
<td>Elevated Tank in Precinct B1</td>
<td>0.7</td>
<td>R 7 000 000.00</td>
</tr>
</tbody>
</table>

**SUB-TOTAL**
- R 77 000 000.00

**TOTAL:**
- R 185 839 000.00

Note: The above table only shows the infrastructure required for the Corridor and not the entire FAP study area.

The above costs have been rearranged as per the phasing, Short, Medium and Long Term, according to phasing periods of: Short Term: Years 2019 – 2025; Medium Term: 2025 – 2035; Long Term: 2035 – 2045.
3.7.3.2.3 Phasing Costs

Short Term

TABLE 19: WATER REQUIREMENTS IN THE SHORT TERM

<table>
<thead>
<tr>
<th>Item</th>
<th>Pipe Diameter &amp; Type (All material types)</th>
<th>Length</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 1 Offtake from Western Aqueduct to Hammarsdale HL</td>
<td>700 Steel</td>
<td>5 526</td>
<td>R 44 208 000.00</td>
</tr>
<tr>
<td>ID 10 Bulk pipe to Elevated Tank in Precinct B1</td>
<td>315 mPVC</td>
<td>1162</td>
<td>R 2 204 000.00</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td>R 46 212 000.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Item</th>
<th>New Reservoirs</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated Tank in Precinct B1</td>
<td>0.7</td>
<td>R 7 000 000.00</td>
</tr>
</tbody>
</table>

**SUBTOTAL:** R 7 000 000.00

Bulk Water Infrastructure Cost for the Corridor (Short Term) **TOTAL:** R 53 412 000.00

Medium Term

TABLE 20: WATER REQUIREMENTS IN THE MEDIUM TERM

<table>
<thead>
<tr>
<th>Item</th>
<th>Pipe Diameter &amp; Type (All material types)</th>
<th>Length</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID 2 Offtake from OW3</td>
<td>700 Steel</td>
<td>5 038</td>
<td>R 40 304 000.00</td>
</tr>
<tr>
<td>ID 5 Precinct B1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>500 Steel</td>
<td>1 216</td>
<td>R 7 296 000.00</td>
</tr>
<tr>
<td>ID 6 Precinct B1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>500 Steel</td>
<td>1 686</td>
<td>R 10 116 000.00</td>
</tr>
<tr>
<td>ID 7 Precinct A1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>315 mPVC</td>
<td>1 780</td>
<td>R 3 382 000.00</td>
</tr>
<tr>
<td>ID 8 Precinct A1: BULK WATER TO SERVICE DEVELOPMENTS</td>
<td>100 mPVC</td>
<td>1 107</td>
<td>R 1 329 000.00</td>
</tr>
<tr>
<td><strong>SUB-TOTAL</strong></td>
<td></td>
<td></td>
<td>R 62 427 000.00</td>
</tr>
</tbody>
</table>
Long Term: Once the new OW 3 reservoir is online, this will have capacity to service developments that are currently being serviced by the Hammarsdale HL & LL reservoirs. This will then unload these reservoir systems and make available capacity for the long-term developments. Developments that are catered for in the short term by the elevated tower can then be shifted onto the proposed OW3 reservoir.

The proposed OW2 reservoir to service the upper portion of Precinct B2, is excluded from this report and is included in the Medium and Long Term Phases of the report titled: *Budget and Phasing Plan*. This proposed infrastructure and costing is included as part of the ultimate infrastructure requirements to service the entire Mpumalanga FAP study area.
3.7.3.3 Roads and Stormwater Projects

3.7.3.3.1 Surface Water Drainage Network Improvements Required
The Net Developable Area of the corridor is 463ha. A volume of 115 750m³ of stormwater will be required to be attenuated. The cost of providing attenuation facilities for the corridor is R 30 300 000.00.

Rainwater can be harvested and utilised to reduce the use of water, and attenuation facilities. Decision for Rain water harvesting is generally being driven by developers and their needs.

3.7.3.3.2 Infrastructure Costs
The Following costs have been applied for linkages in the corridor as a result of the Precinct Plan:
### TABLE 21: POTENTIAL ROAD LINKAGES AND DEALING WITH STORMWATER IN THE SHORT - MEDIUM TERM TIMEFRAME TO CATER FOR THE CORRIDOR DEVELOPMENTS

<table>
<thead>
<tr>
<th>Item</th>
<th>Length (total for both directions)</th>
<th>No. of lanes</th>
<th>Class 2/3 Roadworks</th>
<th>Class 3/4 Roadworks</th>
<th>Class 5 Roadworks</th>
<th>Class 5 Private Roadworks</th>
<th>Sidewalks (Asphalt)</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>m</td>
<td></td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ID1 Potential New Linkages 4a</td>
<td>2 081</td>
<td>4</td>
<td>33 504</td>
<td></td>
<td></td>
<td></td>
<td>10 405</td>
<td>R 68 746 000.00</td>
</tr>
<tr>
<td>ID2 Potential New Linkages 4b</td>
<td>1 429</td>
<td>4</td>
<td>23 007</td>
<td></td>
<td></td>
<td></td>
<td>7 145</td>
<td>R 47 208 000.00</td>
</tr>
<tr>
<td>ID3 Potential New Linkages -4b</td>
<td>918</td>
<td>4</td>
<td>14 780</td>
<td></td>
<td></td>
<td></td>
<td>4 590</td>
<td>R 30 327 000.00</td>
</tr>
<tr>
<td>ID4 Potential New Linkages -5b</td>
<td>1 750</td>
<td>2</td>
<td>14 088</td>
<td></td>
<td></td>
<td></td>
<td>8 750</td>
<td>R 26 115 000.00</td>
</tr>
<tr>
<td>ID5 Potential New Linkages -5a</td>
<td>1 272</td>
<td>2</td>
<td>10 240</td>
<td></td>
<td></td>
<td></td>
<td>6 360</td>
<td>R 18 982 000.00</td>
</tr>
<tr>
<td>ID6 Potential New Linkages -4a</td>
<td>172</td>
<td>4</td>
<td>2 769</td>
<td></td>
<td></td>
<td></td>
<td>860</td>
<td>R 5 683 000.00</td>
</tr>
<tr>
<td>ID7 Existing Dirt Road -5b</td>
<td>653</td>
<td>2</td>
<td>5 257</td>
<td></td>
<td></td>
<td></td>
<td>3 265</td>
<td>R 9 745 000.00</td>
</tr>
<tr>
<td>ID9 Potential New Linkages -3b</td>
<td>460</td>
<td>4</td>
<td>7 406</td>
<td></td>
<td></td>
<td></td>
<td>2 300</td>
<td>R 15 197 000.00</td>
</tr>
<tr>
<td>ID10 Potential New Linkages-3b</td>
<td>595</td>
<td>4</td>
<td>9 580</td>
<td></td>
<td></td>
<td></td>
<td>2 975</td>
<td>R 19 656 000.00</td>
</tr>
<tr>
<td>ID11 Potential New Linkages-4b</td>
<td>982</td>
<td>4</td>
<td>15 810</td>
<td></td>
<td></td>
<td></td>
<td>4 910</td>
<td>R 32 441 000.00</td>
</tr>
<tr>
<td>ID12 Potential New Linkages-4b</td>
<td>1 211</td>
<td>4</td>
<td>19 497</td>
<td></td>
<td></td>
<td></td>
<td>6 055</td>
<td>R 40 006 000.00</td>
</tr>
<tr>
<td>ID14 Potential New Linkages-4b</td>
<td>1 267</td>
<td>4</td>
<td>20 399</td>
<td></td>
<td></td>
<td></td>
<td>6 335</td>
<td>R 41 856 000.00</td>
</tr>
<tr>
<td>ID15 Potential New Linkages-5a</td>
<td>467</td>
<td>2</td>
<td>3 759</td>
<td></td>
<td></td>
<td></td>
<td>2 335</td>
<td>R 6 969 000.00</td>
</tr>
<tr>
<td>ID16 Potential New Linkages-5a</td>
<td>480</td>
<td>2</td>
<td>3 864</td>
<td></td>
<td></td>
<td></td>
<td>2 400</td>
<td>R 7 163 000.00</td>
</tr>
<tr>
<td>ID17 Potential New Linkages-5a</td>
<td>330</td>
<td>2</td>
<td>2 657</td>
<td></td>
<td></td>
<td></td>
<td>1 650</td>
<td>R 4 925 000.00</td>
</tr>
<tr>
<td>ID21 Existing Dirt Road-5b</td>
<td>1 349</td>
<td>2</td>
<td>10 859</td>
<td></td>
<td></td>
<td></td>
<td>6 745</td>
<td>R 20 131 000.00</td>
</tr>
</tbody>
</table>

**SUB-TOTAL:** R 395 150 000.00

**Stormwater Attenuation ponds:** R 30 300 000.00
## PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR PRECINCT PLAN: WARDS 4, 5, 7 AND 91

<table>
<thead>
<tr>
<th>Item</th>
<th>Length</th>
<th>No. of lanes (total for both directions)</th>
<th>Class 2/3 Roadworks</th>
<th>Class 3/4 Roadworks</th>
<th>Class 5 Roadworks</th>
<th>Class 5 Private Roadworks</th>
<th>Sidewalks (Asphalt)</th>
<th>Sub-total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units</td>
<td>m</td>
<td>-</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>m²</td>
<td>R 425 450 000.00</td>
</tr>
</tbody>
</table>

TOTAL: R 425 450 000.00
Note: Roadworks includes kerbing, ducting, road marking/signage, subsoil drainage and stormwater drains and excludes earthworks.

FIGURE 33: ROAD LINKAGES
3.7.3.4 Electrical Projects

3.7.3.4.1 Capacity and Phasing Requirements

The expansion of the bulk electricity infrastructure will need to be undertaken in co-ordination with Eskom and eThekwini Municipality. The image of the map below, shows the proposed growth and development plan for Mpumalanga, the zoning is expressed as per colour coding on the legend. The proposed plan is to be implemented in phases which are still to be finalised. High-level load demand calculations are tabulated and discussed in Table 22 below:

FIGURE 34: MPUMALANGA FAP ZONES

3.7.3.4.2 Electrical Load Demand Assumptions

The below electrical demand assumptions adopted values are applied to calculate the load demands per precinct land use according to the latest Mpumalanga FAP spreadsheet received from the client. The NRS 034:2005, NRS 069:2004 and SANS 204:2011 are standard guidelines used for demand load assumptions as captured below.
### TABLE 22: ELECTRICAL DEMAND ASSUMPTIONS

<table>
<thead>
<tr>
<th>Electrical Demand Assumptions</th>
<th>Adopted Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Commercial</td>
<td>120</td>
<td>W/m²</td>
</tr>
<tr>
<td>General Industry / Logistics</td>
<td>150</td>
<td>kVA/ha</td>
</tr>
<tr>
<td>Logistics Zone</td>
<td>50</td>
<td>W/m²</td>
</tr>
<tr>
<td>General Residential</td>
<td>2.3</td>
<td>kVA per unit</td>
</tr>
<tr>
<td>General Residential Hotel</td>
<td>120</td>
<td>VA/m²</td>
</tr>
<tr>
<td>Rural / Traditional Settlement</td>
<td>2.0</td>
<td>kVA per unit</td>
</tr>
<tr>
<td>Office Park</td>
<td>85</td>
<td>W/m²</td>
</tr>
<tr>
<td>Agricultural</td>
<td>20</td>
<td>VA/m²</td>
</tr>
<tr>
<td>Education</td>
<td>30</td>
<td>VA/m²</td>
</tr>
</tbody>
</table>

3.7.3.4.3 Load Demands per Grouped Landuse

Table 23 captures the overall demand load as calculated per Landuse type of the study area; a total of 202.7MVA is a high level estimated load demand. The Group Electrical Demands, Item1, in below table is a combination of eight different LUMPs, namely: agriculture high impact, agriculture medium impact, agriculture low impact, civic and social, education, extractive industry, general industry, light industry and logistics.

### TABLE 23: TOTAL LOAD DEMAND FOR THE AREA OF STUDY

<table>
<thead>
<tr>
<th>GROUPED LUMP</th>
<th>kVA</th>
<th>MVA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Group Electrical Demands</td>
<td>59154,32</td>
<td>59,15</td>
</tr>
<tr>
<td>2. Residential High Impact</td>
<td>1136,49</td>
<td>1,14</td>
</tr>
<tr>
<td>3. Residential Medium Impact</td>
<td>11974,38</td>
<td>11,97</td>
</tr>
<tr>
<td>4. Residential Low Impact</td>
<td>7239,45</td>
<td>7,24</td>
</tr>
<tr>
<td>5. Transitional Settlement</td>
<td>30820,98</td>
<td>30,82</td>
</tr>
<tr>
<td>6. Rural Settlement</td>
<td>2259,63</td>
<td>2,26</td>
</tr>
<tr>
<td>7. Mixed Use Core</td>
<td>18888,71</td>
<td>18,89</td>
</tr>
<tr>
<td>8. Mixed Use Low Impact</td>
<td>28608,89</td>
<td>28,61</td>
</tr>
<tr>
<td>9. Mixed Use Medium Impact</td>
<td>42652,71</td>
<td>42,65</td>
</tr>
<tr>
<td>TOTAL</td>
<td>202735,56</td>
<td>202,74</td>
</tr>
</tbody>
</table>

The total MVA required for the entire FAP study area is 202.73 MVA, and for the corridor along the MR385, the required electrical infrastructure is 95.86 MVA.

3.7.3.4.4 High Level Cost

The high-level electrical infrastructure cost for the proposed CORRIDOR is Mpumalanga FAP is R34 490 000.00 excl. VAT, which amounts to 95.86MVA of electrical demand. The cost excludes items below:

1. Brick built substations (as required to be built at the consumer boundary);
2. Eskom and eThekwini Municipality applications;
3. Major substation/s including associated switchgear;
4. EIA;
5. NERSA;
6. SANRAL, Transnet and etc. application;
7. Professional Engineering Fees;
8. Geotechnical surveys;
9. Land surveying

NB: The above high-level costs are based on eThekwini Municipality costs per connections and cost/kVA of calculated capacity.

3.7.3.4.5 INTEGRATION OF ELECTRICITY PLANS
As stated above Mpumalanga is currently supplied from the Mpumalanga Main Intake Substation, a 132/11 kV substation which Eskom owns the 132kV side and eThekwini Electricity owns the 11kV side. The infrastructure planning; short term to long term must be done in consultation with the relevant stakeholders. Eskom network planning takes into consideration various discipline specific plans either at strategic or more detailed project level.

Therefore, integration of plans at all levels, including Transmission, Sub-transmission and Reticulation requires effective communication between stakeholders. Special emphasis is required for liaison with Transmission Expansion Planning, it is important to develop a common vision between all parties involved in network investment for the long-term development and renewal of the network.

It must also be noted that the utilisation of any form of renewable energy should be promoted to service future development and reduce demand for bulk electricity infrastructure provision.
3.7.3.5 Solid Waste Management Projects

3.7.3.5.1 Solid Waste Management Improvements Required

The following solid waste management improvements based on land uses for the undeveloped areas are reflected in the table below:

**TABLE 24: SOLID WASTE GENERATION FROM CORRIDOR PROPOSED LANDUSES**

<table>
<thead>
<tr>
<th>Land use</th>
<th>MAX Total Waste Gen - MAX LANDFILLED m³/day</th>
<th>TOTAL MAX LANDFILLED m³/day</th>
<th>TOTAL MAX RECYCLED m³/day</th>
<th>LIKELY Total Waste Gen - likely LANDFILLED m³/day</th>
<th>LIKELY RECYCLED m³/day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Civic and Social Industry</td>
<td>0.861</td>
<td>0.516</td>
<td>0.344</td>
<td>0.688</td>
<td>0.413</td>
</tr>
<tr>
<td>General Industry</td>
<td>204.750</td>
<td>184.275</td>
<td>20.475</td>
<td>163.800</td>
<td>147.420</td>
</tr>
<tr>
<td>Light Industry</td>
<td>17.190</td>
<td>15.471</td>
<td>1.719</td>
<td>13.752</td>
<td>12.377</td>
</tr>
<tr>
<td>Mixed Use Low Impact</td>
<td>0.637</td>
<td>0.497</td>
<td>0.140</td>
<td>0.539</td>
<td>0.421</td>
</tr>
<tr>
<td>Mixed Use Medium Impact</td>
<td>3.233</td>
<td>2.516</td>
<td>0.717</td>
<td>2.129</td>
<td>1.645</td>
</tr>
<tr>
<td>Residential Low Impact</td>
<td>5.733</td>
<td>4.109</td>
<td>1.625</td>
<td>5.683</td>
<td>4.079</td>
</tr>
<tr>
<td>Residential Medium Impact</td>
<td>1.637</td>
<td>1.212</td>
<td>0.425</td>
<td>1.637</td>
<td>1.212</td>
</tr>
<tr>
<td>Transitional Settlement</td>
<td>0.013</td>
<td>0.010</td>
<td>0.003</td>
<td>0.013</td>
<td>0.010</td>
</tr>
<tr>
<td>Grand Total</td>
<td>234.053</td>
<td>208.607</td>
<td>25.447</td>
<td>188.241</td>
<td>167.578</td>
</tr>
</tbody>
</table>

3.7.3.5.2 Capacity and Phasing Requirements

From the above table, a volume of waste generated for the Corridor Precincts B1 and A1 is 234 m³/day of solid waste, of which 25.5 m³/day is recyclable and 208.6 m³/day goes to the Landfill. It is likely that the total of 188.2 m³/day of solid waste, of which 20.6 m³ is recyclable and 167.5 m³/day goes to the Landfill for new developments within Corridor of the FAP.
The Hammarsdale transfer station has 11 years of remaining life. Current capacity is 354m³/day. A total likely 213m³/day (510 tonnage/day) of transfer capacity at the transfer station is required for the ultimate FAP (new developments). The estimated likely 167.5m³/day to be landfilled can be catered for by the existing infrastructure in the short term to service the corridor.

It is noted that despite the solid waste transfer facilities currently having capacity. Frequent dumping along water courses has been noted by communities, and mentioned at the public meeting held on 3 March 2018. The municipality needs to take cognisance of this and consider methods to address this finding under their operational domain to include mitigation measures. It is recommended that this be made into a project and should be further investigated within municipal framework to prevent further pollution to river systems.
3.8 CORRIDOR PRIORITY ACTION AREAS

The following priority action areas have been identified within the precinct:

- Priority Action Area 1 – MR385 mixed use activity corridor
- Priority Action Area 2 – industrial expansion area west of Hammarsdale and integration with Hammers Estate
- Priority Action Area 3 – industrial expansion area southeast of Hammarsdale
- Priority Action Area 4 – mixed use node and development area along MR385 corridor
- Priority Action Area 5 – residential settlement development area northwest of MR385

3.8.1 PRIORITY ACTION AREA 1: MR385 ACTIVITY CORRIDOR

Priority Action Area 1 extends from the N3 / MR385 east interchange in the north to the Mpumalanga town centre precinct in the southwest. MR385 is a Minor Arterial (Class U3) and performs an important mobility, connectivity and accessibility functions for the precinct and broader Mpumalanga area. The lands along the corridor are designated for a mix of Logistics, Medium Impact Mixed Use, Low Impact Mixed Use, General Industry, Light Industrial and Environmental Management / Services in the Mpumalanga FAP.

The following roles, concepts and proposals have been identified for the development of the area:

<table>
<thead>
<tr>
<th>Roles and Functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The primary mobility and regional connectivity route connecting Mpumalanga to the broader metro area and associated social and economic opportunities.</td>
</tr>
<tr>
<td>The main higher order linkage route connecting different areas within Mpumalanga, such as Keystone Park, Hammarsdale, Mpumalanga town centre and Georgedale.</td>
</tr>
<tr>
<td>An important primary public transport route for buses and taxis and any future BRT services connecting the precinct to the Durban CBD and metro opportunities.</td>
</tr>
<tr>
<td>An increasingly important pedestrian link, particularly between the Hammarsdale and Mpumalanga areas.</td>
</tr>
<tr>
<td>A potential cycling route connecting places of work and residence within the broader Mpumalanga area.</td>
</tr>
<tr>
<td>The primary activity corridor within the area with a mix of more intensive land uses and activities along the corridor, including the new town centre mixed use development, Hammarsdale industrial area, Keystone Park logistics development and future mixed use and residential development opportunities.</td>
</tr>
<tr>
<td>The main gateway into the Hammarsdale / Mpumalanga area from the N3 at the Hammarsdale (east) and Cato Ridge (west) interchanges.</td>
</tr>
<tr>
<td>Currently a major physical barrier to integration and cross-linkage along the route due to the significant width of MR385 and the limited accessibility / entrances along the route but with the potential to act as a spatial integrator for the northern functional area and broader Mpumalanga area.</td>
</tr>
</tbody>
</table>
**Development Concept**

- A key environmental image of the area as experienced by commuters and pedestrians using MR385.
- A conduit for economic activity and passing trade, which supports existing businesses and generates visibility along this corridor and has the potential to additional generate opportunities for businesses to develop along the corridor.
- The multi-functional role of the corridor can lead to conflicts between the linkage and place functions and there is a need to try and achieve an appropriate balance between these functions.
- The MR385 corridor currently has a range of variable character and there is a need to develop a more consistent character along the corridor.

- Achieve an appropriate balance between the various roles and functions of MR385 corridor to ensure that it can perform optimally in terms of supporting both mobility and accessibility requirements and social and economic development opportunities.
- Develop the MR385 corridor as the primary regional accessibility route, public transport connector, activity corridor and spatial integrator for the northern functional area and broader Mpumalanga area.
- Design MR385 to safely accommodate a range of users, including private vehicles, public transport services, pedestrians and cyclists.
- Reinforce MR385 as the gateway into the northern functional area and broader Mpumalanga area and promote spatial integration and cross-linkages across the corridor by facilitating adjoining land use development, facilitating safe pedestrian linkages across MR385 and signalised intersections at junctions, developing a consistent landscaping treatment, encouraging buildings to respond to and address the corridor, etc.

**Land Use and Activity**

- Facilitate the development of a mix of land uses along the MR385 corridor accessed via controlled intersections, including a range of commercial / mixed uses, residential uses, industrial and light industrial / logistics uses and public / institutional uses.
- Facilitate the provision of trading facilities in designated areas as part of the proposed BRT / PT stops along MR385 but ensure that this does not conflict with traffic safety or public transport and NMT requirements.

**Access and Circulation**

- The MR385 corridor is a primary public transport connector (bus and taxi) that links the precinct with other settlements and developments along the MR385 corridor and with the broader metro area via the N3/M13.
- Develop MR385 as the primary public transport corridor for the proposed IRPTN / BRT trunk route connecting the precinct and Mpumalanga to the broader metro area, including the Pinetown and Durban CBDs.
- Develop a number of BRT / PT stops along MR385 at key interchange points between the primary and secondary public transport networks, including within.
walking distance of: a) the town centre and proposed rail station; b) Hammer’s Estate, Sterkspruit industrial area and Hammarsdale rail station; c) the Hammarsdale industrial area, commercial node and taxi rank; and d) the Keystone Park development and new residential development area to the west.

- Upgrade and widen MR385 to a 3 + 3 lane configuration north of Keystone Park junction to increase capacity for traffic growth for buses, taxis, cars and heavy vehicles.
- Upgrade and widen MR385 to a 2 + 2 lane configuration south of Keystone Park junction to increase capacity for traffic growth for buses, taxis, cars and heavy vehicles.
- Ensure that new accesses along MR385 are appropriately spaced to maintain the mobility function of the route and avoid the provision of direct site access from the route.
- Provide signalised junctions at major intersections along MR385 to ensure traffic and pedestrian safety and provide controlled access to cross-linkages that connect to MR385.
- Develop pedestrian / cycling multi-ways along either side of MR385 physically separated from the roadway to provide continuous NMT links connecting settlements and developments along the corridor.
- Provide public lighting and landscaping along these NMT multi-ways to provide safe and attractive NMT routes and to landscape, spatially define and soften the MR385 corridor.
- Provide safe pedestrian crossings at regular intervals along MR385 by establishing signalised intersections at key traffic junctions to connect land use development areas on either side of the route and provide access to public transport and activity nodes.
- Widen the existing road bridge or develop a new adjacent pedestrian / cycling bridge over the Sterkspruit River to provide for improved NMT connectivity between Mpumalanga and Hammarsdale along MR385.
- Develop a system of parallel local access streets along MR385 to accommodate local traffic movements and maintain the mobility function of MR385.

**Public Realm, Landscape and Built Form**

- Edges and interfaces with MR385 should be landscaped and/or architecturally treated to reduce visual impact and contribute to the experience of the road users. No service areas should face onto these roads unless adequately and appropriately screened.
- Establish landmarks / gateway treatments at the entrances to adjoining development areas from MR385 to improve imageability, legibility and orientation and reinforce these transition zones from the high-speed mobility function of the MR385 to the calmer traffic accessibility function of the adjoining streets. Key
locations include the main entrances to Priority Action Areas 2, 3 and 4 from MR385.

- Establish a consistent landscaping approach along MR385 to develop a recognisable character and environmental quality for the route.
- Utilise tree planting along the corridor to improve spatial definition and break up the wide expanse of the road corridor.

Environmental Management and Services

- Retain and protect existing the biodiversity and functional value of the D’MOSS through appropriate zonation, and more specifically buffering these systems (wetlands, grasslands, woodlands, rivers). The width of buffers varies according to: System type (grassland, wetland); Sensitivity of the system and associated species; Risk – posed by different development activities and systems; Thresholds - as established based on science, and or translated into policy. As a primary mechanism for protection, the general buffers used in defining the open space system need to be refined when developing project layouts by applying appropriate guidance and tools3 and/or specialist input.
- Limit the impact of proposed new transport infrastructure which traverses the key aquatic systems (Sterkspruit and tributaries) by: limiting the number of crossing points, locating crossing points at the narrowest point of these systems; using appreciate design to reduce disturbance to flow within the system.
- Improve the management of natural habitats (such as wetlands, grasslands, woodlands, rivers and dams) associated with the Sterkspruit River catchment to increase these habitats’ ability to supply services such as flood avoidance, water regulation and supply, erosion control, waste treatment and nutrient cycling and food production. This requires the inclusion of restoration and management plans for natural areas as conditions of planning approvals. The management plans must be developed in conjunction with the landscaping plans in order that the natural systems are integrated into the overall development vision, implementation and long-term management/maintenance.
- Identify and optimize any income sustainable generating opportunities from the open space system, to support improved appreciation of their value and finance restoration and management.
- Avoid development on slopes steeper than 1:3.
- Ensure compliance with all regulatory processes triggered by development activities, including the NEMA: EIA and DWS: Water-use license process. The restoration and management requirements must be conditions of approvals and must be built into the development.
- Limit negative impacts on natural systems and downstream users, particularly from the industrial activities within this area through best practice design and technology

3 Development of a methodology to determine appropriate buffer zones for developments associated with wetlands, rivers and estuaries (WRC Project No. K5/2200).
relating to effluent, solid waste and storm-water management practices. Demonstration of sustainable and appropriate options should also be a requirement of planning approvals.

<table>
<thead>
<tr>
<th>Infrastructure and Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Utilise MR385 as part of the infrastructure corridor connecting developments along the corridor to local infrastructure facilities within the area.</td>
</tr>
</tbody>
</table>

Figure 36 indicates the key FAP land use and transport proposals for the area.
FIGURE 36: PRIORITY ACTION AREA 1 – MPUMALANGA FAP PROPOSALS
### 3.8.2 Priority Action Area 2: Industrial / Business Expansion Area

Priority Action Area 2 is located west of MR385 and Hammarsdale industrial area and east of Hammers Estate residential area. The majority of the lands are designated as General Industry in the Mpumalanga FAP and there are also some parts designated as Environmental Management / Services. The following roles, concepts and proposals have been identified for the development of the area:

| Roles and Functions | • Low to medium impact industrial development expansion area along MR385 west of Hammarsdale.  
|                     | • Biodiversity and surface water management assets associated with Sterkspruit River tributary and D’MOSS areas.  
|                     | • Interface area between Hammers Estate residential area to the west and Hammarsdale industrial area to the east. |
| Development Concept | • Develop the lands west of MR385 as an industrial expansion area with general industrial uses and supporting infrastructure and services.  
|                     | • Facilitate improved integration and linkage between Hammers Estate in the west and Hammarsdale in the east. |
| Land Use and Activity | • Facilitate the development of the lands west of MR385 for general industrial uses. |
| Access and Circulation | • Provide access to the industrial lands and existing businesses via a new road linkage / collector street connecting to MR385 opposite the MR385 / Van Eck Avenue junction.  
|                     | • This collector street will provide a linkage to Hammers Estate and should be designed to accommodate local public transport services.  
|                     | • This new road linkage will allow for the existing direct site access onto MR385 to be closed off to improve the mobility function and safety of MR385.  
|                     | • Improve integration between Hammers Estate and Hammarsdale (including the existing Hammarsdale taxi rank and rail station and the proposed Hammarsdale BRT/PT station), including the new road linkage, a priority NMT linkage and a safe signalised crossing over MR385 linking to Hammarsdale and associated employment, service and BRT / PT and rail station facilities.  
|                     | • Encourage the development of an attractive local street network with sufficient capacity and an appropriate design treatment for industrial traffic.  
|                     | • Provide NMT multi-ways along all routes within the street network to provide safe, attractive and convenient walking and cycling routes.  
|                     | • Stacking and parking areas for trucks to be accommodated on-site. |
| Public Realm, Landscape and Built Form | • Facilitate the development of a range of industrial site sizes to allow for different types and scales of industrial development.  
|                     | • Establish a landmark / gateway treatment at the entrance to the industrial area from MR385 to improve imageability, legibility and orientation and reinforce this
transition zone from the high-speed mobility function of the MR385 to the calmer traffic accessibility function of the adjoining street.

- Edges and interfaces with MR385 should be landscaped and/or architecturally treated to reduce visual impact and contribute to the experience of the road users. No service areas should face onto these roads unless adequately and appropriately screened.
- Encourage landscaping along MR385 and the main collector streets to create treed avenues.
- Control the scale and placement of signage on buildings.

- Retain and protect existing the biodiversity and functional value of the D’MOSS through appropriate zonation, and more specifically buffering these systems (wetlands, grasslands, woodlands, rivers). The width of buffers varies according to: System type (grassland, wetland); Sensitivity of the system and associated species; Risk – posed by different development activities and systems; Thresholds - as established based on science, and or translated into policy. As a primary mechanism for protection, the general buffers used in defining the open space system need to be refined when developing project layouts by applying appropriate guidance and tools4 and/or specialist input.

- Limit the impact of proposed new transport infrastructure which traverses the key aquatic systems (Sterkspruit and tributaries) by: limiting the number of crossing points, locating crossing points at the narrowest point of these systems; using appreciate design to reduce disturbance to flow within the system.

- Improve the management of natural habitats (such as wetlands, grasslands, woodlands, rivers and dams) associated with the Sterkspruit River catchment to increase these habitats’ ability to supply services such as flood avoidance, water regulation and supply, erosion control, waste treatment and nutrient cycling and food production. This requires the inclusion of restoration and management plans for natural areas as conditions of planning approvals. The management plans must be developed in conjunction with the landscaping plans in order that the natural systems are integrated into the overall development vision, implementation and long-term management/maintenance.

- Identify and optimize any income sustainable generating opportunities from the open space system, to support improved appreciation of their value and finance restoration and management.

- Avoid development on slopes steeper than 1:3.

- Ensure compliance with all regulatory processes triggered by development activities, including the NEMA:EIA and DWS: Water-use license process. The

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4 Development of a methodology to determine appropriate buffer zones for developments associated with wetlands, rivers and estuaries (WRC Project No. K5/2200).
restoration and management requirements must be conditions of approvals and must be built into the development.

- Limit negative impacts on natural systems and downstream users, particularly from the industrial activities within this area through best practice design and technology relating to effluent, solid waste and storm-water management practices. Demonstration of sustainable and appropriate options should also be a requirement of planning approvals.

**Infrastructure and Services**

- Encourage sustainable approaches to infrastructure provision, such as Sustainable Drainage Systems (SuDS), renewable energy technologies (e.g. solar panels) and rainwater harvesting (i.e. rainwater tanks), for all new developments, and where feasible, retrofit the infrastructure of existing developments.
- Provide waterborne sanitation via a sewer connection to an upgraded regional Hammarsdale WWTW.
- Electricity bulk services and reticulation to be provided Eskom.
- Extend sewer, water and electricity reticulation systems to service new development areas.
- Solid waste collection to be provided via Durban Solid Waste services to the nearest solid waste site.
- Control effluent discharge and stormwater runoff generated by further industrial development.
- Retain the ecological integrity of the open space system to provide a green infrastructure network that can assist with surface water management, flood risk attenuation and waste assimilation to reduce the need for hard infrastructure.

Figure 37 indicates the key FAP land use and transport proposals for the area and Figure 38 indicates the conceptual layout and indicative built form response for the area.
FIGURE 37: PRIORITY ACTION AREA 2 – MPUMALANGA FAP PROPOSALS
3.8.3 **Priority Action Area 3: Industrial / Business Expansion Area**

Priority Action Area 3 is located southeast and south of Hammarsdale and is accessed primarily via Kelly Road and Buckman Boulevard. The majority of the lands are designated as General Industry and Light Industry in the Mpumalanga FAP and there are also some parts designated as Environmental Management / Services and for a mix of other uses. The following roles, concepts and proposals have been identified for the development of the area:

<table>
<thead>
<tr>
<th>Roles and Functions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Low to medium impact industrial development expansion area southeast of Hammarsdale and in Sterkspruit.</td>
<td></td>
</tr>
<tr>
<td>• Biodiversity and surface water management assets associated with Sterkspruit River and D’MOSS areas.</td>
<td></td>
</tr>
<tr>
<td>• Interface area between Sterkspruit and Mpumalanga areas to the south and Hammarsdale industrial area to the north.</td>
<td></td>
</tr>
</tbody>
</table>
## Development Concept

- Develop the lands southeast and south of Hammarsdale as an industrial expansion area with a mix of general and light industrial uses and supporting infrastructure and services.
- Facilitate improved integration and linkage between Hammarsdale and Sterkspruit / Mpumalanga.

## Land Use and Activity

- Develop former Rainbow Chickens lands southeast of Hammarsdale and the vacant lands in Sterkspruit for general industrial uses.
- Develop lands southeast of rail line for light industrial uses with a suitable layout and design to avoid adverse impacts on the surrounding D’MOSS areas.
- Facilitate the provision of trading facilities in designated areas as part of the proposed upgrade of the Hammarsdale rail station but ensure that this does not conflict with traffic safety or public transport and NMT requirements.

## Access and Circulation

- Provide access to the area southeast of Hammarsdale industrial area via Kelly Road and to the Sterkspruit industrial area via Buckman Boulevard and Shezi Main Road.
- Upgrade the Hammarsdale rail station precinct and improve NMT access to the station from surrounding areas. This will include the development of: a) a direct, safe and attractive dedicated NMT route connecting to Hammarsdale rail station from the Mpumalanga town centre precinct and Emalangeni residential areas to the southeast; and b) a pedestrian bridge and link from Kelly Road to the north of the station.
- Develop a future BRT / PT station within easy walking distance of the MR385 / Kelly Road junction and provide improved pedestrian linkages to this station along MR385 and surrounding areas.
- Provide improved pedestrian sidewalks along Kelly Road and Buckman Boulevard with associated public lighting and landscaping to provide safe, attractive and convenient walking routes.
- Retrofit cycling paths along Kelly Road and Buckman Boulevard to provide safe, attractive and convenient cycling routes.
- Stacking and parking areas for trucks to be accommodated on-site.

## Public Realm, Landscape and Built Form

- Facilitate a range of industrial site sizes to allow for different types and scale of industrial development.
- Establish a landmark / gateway treatment at the entrance to the industrial area / Kelly Road from MR385 to improve imageability, legibility and orientation and reinforce this transition zone from the high-speed mobility function of the MR385 to the calmer traffic accessibility function of the adjoining street.
- Retain, enhance and extend the existing landscaping along Kelly Road and provide public lighting along the route.
- Provide landscaping and public lighting along Buckman Boulevard and the proposed dedicated NMT link to Hammarsdale rail station.
- Control the scale and placement of signage on buildings.
### Environmental Management and Services

- Retain and protect existing the biodiversity and functional value of the D'MOSS through appropriate zonation, and more specifically buffering these systems (wetlands, grasslands, woodlands, rivers). The width of buffers varies according to: System type (grassland, wetland); Sensitivity of the system and associated species; Risk – posed by different development activities and systems; Thresholds - as established based on science, and or translated into policy. As a primary mechanism for protection, the general buffers used in defining the open space system need to be refined when developing project layouts by applying appropriate guidance and tools and/or specialist input.

- Limit the impact of proposed new transport infrastructure which traverses the key aquatic systems (Sterkspruit and tributaries) by: limiting the number of crossing points, locating crossing points at the narrowest point of these systems; using appreciate design to reduce disturbance to flow within the system.

- Improve the management of natural habitats (such as wetlands, grasslands, woodlands, rivers and dams) associated with the Sterkspruit River catchment to increase these habitats’ ability to supply services such as flood avoidance, water regulation and supply, erosion control, waste treatment and nutrient cycling and food production. This requires the inclusion of restoration and management plans for natural areas as conditions of planning approvals. The management plans must be developed in conjunction with the landscaping plans in order that the natural systems are integrated into the overall development vision, implementation and long-term management/maintenance.

- Identify and optimize any income sustainable generating opportunities from the open space system, to support improved appreciation of their value and finance restoration and management.

- Avoid development on slopes steeper than 1:3.

- Ensure compliance with all regulatory processes triggered by development activities, including the NEMA: EIA and DWS: Water-use license process. The restoration and management requirements must be conditions of approvals and must be built into the development.

- Limit negative impacts on natural systems and downstream users, particularly from the industrial activities within this area through best practice design and technology relating to effluent, solid waste and storm-water management practices. Demonstration of sustainable and appropriate options should also be a requirement of planning approvals.

### Infrastructure and Services

- Encourage sustainable approaches to infrastructure provision, such as Sustainable Drainage Systems (SuDS), renewable energy technologies (e.g. solar panels) and

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5 Development of a methodology to determine appropriate buffer zones for developments associated with wetlands, rivers and estuaries (WRC Project No. K5/2200).
rainwater harvesting (i.e. rainwater tanks), for all new developments, and where feasible, retrofit the infrastructure of existing developments.

- Provide waterborne sanitation via a sewer connection to an upgraded regional Hammarsdale WWTW.
- Electricity bulk services and reticulation to be provided Eskom.
- Extend sewer, water and electricity reticulation systems to service new development areas.
- Solid waste collection to be provided via Durban Solid Waste services to the nearest solid waste site.
- Control effluent discharge and stormwater runoff generated by further industrial development.
- Retain the ecological integrity of the open space system to provide a green infrastructure network that can assist with surface water management, flood risk attenuation and waste assimilation to reduce the need for hard infrastructure.

Figure 39 indicates the key FAP land use and transport proposals for the area and Figure 40 indicates the conceptual layout and indicative built form response for the area.
FIGURE 39: PRIORITY ACTION AREA 3 – MPUMALANGA FAP PROPOSALS
3.8.4 **Priority Action Area 4: Mixed Use Development Area**

Priority Action Area 4 is located in the northern part of the functional area west of MR385 and Keystone Park. The majority of the lands are designated as Mixed Use Medium Impact and Mixed Use Low Impact in the Mpumalanga FAP and there are also some parts designated as Environmental Management / Services. The following roles, concepts and proposals have been identified for the development of the area:

| Roles and Functions | Proposed mixed use urban node with commercial, service, residential and public facility uses serving the surrounding development areas. |

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**FIGURE 40: PRIORITY ACTION AREA 3 – CONCEPTUAL LAYOUT AND INDICATIVE BUILT FORM RESPONSE**
- Biodiversity and surface water management assets associated with Sterkspruit River tributary and D’MOSS areas.
- Interface area providing access to BRT / PT facilities along MR385 from a proposed new residential settlement development area to the west and linkages to MR385 and Keystone Park logistics development area to the east.

**Development Concept**

- Develop the lands west of MR385 as a mixed-use node and development area with supporting land uses, public spaces, facilities and amenities.

**Land Use and Activity**

- Develop a mixed-use node and new activity spine integrated with a proposed BRT/PT station along MR385 corridor.
- Develop a vertical and/or horizontal mix of commercial, residential and public facility uses.
- Support the provision of trading facilities in designated areas as part of the mixed-use development node and activity spine but ensure that this does not conflict with traffic safety or public transport and NMT requirements.

**Access and Circulation**

- Provide access to the area via new road linkages from MR385, including opposite the northern entrance to Keystone Park and a further linkage to the south that avoids the environmental management area.
- The northern junction should be developed as a full, signalised intersection with right and left turning lanes, safe pedestrian crossings, etc.
- The southern junction should also preferably be developed as a signalised intersection with right and left turning lanes to increase traffic capacity, reduce the right turning lane requirements at the northern junction and provide higher levels of access to the mixed-use node. The southern junction could also potentially be developed as a left in, left out junction if detailed road design requirements indicate that this is necessary.
- Develop a new BRT / PT station at the northern junction to the mixed-use area providing a high level of public transport access to the area.
- Develop an activity spine running north-south through the mixed-use area as the main high street for linking and structuring the development of the area.
- Provide for adequate public transport feeder services linking to the proposed BRT / PT station, including potential taxi facilities along the main street/s within the mixed-use area.
- Develop an interconnected urban street network with a fine-grained block structure to promote permeability and walkability.
- Provide NMT multiways along all routes within the street network to provide safe, attractive and convenient walking and cycling routes.
- Provide safe pedestrian crossings over MR385 at each of the junctions with the new road linkages to the area, including the new BRT / PT station at the northern junction.
<table>
<thead>
<tr>
<th>Public Realm, Landscape and Built Form</th>
<th>Environmental Management and Services</th>
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| • Encourage the development of on-site parking spaces to the rear of buildings to give shops, business premises and public facilities maximum exposure to the street and passing trade.  
• Provide traffic calming measures along all routes in the vicinity of new schools. | • Retain and protect existing the biodiversity and functional value of the D’MOSS through appropriate zonation, and more specifically buffering these systems (wetlands, grasslands, woodlands, rivers). The width of buffers varies according to: System type (grassland, wetland); Sensitivity of the system and associated species; Risk – posed by different development activities and systems; Thresholds – as established based on science, and or translated into policy. As a primary mechanism for protection, the general buffers used in defining the open space system need to be refined when developing project layouts by applying appropriate guidance and tools and/or specialist input. |
| • Establish a high quality-built form, landscaping and public space quality for the mixed-use node and activity spine through the provision of landscaped streets, pedestrian sidewalks, and higher quality building frontages onto adjoining access roads and by responding to existing contours to avoid the creation of large scale platforms for new buildings.  
• Develop an interconnected urban street network with a fine-grained block structure to promote permeability and walkability.  
• Develop a network of new public spaces / parks to provide recreational facilities and focal points within the area.  
• Establish a landmark / gateway treatment at the entrance to the mixed-use node from MR385 in the vicinity of the proposed BRT / PT station to improve imageability, legibility and orientation and reinforce this transition zone from the high-speed mobility function of the MR385 to the calmer traffic accessibility function of the adjoining street.  
• Ensure that new retail and business developments respond positively to adjoining public streets and spaces. Encourage buildings to locate along the road frontage (a zero-building line) with retail uses on the ground floor and retail, office and residential uses on the upper floors.  
• Encourage responsive built form to spatially define and activate adjoining public spaces and streets.  
• Control the scale and placement of signage on buildings.  
• Edges and interfaces with MR385 should be landscaped and/or architecturally treated to reduce visual impact and contribute to the experience of the road users. No service areas should face on to these roads unless adequately and appropriately screened. |  
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6 Development of a methodology to determine appropriate buffer zones for developments associated with wetlands, rivers and estuaries (WRC Project No. K5/2200). |  

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**Infrastructure and Services**

- Encourage sustainable approaches to infrastructure provision, such as Sustainable Drainage Systems (SuDS), renewable energy technologies (e.g. solar panels) and rainwater harvesting (i.e. rainwater tanks), for all new developments, and where feasible, retrofit the infrastructure of existing developments.
- Provide waterborne sanitation via a sewer connection to an upgraded regional Hammarsdale WWTW.
- Electricity bulk services and reticulation to be provided Eskom.
- Extend sewer, water and electricity reticulation systems to service new development areas.
- Solid waste collection to be provided via Durban Solid Waste services to the nearest solid waste site.
- Retain the ecological integrity of the open space system to provide a green infrastructure network that can assist with surface water management, flood risk attenuation and waste assimilation to reduce the need for hard infrastructure.
PREPARATION OF THE MPUMALANGA NORTHERN FUNCTIONAL AREA PLAN AND DRAFT SCHEME, INCLUDING THE MR385 EAST CORRIDOR PRECINCT PLAN: WARDS 4, 5, 7 AND 91

Figure 41 indicates the key FAP land use and transport proposals for the area and Figure 42 indicates the conceptual layout and indicative built form response for the area.

FIGURE 41: PRIORITY ACTION AREA 4 – MPUMALANGA FAP PROPOSALS
3.8.5 Priority Action Area 5: Residential Settlement Development Area

Priority Action Area 5 is located in the northern part of the functional area west of MR385 and Keystone Park and south of the N3. The majority of the lands are designated as Residential Medium Impact and Residential Low Impact in the Mpumalanga FAP and there are also some parts designated as Environmental Management / Services. The following roles, concepts and proposals have been identified for the development of the area:

| Roles and Functions | • Proposed low to medium density residential settlement development area with supporting public facilities and infrastructure.  
|                     | • Biodiversity and surface water management assets associated with Sterkspruit River tributary and D'MOSS areas. |
| Development Concept | • Develop the lands as a residential settlement development area with supporting street network, NMT infrastructure, public spaces, facilities, amenities and landscaping and service infrastructure. |
**Land Use and Activity**

- Encourage the development of a mixed income residential settlement including middle to higher income and gap housing.
- Promote the development of more medium density residential uses along the main public street network and lower density residential development away from the main streets and adjoining the open space system and environmental assets.
- Avoid the creation of gated residential estates, particularly along the main public street network. Gated residential estates may be considered in some cases provided they are of a limited size, located away from the main public street network and do not unduly undermine connectivity, permeability and walkability, such as along short cul-de-sac routes enclosed by the open space system on three sides.
- Facilitate the provision of public facilities, including primary and secondary schools, in appropriate locations, such as on higher, flatter land, to provide focal points within residential neighbourhoods.
- Promote the clustering and multi-use of public facilities, such as primary and secondary schools, community halls and sports fields, that can be shared across user groups within the local community area.
- Investigate the potential to develop limited low-impact tourism / eco-tourism / nature-based tourism facilities and/or activities in a sustainable manner along the edge of the open space system.

**Access and Circulation**

- Provide access to the area via the collector street connecting to the junction with MR385 (opposite Keystone Park) and via a link to the district road south of the N3 (which links to MR385 via an underpass under the N3).
- Establish a publicly accessible primary street network providing linkages into the area from MR385 and a loop street system connecting through the area.
- Provide for adequate public transport feeder services linking to the proposed BRT / PT station along MR385, including potential public transport facilities along the main collector street in the vicinity of the main public facilities.
- Ensure that an interconnected residential street network is developed with a fine-grained block structure to promote permeability and walkability.
- Provide traffic calming measures along all routes in the vicinity of new schools.
- Provide NMT multi-ways along all routes within the street network to provide safe, attractive and convenient walking and cycling routes.
- Support the proposal in the Cato Ridge FAP to provide for a new local access road to be constructed parallel to the N3 in order to connect the new industrial area in Cato Ridge East to the MR385 south of the existing Cato Ridge village, to a new interchange north of the proposed industrial area and to the MR385 at Keystone in Mpumalanga via Track 73031.
- Investigate the potential to establish an NMT linkage connecting to the Cato Ridge future development area to the west.
- Create identifiable neighbourhoods that respond to the local context and landscape character within each development block tied together by consistently landscaped linkage roads and pedestrian sidewalks.

- Establish a high quality-built form, landscaping and public space quality for the residential areas through the provision of landscaped streets, pedestrian sidewalks, and higher quality building frontages onto adjoining access roads and by responding to existing contours to avoid the creation of large scale platforms for new buildings.

- Develop a network of new public spaces / parks to provide recreational facilities and focal points within the various residential neighbourhoods.

- Ensure that an interconnected residential street network is developed with a fine-grained block structure to promote permeability and walkability.

- Encourage responsive built form to spatially define and activate adjoining public spaces and streets, including reduced building lines along the main public residential street network.

- Encourage the landscaping of the main public spaces and street network to create treed avenues and reinforce the public space structure.

- Promote the development of a “green” corridor along the N3 route to enhance the scenic attractiveness of this gateway to the metro area. This could be achieved through retaining existing open spaces and agricultural lands where appropriate, removing alien vegetation, providing appropriate landscaping for new developments and creating view “corridors”.

- Retain existing panoramic views from elevated lands over the surrounding river valleys.

- Ensure that building forms are appropriately sited and designed to avoid the creation of obtrusive developments within the landscape.

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**Environmental Management and Services**

- Retain and protect existing the biodiversity and functional value of the D’MOSS through appropriate zonation, and more specifically buffering these systems (wetlands, grasslands, woodlands, rivers). The width of buffers varies according to: System type (grassland, wetland); Sensitivity of the system and associated species; Risk – posed by different development activities and systems; Thresholds - as established based on science, and or translated into policy. As a primary mechanism for protection, the general buffers used in defining the open space system need to be refined when developing project layouts by applying appropriate guidance and tools7 and/or specialist input.

- Limit the impact of proposed new transport infrastructure which traverses the key aquatic systems (Sterkspruit and tributaries) by: limiting the number of crossing points, locating crossing points at the narrowest point of these systems; using appreciate design to reduce disturbance to flow within the system.

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7 Development of a methodology to determine appropriate buffer zones for developments associated with wetlands, rivers and estuaries (WRC Project No. K5/2200).
• Improve the management of natural habitats (such as wetlands, grasslands, woodlands, rivers and dams) associated with the Sterkspruit River catchment to increase these habitats’ ability to supply services such as flood avoidance, water regulation and supply, erosion control, waste treatment and nutrient cycling and food production. This requires the inclusion of restoration and management plans for natural areas as conditions of planning approvals. The management plans must be developed in conjunction with the landscaping plans in order that the natural systems are integrated into the overall development vision, implementation and long-term management/maintenance.

• Identify and optimize any income sustainable generating opportunities from the open space system, to support improved appreciation of their value and finance restoration and management.

• Avoid development on slopes steeper than 1:3.

• Ensure compliance with all regulatory processes triggered by development activities, including the NEMA: EIA and DWS: Water-use license process. The restoration and management requirements must be conditions of approvals and must be built into the development.

• Limit negative impacts on natural systems and downstream users, particularly from the industrial activities within this area through best practice design and technology relating to effluent, solid waste and storm-water management practices. Demonstration of sustainable and appropriate options should also be a requirement of planning approvals.

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**Infrastructure and Services**

• Encourage sustainable approaches to infrastructure provision, such as Sustainable Drainage Systems (SuDS), renewable energy technologies (e.g. solar panels) and rainwater harvesting (i.e. rainwater tanks), for all new developments, and where feasible, retrofit the infrastructure of existing developments.

• Provide waterborne sanitation via a sewer connection to an upgraded regional Hammarsdale WWTW.

• Electricity bulk services and reticulation to be provided Eskom.

• Extend sewer, water and electricity reticulation systems to service new development areas.

• Solid waste collection to be provided via Durban Solid Waste services to the nearest solid waste site.

• Retain the ecological integrity of the open space system to provide a green infrastructure network that can assist with surface water management, flood risk attenuation and waste assimilation to reduce the need for hard infrastructure.

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Figure 43 indicates the key FAP land use and transport proposals for the area and Figure 44 indicates the conceptual layout and indicative built form response for the area.
FIGURE 43: PRIORITY ACTION AREA 5 – MPUMALANGA FAP PROPOSALS
FIGURE 44: PRIORITY ACTION AREA 5 – CONCEPTUAL LAYOUT AND INDICATIVE BUILT FORM RESPONSE
4 CONCLUSION

The Corridor Plan provides more detailed guidelines for the development of the MR385 east corridor and the associated priority action areas that have been identified. The corridor plan also provides an opportunity to apply, test and refine the proposals and guidelines in the Mpumalanga FAP prepared in the previous phase of the project.

The corridor plan confirms and reinforces the importance of MR385 as a mixed-use activity corridor that performs a multi-faceted role in terms of access and mobility, land use and economic development and spatial integration and legibility. The corridor plan also targets those parts of the functional area that are likely to experience significant growth and development pressure. The corridor plan has proposed refinements to the land use and transport proposals for some of these areas, including the land use designations in priority action area 4 and 5 and the transport proposals along MR385. These changes have accordingly been incorporated into the final version of the Mpumalanga FAP.

It should be noted, however, that the majority of lands along the corridor are under private ownership and it will be the prerogative of private landowners and developers to develop detailed layout proposals for the development of these lands. The corridor plan accordingly provides guidelines to assist the municipality in understanding the strategic potential of the lands and the conceptual layout and built form that could be developed for the area in order to equip the municipality with the tools to assess and guide any future proposals towards the realisation of the vision for the Mpumalanga northern functional area.

It is also stressed that the development potential within the corridor is heavily reliant on sufficient access being provided within the study area. Of critical importance is the second access point off of the MR 385 feeding the mixed-use development near Keystone. If this access point does not come to fruition, or is compromised by being a lower order intersection, then the development potential will need to be reduced within the Precinct.