



Sishen DMS Upgrade

ECONOMIC IMPACT ASSESSMENT

October 2017

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The information contained in this report has been compiled with the utmost care and accuracy within the parameters specified in this document. Any decision based on the contents of this report is, however, the sole responsibility of the decision maker.

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EXECUTIVE SUMMARY

DEMACON was requested by **EXM Advisory Services** to compile an **upgrade of the existing DMS processing plant at Sishen Mine in Kathu.**

Based on an initial brief received, it is understood that the client requires a proposal for an **Economic Impact Assessment** pertaining to the abovementioned proposed project, particularly the **implications of increased production at Sishen Mine due to the process upgrade.**

Economic Base Profiling

- Providing a profile of the local and district economies relative to the provincial economy in terms of size and growth performance
- Provide a detailed sectoral profile for the local and district economies

Sectoral Competitive and Comparative Analysis

- Competitive Advantage Analysis (CAA) is an assessment of the structure and performance of the economy of an area, to identify sectoral economic strengths (“competitive advantages”) and weaknesses, and potential for economic development.

Socio-Economic Profiling

- Profiling of the sending municipalities (Joe Morolong LM and Ga-Segonyana LM) as well as the host municipality (Gamagara LM)
- Detailed profiling of key demographic indicators including age profile, level of education, employment status, dwelling type, tenure type income and LSM (Living Standard Measurement)
- Illustrates the average household income and living standard within the local economy

Quantify the Significance of DMS Upgrade at Sishen Mine

- Provides a quantitative assessment of the impact of the DMS upgrade at Sishen Mine, illustrating the economy-wide impact of the Sishen mining activity
- Provides an indication of the significance and contribution of the Sishen mine, including downstream effects.

SISHEN MINE BACKGROUND

SISHEN MINE BACKGROUND

Sishen mine is the largest operation in Kumba's portfolio, producing around 70% of their annual iron ore production. Located in the Northern Cape province, close to the town of Kathu, the mine has been in operation since 1953 and is one of the largest single open-pit mines in the world. All of the mined ore is transported to the beneficiation plant where it is crushed, screened and beneficiated. Kumba is the only haematite ore producer in the world to fully beneficiate its product, made possible through dense medium separation (DMS) and jig technology. At year end the mine had 4 040 permanent full-time employees and 1 426 fulltime contractors.

LOCALITY / ZONE OF INFLUENCE

The mine has a sphere of influence which extends to the following areas:

The host municipality, i.e. Gamagara LM includes the footprint of the Sishen iron ore mining activity, the town of Kathu, Dibeng, Sesheng, and Olifantshoek. Sending municipalities include Joe Morolong LM and Ga-Segonyana LM

The economic data analysed in this report will focus on Gamagara Local Municipality as the local economy in which the mine is situated and the John Taolo Gaetsewe District Municipality, in relation to the Northern Cape Province. The socio-economic data analysed will focus on John Taolo Gaetsewe District Municipality, including a detailed analysis of Gamagara Local Municipality, as well as the main sending municipalities – Ga-Segonyana Local Municipality and Joe Morolong Local Municipality.

PROJECT BACKGROUND

The project entails the upgrading of the DMS processing plant to **Ultra-High Dense Media Separation (UHDMS) technologies**. The value proposition for this project is based on the production of an **additional 3.2Mtpa** of saleable product by May 2021, for the duration of LOM, of standard lump and fine product beneficiating 12.3Mtpa of "C" grade ores in the modified DMS Plant.

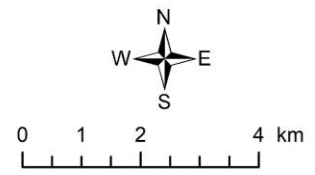
Minimal mining cost would be incurred as the material is already being mined as part of the current LOM production schedule at Sishen. This is a brownfields project, and the design would make maximum use of existing 'free' plant capacity, services and infrastructure in the underutilised DMS Plant. This requires limited modification to the UHDMS capable of processing a combined plant feed of "A" and "C" grade ores. The design would make use of existing product, discard and slimes-handling systems where excess capacity is available. Ultra-high dense medium separation (UHDMS) is a processing technology similar to dense medium separation (DMS). However, medium densities can reach 4.2g/cc (versus 3.8g/cc) at which low grade materials can be efficiently beneficiated.

The benchmarked capital intensity of the project is thus relatively low compared to typical iron ore projects. Based on Pre-Feasibility B design and cost estimates, the financial return on investment calculated using the Kumba Corporate Model (updated June 2017) and Anglo American (March 2017) Strategic Parameters is as shown in the table below.

SISHEN MINE LOCATION



- Legend**
- INFRASTRUCTURE**
- National Road
 - Regional Road
 - District Road
 - Railways
- MINING OPERATIONS**
- Existing



USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen and the GIS User Community; Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

DEMOGRAPHIC ANALYSIS

JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY



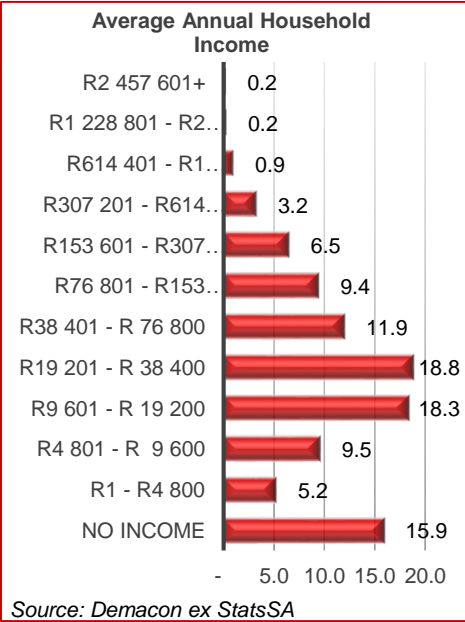
POPULATION

2011: 224 718
2017: 242 884

HOUSEHOLDS

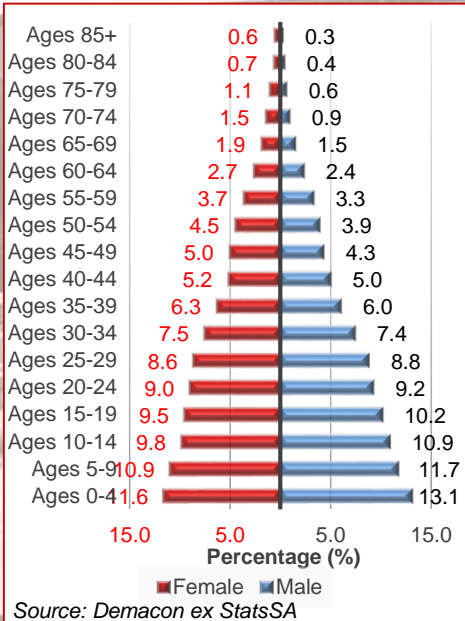
2011: 61 286
2017: 69 288

Source: Demacon ex StatsSA



Economically Active Population: 45.3%
Employed: 70.3%
Unemployed: 29.7%

Source: Demacon ex StatsSA



Freestanding house: 73.1%
Traditional dwelling: 11.6%
Informal dwelling: 10.5%

Source: Demacon ex StatsSA



No schooling: 14.7%
Some primary: 19.4%
Complete primary: 5.2%
Some secondary: 31.7%
Grade 12: 20.6%
Higher education: 8.4%

Source: Demacon ex StatsSA

GAMAGARA LOCAL MUNICIPALITY



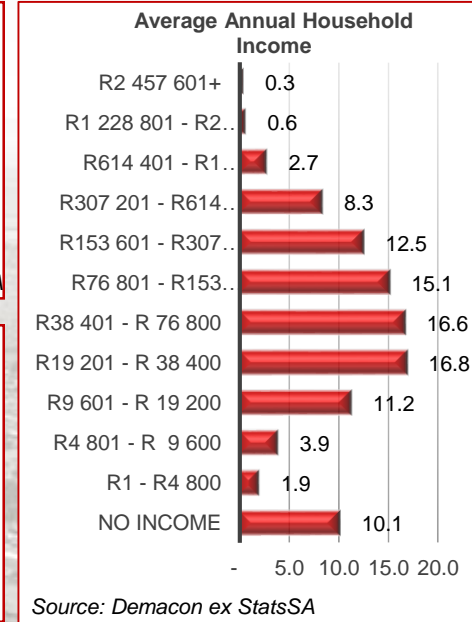
POPULATION

2011: 41 613
2017: 51 719

HOUSEHOLDS

2011: 10 806
2017: 13 092

Source: Demacon ex StatsSA



Economically Active Population: 65.2%
Employed: 82.3%
Unemployed: 17.7%

Source: Demacon ex StatsSA



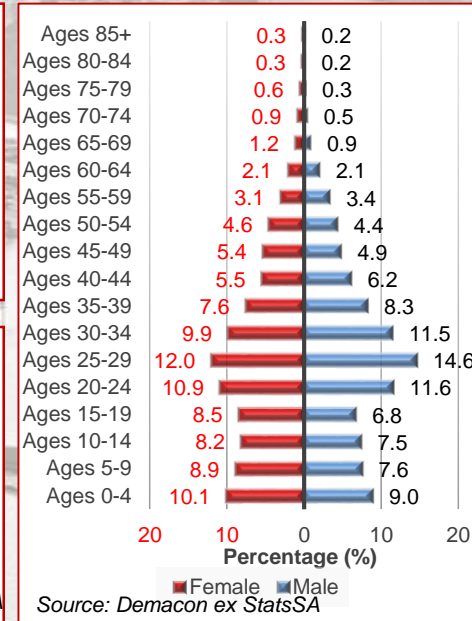
Freestanding House: 66.5%
Informal dwelling: 23.0%
Flat / apartment: 5.1%

Source: Demacon ex StatsSA



No schooling: 10.6%
Some primary: 11.3%
Complete primary: 5.5%
Some secondary: 33.3%
Std 10/Grade 12: 26.6%
Higher education: 12.6%

Source: Demacon ex StatsSA

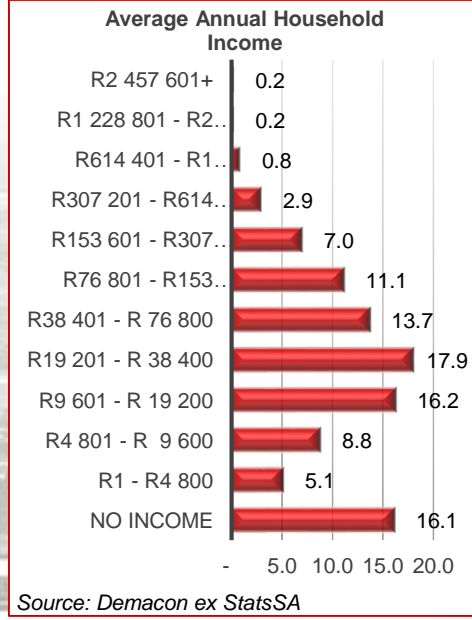


DEMOGRAPHIC ANALYSIS – SENDING MUNICIPALITIES

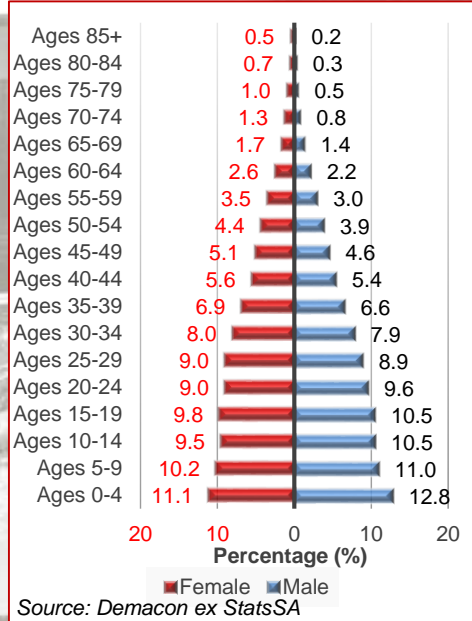
GA-SEGONYANA LOCAL MUNICIPALITY



POPULATION
 2011: 93 617
 2017: 106 813
HOUSEHOLDS
 2011: 26 798
 2017: 31 830
 Source: Demacon ex StatsSA



Economically Active Population: 50.8%
 Employed: 66.3%
 Unemployed: 33.7%
 Source: Demacon ex StatsSA



Freestanding House: 78.1%
 Informal dwelling: 11.3%
 Traditional dwelling: 6.7%
 Source: Demacon ex StatsSA

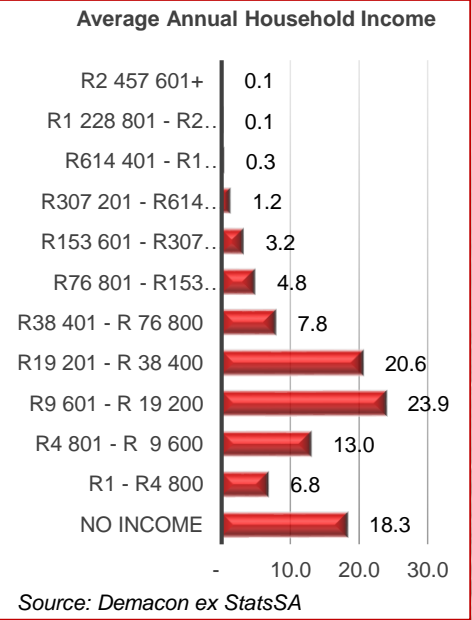


No schooling: 9.7%
 Some primary: 17.3%
 Complete primary: 4.9%
 Some secondary: 34.3%
 Std 10/Grade 12: 23.7%
 Higher education: 10.0%
 Source: Demacon ex StatsSA

JOE MOROLONG LOCAL MUNICIPALITY



POPULATION
 2011: 89 487
 2017: 84 353
HOUSEHOLDS
 2011: 23 683
 2017: 24 366
 Source: Demacon ex StatsSA



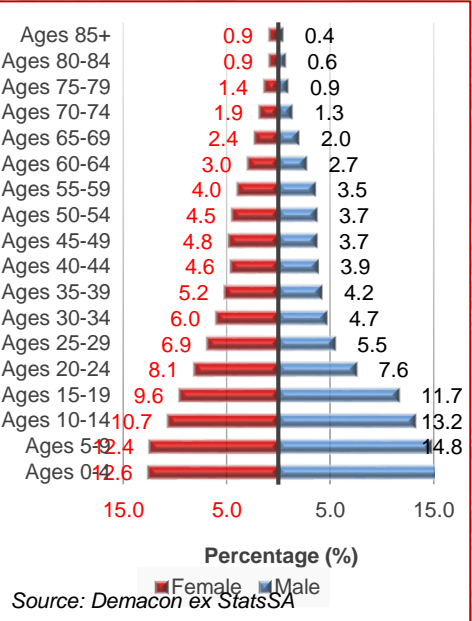
Economically Active Population: 26.2%
 Employed: 61.4%
 Unemployed: 38.67%
 Source: Demacon ex StatsSA



Freestanding House: 71.0%
 Traditional dwelling: 22.4%
 Informal dwelling: 4.2%
 Source: Demacon ex StatsSA

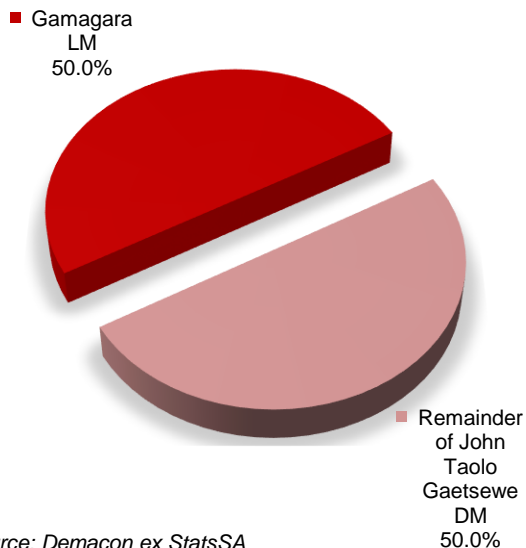


No schooling: 22.9%
 Some primary: 26.6%
 Complete primary: 5.2%
 Some secondary: 27.8%
 Std 10/Grade 12: 13.4%
 Higher education: 4.1%
 Source: Demacon ex StatsSA



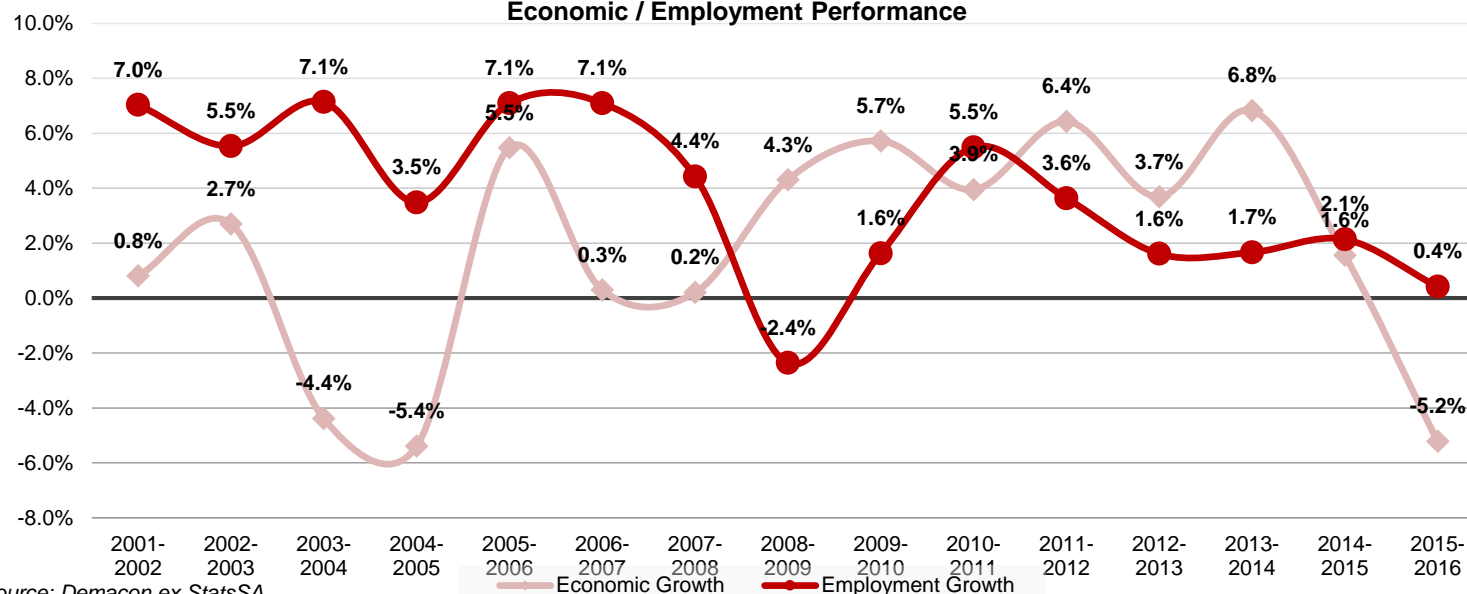
GAMAGARA LOCAL MUNICIPALITY ECONOMIC BACKGROUND

Size of Local Economy, 2016



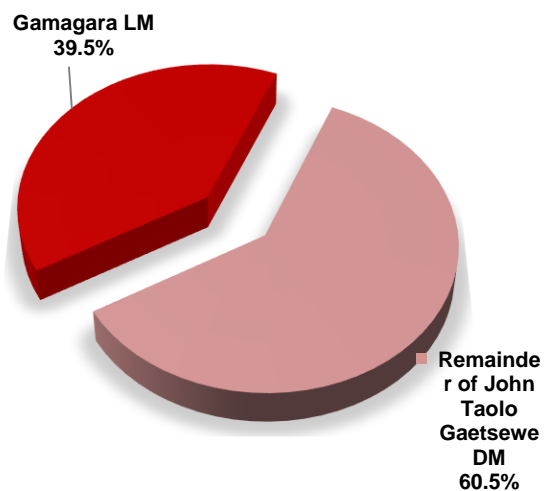
Source: Demacon ex StatsSA

Economic / Employment Performance



Source: Demacon ex StatsSA

Total Employment Contribution, 2016



Source: Demacon ex StatsSA

ECONOMIC & EMPLOYMENT GROWTH

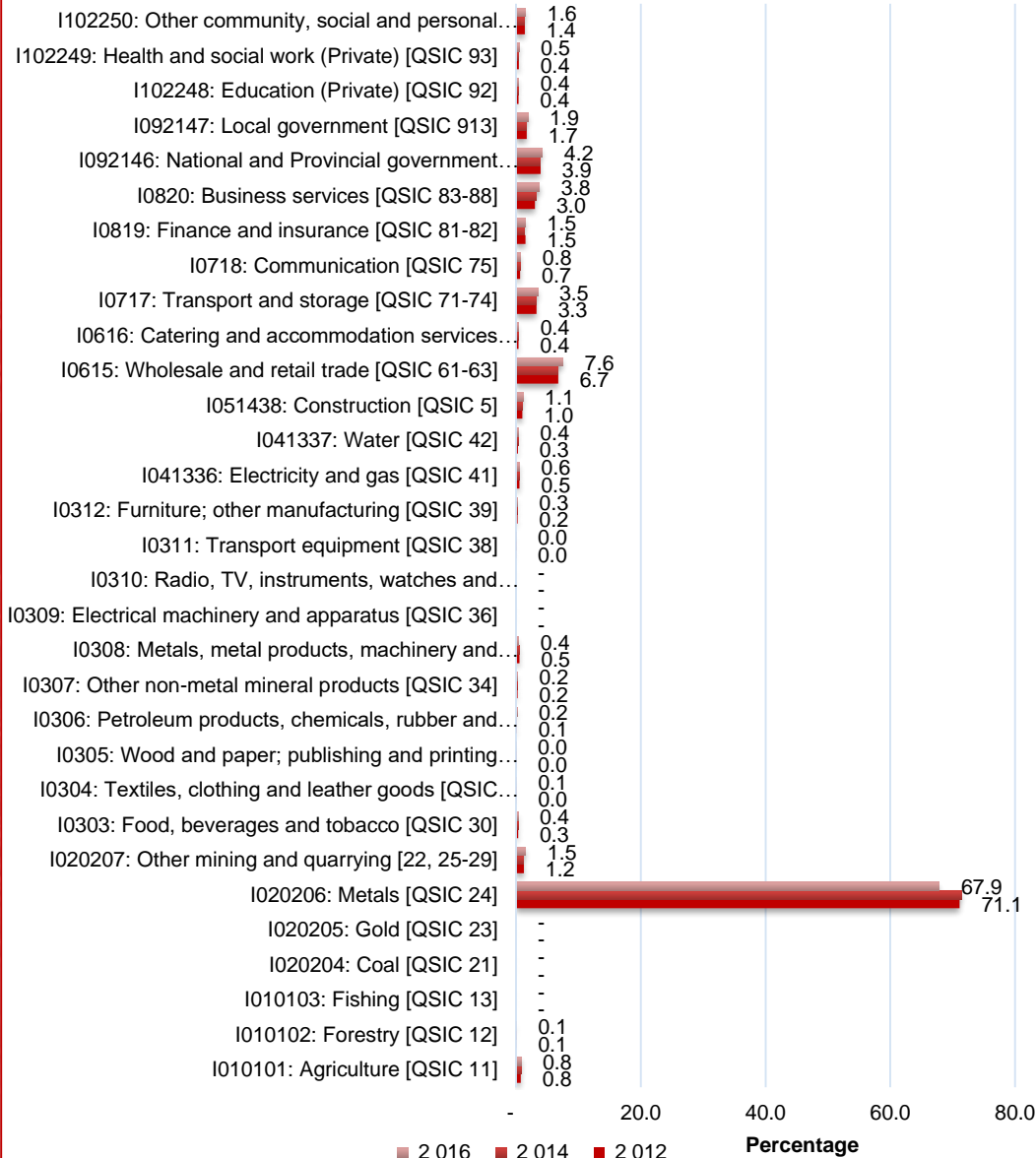
- ✓ The **Gamagara local economy** reached an average growth rate of approximately 1.8% over the long term period (2001 to 2016). The short to medium term recorded an average growth rate of approximately 2.7%.
- ✓ **Gamagara local employment** reached an average growth rate of approximately 3.7% over the long term period (2001 to 2016). The short to medium term recorded an average growth rate of approximately 1.9%.
- ✓ Since 2013, the employment growth has declined, indicating the effect of mechanisation on employment levels.

	2006	2016	Net gain / loss	Average gain / loss per annum
Working Age Population	2 188	2 995	807	81
Not economically active	6 060	7 358	1 298	130
Economically Active	3 475	4 714	1 239	124
Total Employment (formal & informal)	11 723	15 067	3 344	334
Unemployment	1 157	3 311	2 154	215
	12 880	18 378	5 498	550

A total of 3 344 formal jobs were created during the past ten years (from 2006 to 2016) in Gamagara Local Municipality, which translates to approximately 1334 formal employment opportunities created per annum. The number of highly skilled employment increased at an average of 81 new jobs per annum. The informal sector increased with approximately 2 154 jobs during the past ten years (from 2006 to 2016), which translates to approximately 215 new informal jobs per annum.

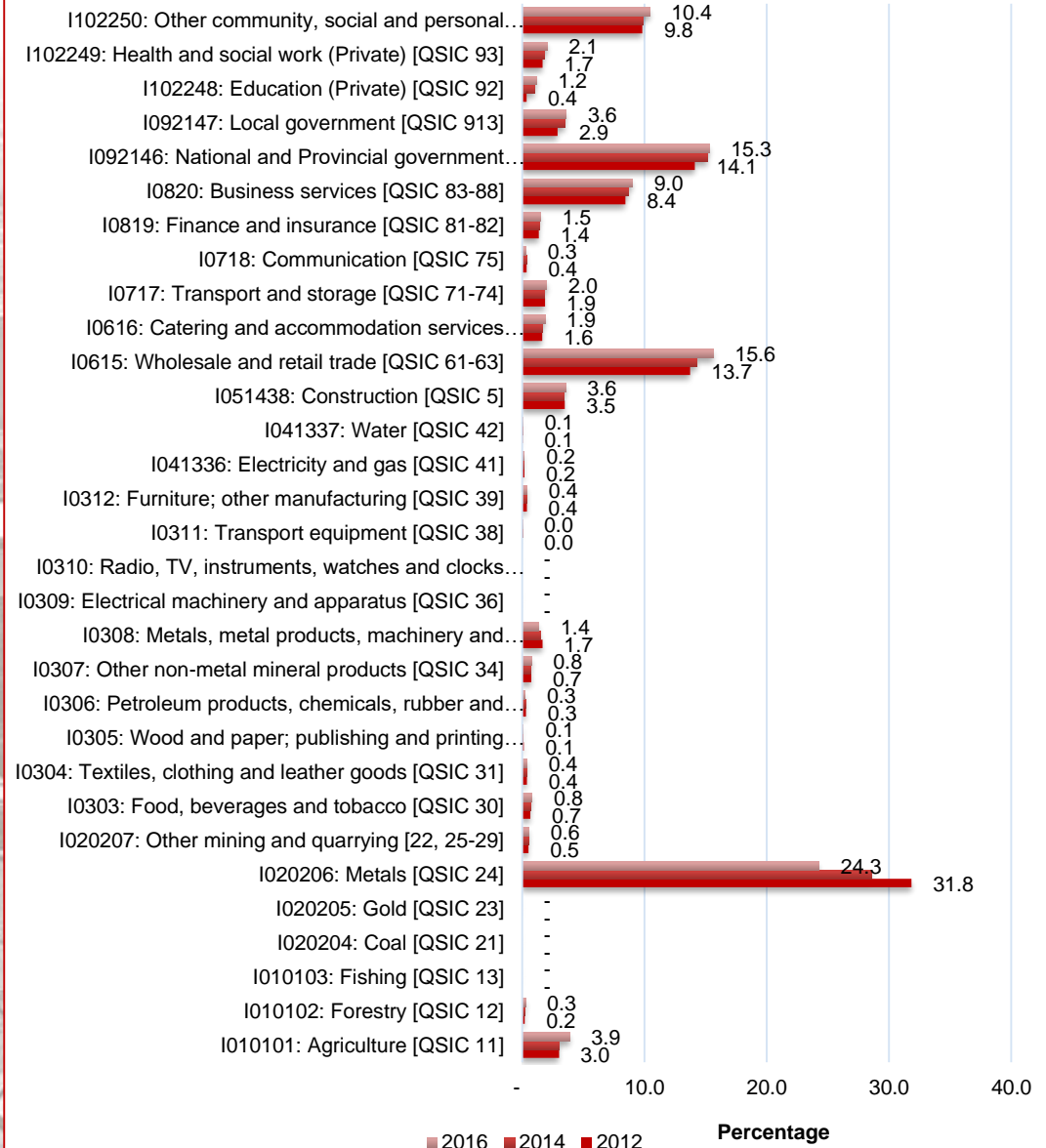
GAMAGARA LOCAL MUNICIPALITY ECONOMIC BACKGROUND

Gamagara Local Economy - Sectoral Profile



Source: Demacon ex StatsSA

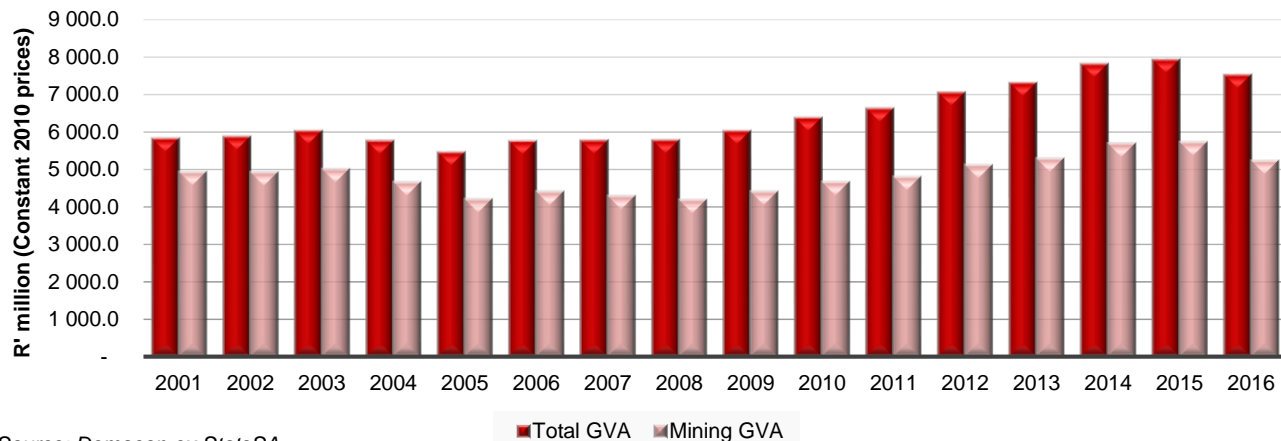
Gamagara Local Municipality Employment - Sectoral Profile



Source: Demacon ex StatsSA

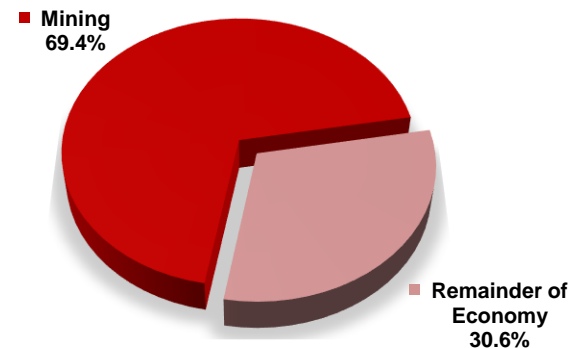
GAMAGARA LOCAL MUNICIPALITY ECONOMIC BACKGROUND

Total GVA & Mining GVA, 2001-2016



Source: Demacon ex StatsSA

Mining Significance of Gamagara Local Municipality Economy



Source: Demacon ex StatsSA

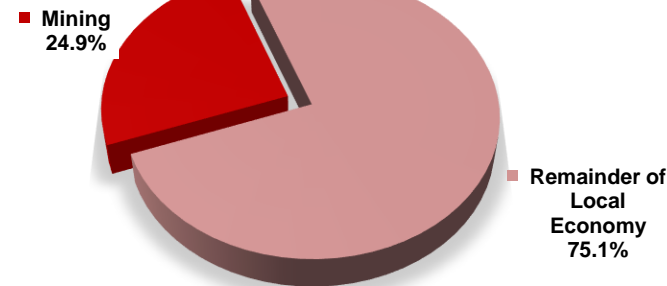
The size of the Gamagara LM mining GVA remained steady for 2001 to 2003, after which a decline can be observed from 2003 to 2008. Total GVA began to increase again from 2008 to 2015 after which a slight decline can be seen in 2016. As a result of the dominance of mining in the local economy, the total GVA reflected the same trends over this period.

Total Employment & Mining Employment, 2001-2016



Source: Demacon ex StatsSA

Mining Significance of Gamagara Local Municipality Employment

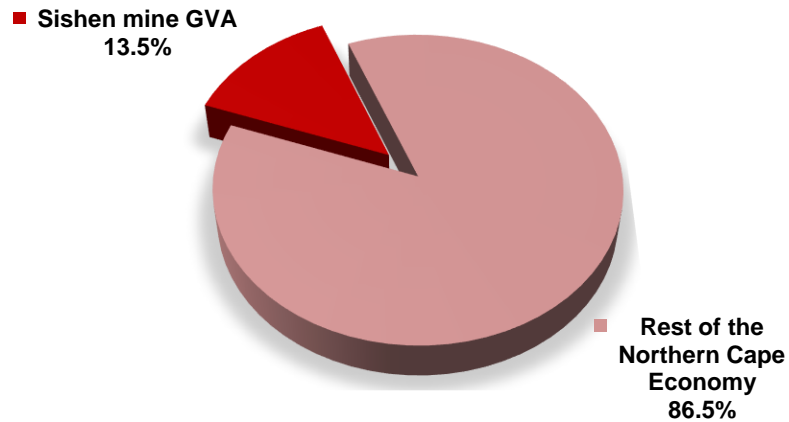


Source: Demacon ex StatsSA

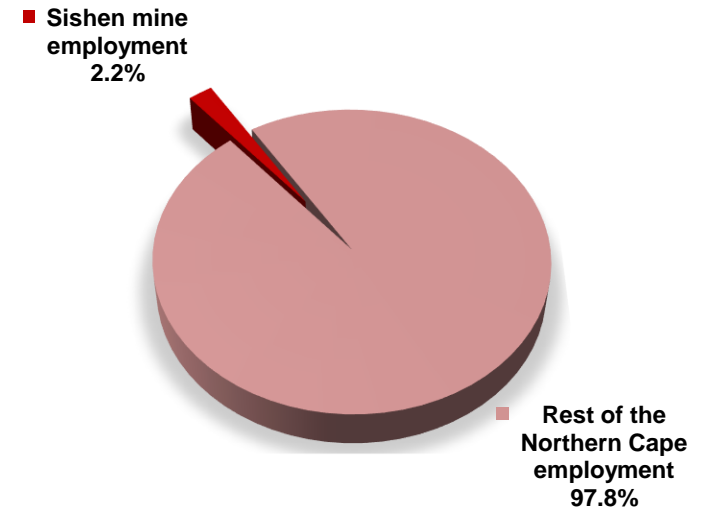
Total employment in the local municipality has increased steadily from 8 742 in 2001 to 15 067 in 2016. Mining employment, however, has fluctuated from 2001 to 2016, reaching a high of 9 271 in 2008. Mining employment has decreased year-on-year from 2012 and totals 8 018 in 2016.

SIGNIFICANCE OF SISHEN MINE

Sishen mine significance in provincial economy



Significance of Sishen Mine Employment in the provincial economy



A Total of 21.9% of formal provincial employees are affected by Sishen



Shipment / transport



First round beneficiation



Insurance services



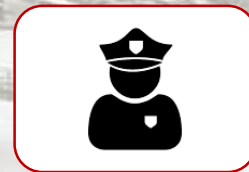
Education facilities



Health care facilities



Automotive industry



Police services



Private security



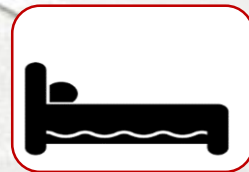
Retail and fuel sales industry



Banking and insurance



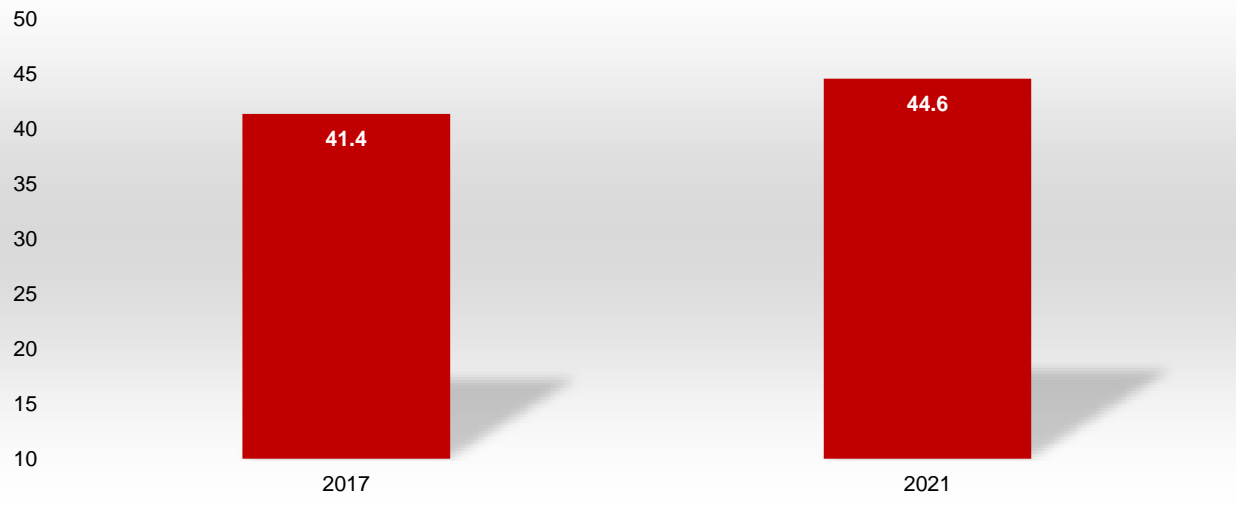
Property brokers



Hospitality industry

POTENTIAL IMPACT OF UHDMS

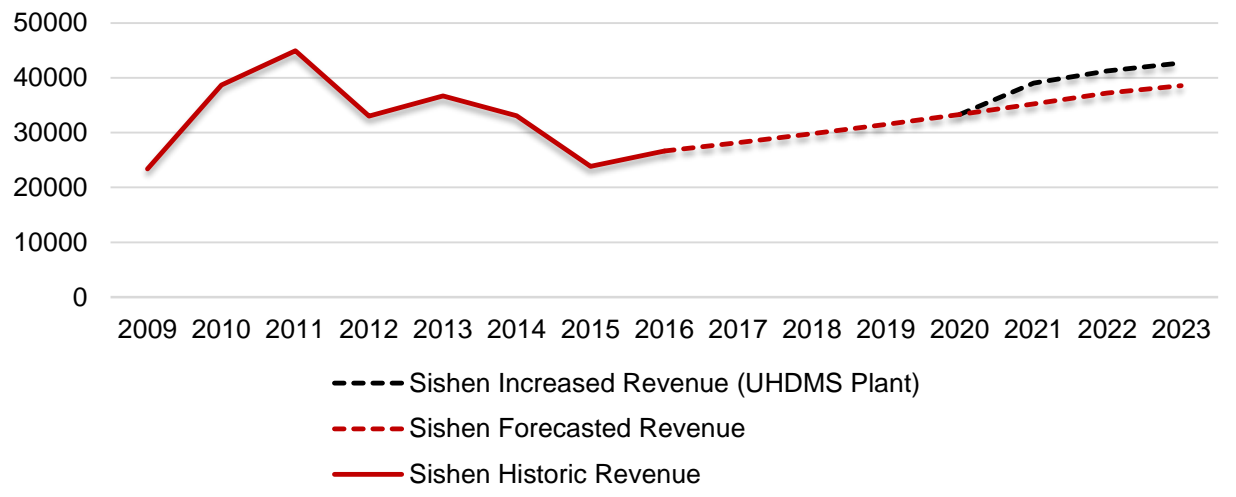
Sishen Mine Production



POTENTIAL IMPACT ON PRODUCTION

Should Ultra-High Dense Media Separation (UHDMS) technologies be utilised at Sishen, the production of an additional 3.2Mtpa of saleable product by May 2021, for the duration of LOM, will be possible. The new technology will increase current average production of 41.4 Mtpa to approximately 44.6 Mtpa.

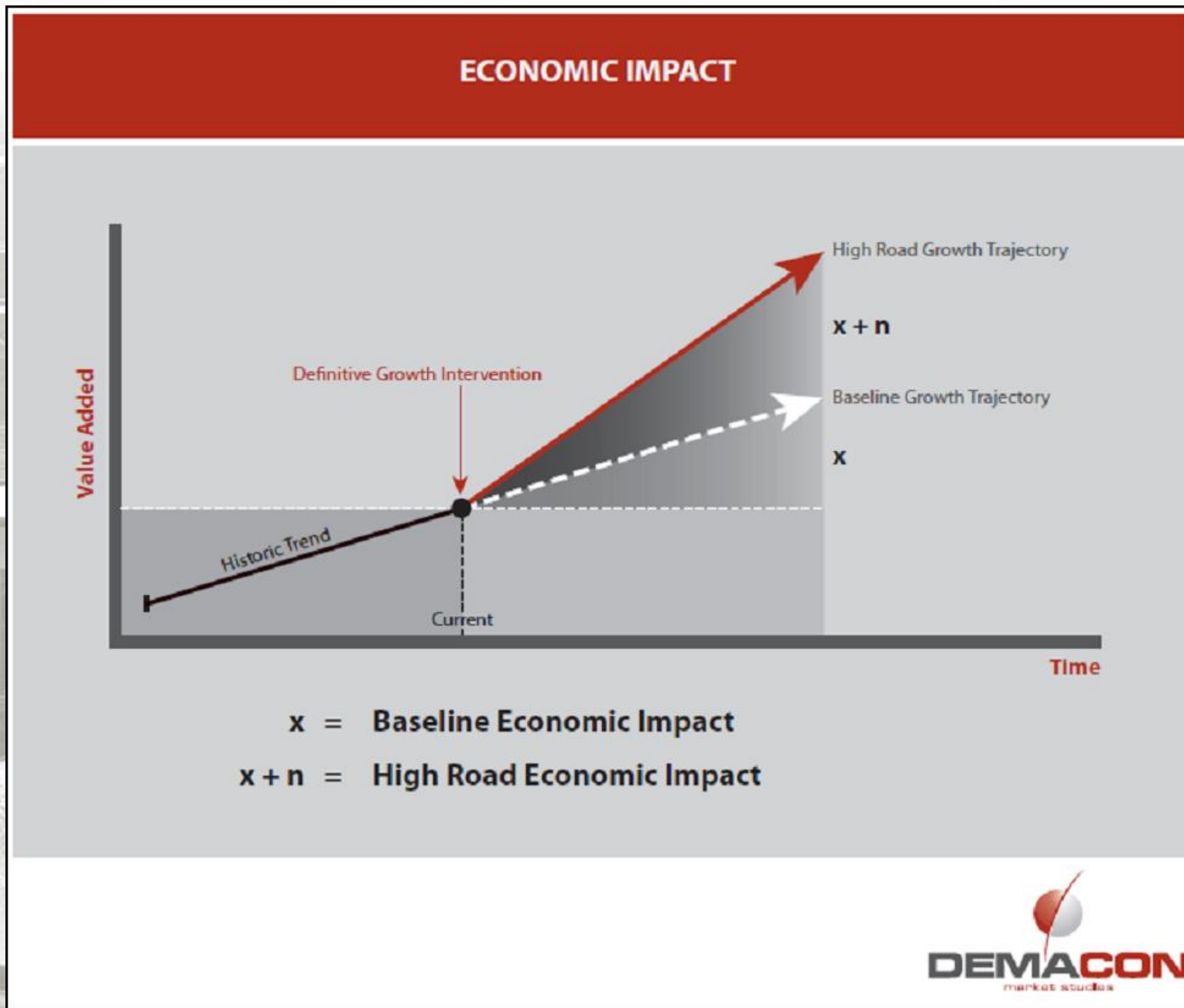
Sishen Potential Revenue



POTENTIAL IMPACT ON REVENUE

The future income yield will be positively correlated with the higher average annual production capacity of Sishen. It is expected that the UHDMS will yield 10.8% higher revenue compared with revenue generated through the DMS process.

POTENTIAL IMPACT OF UHDMS



QUANTITATIVE ECONOMIC IMPACT

CONSTRUCTION PHASE

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R2 052 832 372	R37 462 778	R643 105 936	R2 733 401 085
Additional GGP	R1 565 506 222	R16 341 569	R285 618 940	R1 867 466 731
Additional Employment	2 483	67	1 532	4 082



Variable	Total Impact
Additional Business Sales	R2.7 billion
Additional GGP	R1.9 billion
Additional Employment	4 082 (of which 2 483 direct)

The capital expenditure will potentially create an additional R2.7 billion in new business sales, R1.9 billion in additional GGP, as well as 4 082 short term employment opportunities. Total impact includes direct, indirect as well as induced effects.

OPERATIONAL PHASE

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R532 652 521	R9 720 542	R166 867 983	R709 241 046
Additional GGP	R406 205 031	R4 240 180	R74 110 117	R484 555 328
Additional Employment	644	17	397	1 059



Variable	Total Impact
Additional Business Sales	R709.2 million
Additional GGP	R484.6 million
Additional Employment	1 059 jobs (Of which 644 direct)

The above tables calculate the net additional gain, *i.e.* the difference between the new UHDMS and the conventional DMS process.

The average additional operational expenditure will potentially create an additional R709.2 million in new business sales, R484.6 million in additional GGP, as well as 1 059 sustained employment opportunities. Total impact includes direct, indirect as well as induced effects. Albeit that employment at the plant will not dramatically increase, increased production at the plant, will create downstream economic impacts along the value chain as a consequence of the output multiplier.

**The calculation is based on operational expenditure per ton product (ROM) of R162.17/ton.*

QUALITATIVE ECONOMIC IMPACT

The evaluation of impacts is conducted in terms of the criteria detailed in the tables to follow. The various environmental impacts and benefits of this project will be discussed in terms of the status, extent, duration, probability, and magnitude of the impact. Finally, an accumulative impact and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance.

In order to adequately assess and evaluate the impacts and benefits associated with the project it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. For informed decision making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the status of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The status of the impact can be described as negative, positive or neutral.

1. STATUS OF IMPACT

RATING	DESCRIPTION	QUANTITATIVE RATING
Positive	A benefit to the environment	+
Neutral	No cost or benefit to the environment.	N
Negative	A cost to the environment.	-

2. EXTENT OF IMPACT

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Site Specific; Occurs within the site boundary.	1
Medium - Low	Local; Extends beyond the site boundary; extending only as far as local community or urban area	2
Medium	Provincial / Regional; Extends far beyond the site boundary; Widespread effect	3
Medium - High	National i.e. South Africa	4
Very High	Across International Borders	5

3. DURATION OF IMPACT

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Immediate (less than a year)	1
Medium - Low	Short term (1-5 years)	2
Medium	Medium term (6-15 years)	3
Medium - High	Long term (the impact will cease after the operational life of the project)	4
High	Permanent (no mitigation measures of natural process will reduce the impact after construction)	5

QUALITATIVE ECONOMIC IMPACT

4. MAGNITUDE OF IMPACT

RATING	DESCRIPTION	QUANTITATIVE RATING
None	Where the aspect will have no impact on the environment	0
Minor	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are not affected	1
Low	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are slightly affected	2
Moderate	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes continue albeit in a modified way	3
High	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are altered to the extent that it will temporarily cease	4
Very high / don't know	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are altered to the extent that it will permanently cease	5

6. PROBABILITY OF IMPACT

RATING	DESCRIPTION	QUANTITATIVE RATING
None	Impact will not occur	0
Improbable	the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures	1
Low Probability	There is a possibility that the impact will occur	2
Medium Probable	The impact may occur	3
Highly Probable	It is expected that the impact will occur; Chance of occurrence.	4
Definite	Impact will occur regardless of any prevention measures	5

5. IMPACT SIGNIFICANCE OF RATING

IMPACT	RATING	DESCRIPTION	QUANTITATIVE RATING
Negligible / Positive	No Impact	The impact has no impact or the impact is unknown	0
	Low	The impact does not have a direct influence on the decision to develop the area	Up to 15
	Low-Medium	The impact has an influence but the impact can be mitigated	16 - 30
	Medium	The impact could influence the decision to develop in the area unless it is effectively mitigated	31 - 45
	Medium-High	The impact will have a direct influence on the decision to develop but there are means of mitigating the impact although these may be difficult as well as expensive	46 – 60
	High	Where the impact must have an influence on the decision to proceed to develop in the area	Above 60

QUALITATIVE ECONOMIC IMPACT

THEME	SPECIFIC IMPACT	STATUS OF IMPACT	IMPACT SIGNIFICANCE PRIOR TO MITIGATION					SIGNIFICANCE	DESCRIPTION & MITIGATION MEASURES	IMPACT SIGNIFICANCE POST MITIGATION
			EXTENT	DURATION	MAGNITUDE	PROBABILITY				
CONSTRUCTION PHASE										
Mining	Employment	+	3*	2	2	4	50 (Medium)	Approximately 2 070 employment opportunities will be created during the construction phase.	Medium-High	
	Economic Value Ad	+	3	2	3	4	70 (High)	If local contractors are used for construction, the construction phase will benefit the local economy as a whole.	Medium-High	
OPERATIONAL PHASE										
Mining	Employment	+	2	4	3	4	30 (Medium)	Increased production as a result of the UHDMS will create job opportunities along the product value chain.	Medium-High	
	Production	+	4	4	3	4	60 (High)	The production of an additional 3.2Mtpa will increase Sishen mine's annual potential revenue, which will translate into additional business sales and additional GGP.	Medium-High	
	Infrastructure	+	3	4	3	4	25 (Medium)	Although no extensive municipal infrastructure upgrades would be required, increased production is set to have downstream infrastructure implications along the value chain which might stimulate further investment.	Low	
	Service Sector (e.g. retail, health care, housing, education)	+	3	4	3	4	55 (Medium)	The increased revenue and the increased employment as a result of the higher production will sustain increased demand for economic goods and services, e.g. retail, health care, housing, education, etc.	Medium-High	

*Although certain expertise and technologies will be imported.

From the above, it appears that the impact of the conversion to UHDMS technology will enhance the Sishen mine production and revenue which, in turn, will be advantageous for the local and district economies. Additional production and revenue creates benefits in respect of additional business sales, additional GGP, as well as additional indirect and induced employment.

The UHDMS constitutes a process improvement which ultimately enhances efficiency with some noticeable economic benefits. In the context of concerns regarding long term sustainability of the mining sector, process improvements increase longevity and fulfil an important role in securing the economic livelihood and prosperity for local communities.

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1

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

DEMACON was requested by **EXM Advisory Services** to compile an **upgrade of the existing DMS processing plant at Sishen Mine in Kathu.**

1.2 PROJECT BRIEF

Based on an initial brief received, it is understood that the client requires a proposal for an **Economic Impact Assessment** pertaining to the abovementioned proposed project, particularly the **implications of increased production at Sishen Mine due to the process upgrade.**

1.3 METHODOLOGY

In the context of the brief, the following methodology was deployed:

Economic Base Profiling

- Providing a profile of the local and district economies relative to the provincial economy in terms of size and growth performance
- Provide a detailed sectoral profile for the local and district economies

Sectoral Competitive and Comparative Analysis

- Competitive Advantage Analysis (CAA) is an assessment of the structure and performance of the economy of an area, to identify sectoral economic strengths (“competitive advantages”) and weaknesses, and potential for economic development.

Socio-Economic Profiling

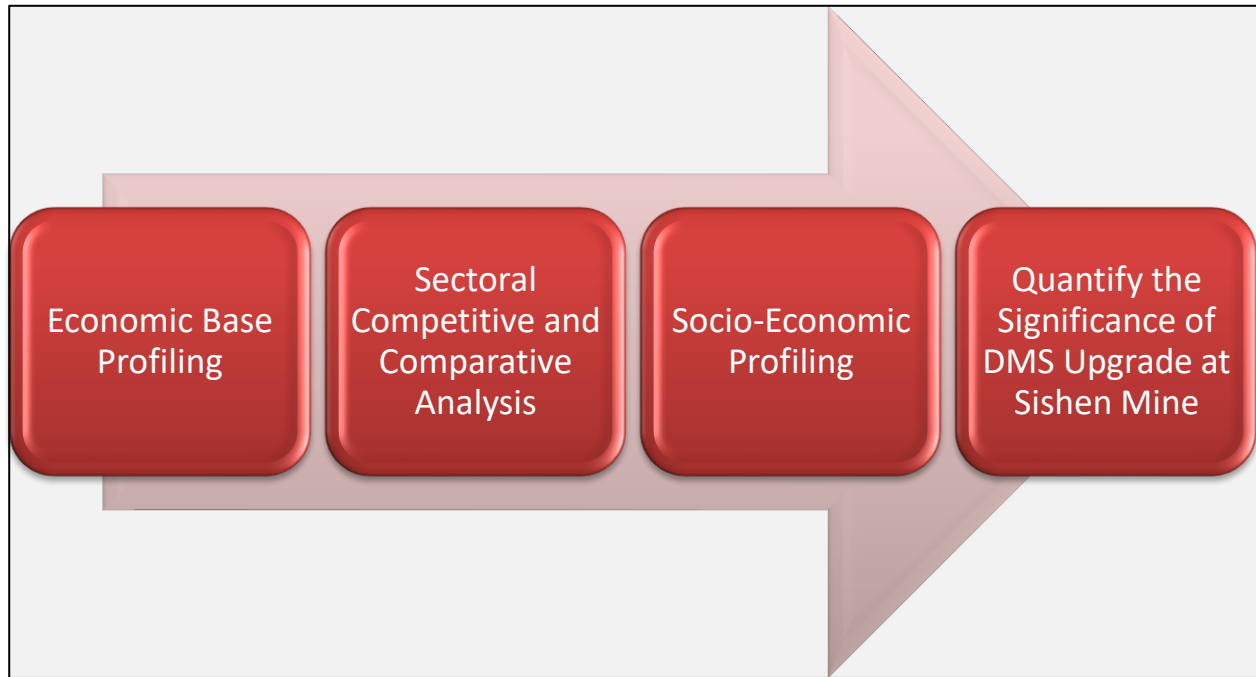
- Profiling of the sending municipalities (Joe Morolong LM and Ga-Segonyana LM) as well as the host municipality (Gamagara LM)
- Detailed profiling of key demographic indicators including age profile, level of education, employment status, dwelling type, tenure type income and LSM (Living Standard Measurement)
- Illustrates the average household income and living standard within the local economy

Quantify the Significance of DMS Upgrade at Sishen Mine

- Provides a quantitative assessment of the impact of the DMS upgrade at Sishen Mine, illustrating the economy-wide impact of the Sishen mining activity
- Provides an indication of the significance and contribution of the Sishen mine, including downstream effects.

Figure 1.1 shows the methodology of the study.

Figure 1.1: Study Methodology



1.4 LOCALITY / ZONE OF INFLUENCE

The mine has a sphere of influence which extends to the following areas:

- The host municipality, i.e. Gamagara LM includes the footprint of the Sishen iron ore mining activity, the town of Kathu, Dibeng, Sesheng, and Olifantshoek
- Sending municipalities include Joe Morolong LM and Ga-Segonyana LM

The economic data analysed in this report will focus on Gamagara Local Municipality as the local economy in which the mine is situated and the John Taolo Gaetsewe District Municipality, in relation to the Northern Cape Province. The socio-economic data analysed will focus on John Taolo Gaetsewe District Municipality, including a detailed analysis of Gamagara Local Municipality, as well as the main sending municipalities – Ga-Segonyana Local Municipality and Joe Morolong Local Municipality.

1.5 SISHEN BACKGROUND

The mine is situated close to the town of Kathu in the Northern Cape Province, 289km by road from Kimberley.

Sishen mine is Kumba's flagship operation. The mine obtains its iron ore from mining the valuable iron ore bodies within its mining lease area. Mining is done by open pit (opencast) methods. The mine operates a single pit that stretches 14km north to south. It is 2,5km across at its widest point and almost 400m deep, making it one of the seven largest open-cast mines in the world. The pit can broadly be divided into a north, central and south pit area. Waste dumps are located on the east and west sides of the pit.

The mine operates 24 hours a day, seven days a week. The mine beneficiates its ore to sell niche products domestically, and at a premium to international markets. Iron ore mined is transported to the beneficiation plant where it is crushed, screened and beneficiated. The mine uses dense-medium separation (DMS) and jigging technologies to achieve this. Sishen mine is the only haematite ore producer in the world to fully beneficiate its product.

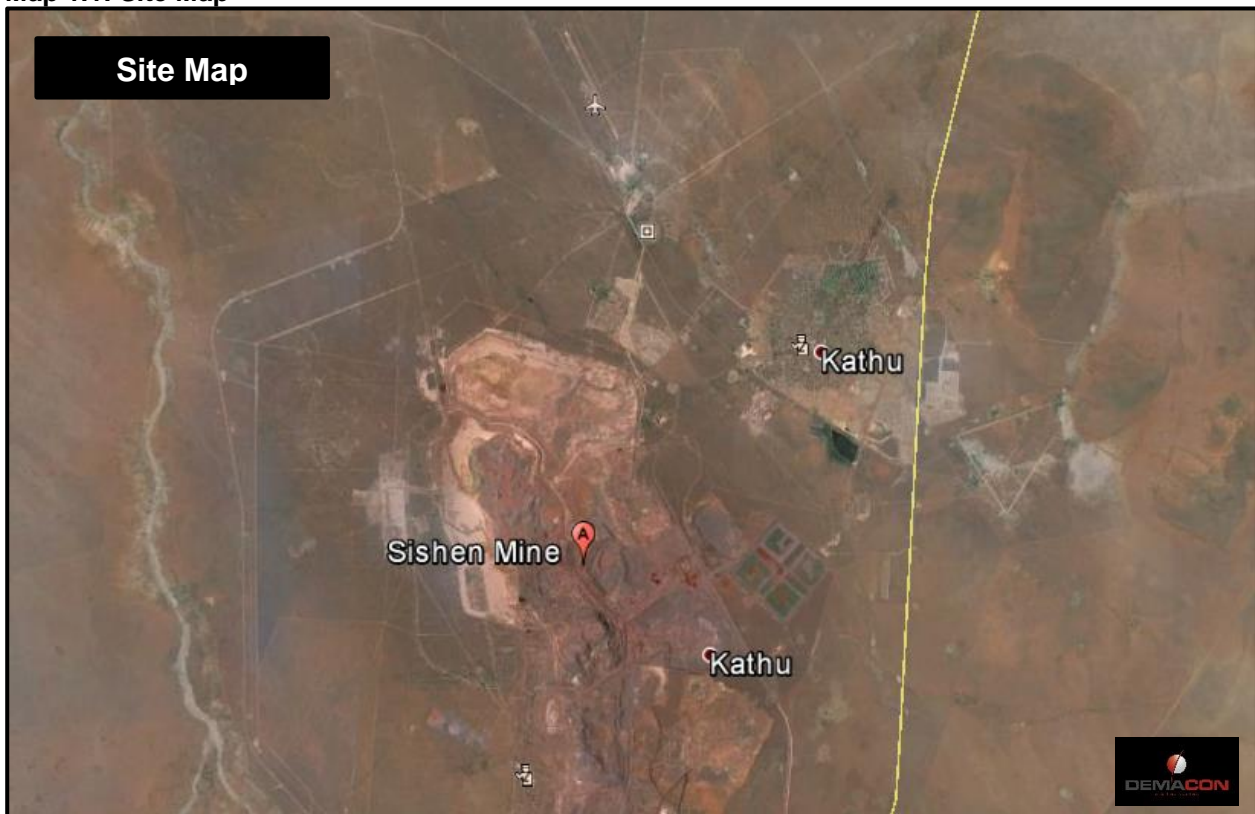
Sishen mine is serviced by a dedicated iron ore rail link, the Sishen/Kolomela-Saldanha Iron Ore Export Channel (IOEC), which transports iron ore to Saldanha Bay where it is shipped to export markets. Iron ore is also transported to domestic customers via domestic rail infrastructure. The rail and port operations are owned and operated by the state-owned entity, Transnet.

The mine is historically the single largest role player in the local municipal economy in terms of both production and employment. National strategic interventions have been based solely around Sishen, for example the Sishen-Saldanha railway.

1.6 LOCATION OF SISHEN

Map 1.1 shows the location of the mine relative to Kathu.

Map 1.1: Site Map



1.7 PROJECT BACKGROUND

The project entails the upgrading of the DMS processing plant to **Ultra-High Dense Media Separation (UHDMS) technologies**. The value proposition for this project is based on the production of an **additional 3.2Mtpa** of saleable product by May 2021, for the duration of LOM, of standard lump and fine product beneficiating 12.3Mtpa of “C” grade ores in the modified DMS Plant.

Minimal mining cost would be incurred as the material is already being mined as part of the current LOM production schedule at Sishen. Also, as this is a brownfields project, the design would make maximum use of existing ‘free’ plant capacity, services and infrastructure in the underutilised DMS Plant; this requires limited modification to the UHDMS capable of processing a combined plant feed of “A” and “C” grade ores. The design would make use of existing product, discard and slimes-handling systems where excess capacity is available. Ultra-high dense medium separation (UHDMS) is a processing technology similar to dense medium separation (DMS). However, media

densities can reach 4.2g/cc (versus 3.8g/cc) at which low grade materials can be efficiently beneficiated.

The benchmarked capital intensity of the project is thus relatively low compared to typical iron ore projects.

- **Rail capacity**

It is assumed that there would be sufficient rail capacity to transport the additional 3.2Mtpa of product from May 2021 onwards. This would be reviewed in the study phase with reference to the latest MTP and details of the construction tie-in and ramp up schedule for the project.

- **Housing requirements**

It is anticipated that there will be minimal additional labour requirements for this project and it is assumed that current housing and township infrastructure in Kathu and surrounding areas will be able to accommodate the increase.

1.8 REPORT OUTLINE

The remainder of the report is structured in terms of the following main headings:

- Chapter 2: Location Analysis
- Chapter 3: Economic Analysis
- Chapter 4: Socio-Economic Overview
- Chapter 5: Economic Impact Assessment
- Chapter 6: Synthesis

2

CHAPTER 2: LOCATION ANALYSIS

2.1 INTRODUCTION

This chapter provides a summary of the main elements of policies in the zone of influence. It serves to provide background on the current status of development in the district and local municipalities and the direction of development. It should be noted that there is lag between the policies and conditions on the ground.

2.2 JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY SPATIAL DEVELOPMENT FRAMEWORK¹

The **John Taolo Gaetsewe District Municipality (JTGDM)** is situated in the Northern Cape Province and is bordered by The Siyanda and Francis Baard District Municipalities to the south and west; The North West Province (Dr. Ruth Segomotsi Mompati District Municipality) to the east and northeast; and Botswana to the northwest. Administratively, the JTGDM comprises three Local Municipalities: (1) The Gamagara Local Municipality; (2) The Ga-Segonyana Local Municipality; and (3) The Joe Morolong Local Municipality, which encapsulates the geographical area covered by the former District Management Area and the former Moshaweng Local Municipality.

The JTGDM is the second smallest district in the Northern Cape, comprising approximately 7% of the geographical area of the province (27 293 km²). The Joe Morolong Local Municipality, at approximately 15 182 km² in extent, is the largest Local Municipality in the district. Prior to 2006, the municipality (then called the Kgalagadi District Municipality) was a cross-boundary municipality, straddling the boundary between the Northern Cape and the North West Provinces. With the redrawing and subsequent demarcation of the boundary of the JTGDM in 2006, the then Moshaweng Local Municipality, which used to be part of the North West Province, and the town of Olifantshoek and its surrounding areas, were included in the Gamagara Local Municipality.

As seen in the maps below (Map 2.1 and Map 2.2), the district SDF indicates that Kathu and Dingleton should be integrated to form one **emerging growth centre**. The SDF, furthermore, categorised Kathu as a **regional node**. As such, Kathu plays an integral role in the larger area. Should Kathu, therefore, experience negative growth, the affect will be visible in the larger area as well, as Kathu forms not just the commercial node for the area, but also the largest employment node.

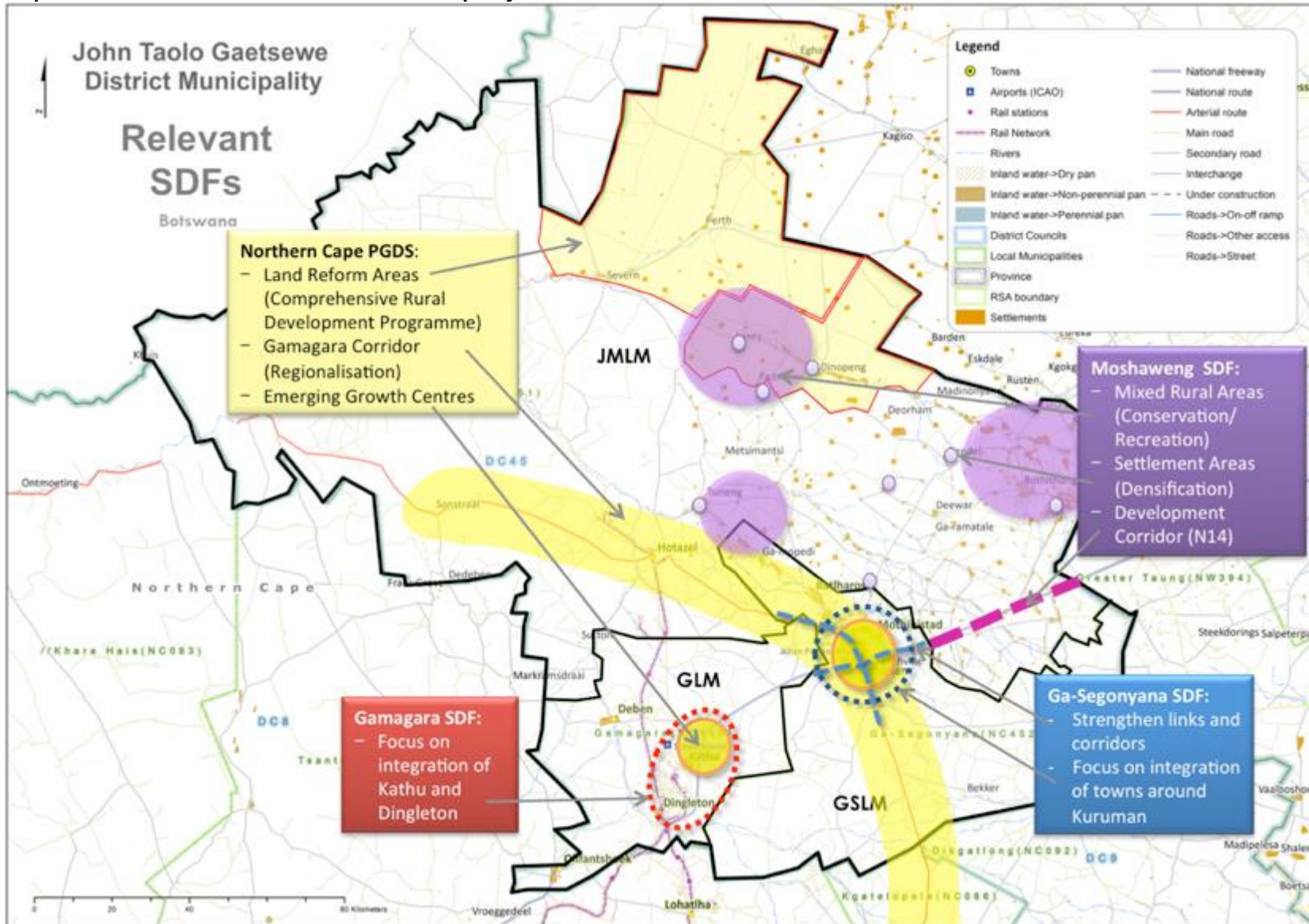
2.3 JOHN TAOLO GAETSEWE DISTRICT MUNICIPALITY INTEGRATED DEVELOPMENT PLAN

The district IDP indicates that the population of Gamagara LM and Ga-Segonyana LM has increased between the 2001 and 2011 census. The population of Joe Morolong has, however, decreased over this period (This is corroborated in Chapter 4). The IDP relates this directly to mining related activities. This reality has far-reaching implications for the district in terms of:

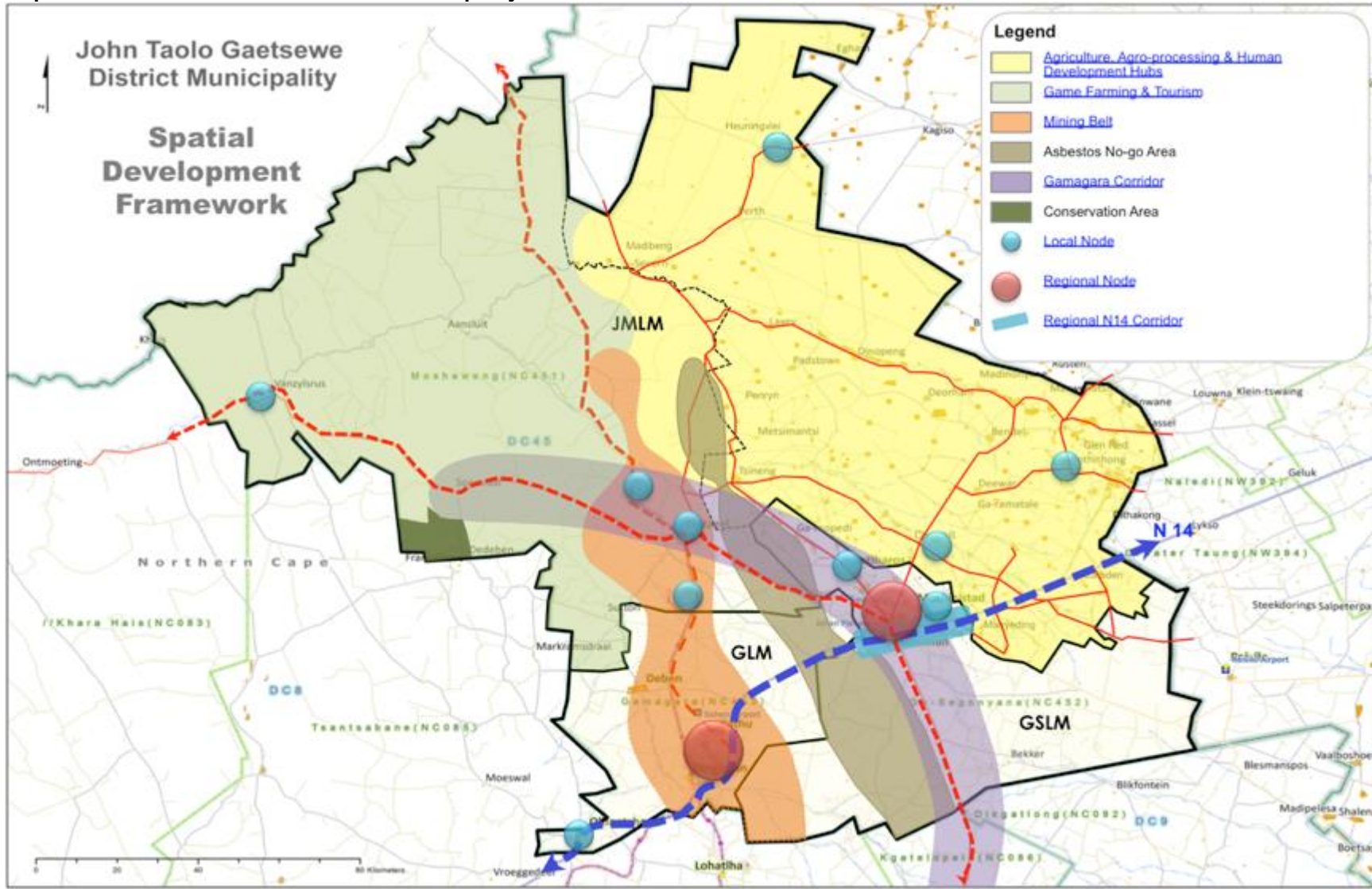
- The scope and extent of the district's spatial development framework
- The services delivery demand put on the District Municipality, as well as the local municipalities in its area of jurisdiction, and
- The grading of the municipalities, and thereof the resources (grants and subsidies) made available to them.

¹ John Taolo Gaetsewe District Municipality Spatial Development Framework, 2012

Map 2.1: John Taolo Gaetsewe District Municipality SDF



Map 2.2: John Taolo Gaetsewe District Municipality Node



2.4 GAMAGARA LOCAL MUNICIPALITY INTEGRATED DEVELOPMENT PLAN²

The Gamagara Municipality serves an area of 2 619 square kilometres, which is approximately 10% of the total John Taolo Gaetsewe District area. It is located in the north-eastern sector of the Northern Cape, on the N14 National Road between Upington and Vryburg. It is approximately 200km north-east of Upington.

The municipal area of Gamagara consists of 5 towns, **Kathu, Sesheng, Dibeng, Dingleton**, and **Olifantshoek**; and the area is demarcated into 5 wards (Ward 1: Kathu, Ward 2: Dibeng, Ward 3: Dingleton, Skerpdraai, Diepkloof, Ward 4: Olifantshoek and Ward 5: Sesheng).

Kathu, 'the town under the trees', came into being because of Iscor's iron ore mining activity in the Kalahari. Municipal status was allocated to the town of Kathu in July 1979. Kathu is connected by rail (Dingleton Station) via Kimberley, as well as by road to all the main centers namely Johannesburg, Bloemfontein, Windhoek and Cape Town, and has an airport with a tarmac runway.

Sesheng is located to the west of Kathu and was initially planned as a high density residential area for mine workers, without families of any social structure. It consists of group housing units that belong to the mine to the west, with small pockets of other houses to the west thereof. Due to pressure from labour unions and Government policy on hostels, group homes are to be changed to single flat units for employees of the mine. The larger residential housing component of Sesheng is located nearer to Kathu in the form of single residential houses (Ext. 5).

Dibeng is located approximately 28km north west of Kathu alongside the R380 road in the Northern Cape Province. The settlement consists of two suburbs, namely Deben and Haakbosdraai. Dibeng started off as a small settlement on the banks of the Gamagara River, which provided water for the small town. The locations of the residential areas are characterized by the river in the centre of town and the rocky lime stone outcrops directly east and west of the river. Dibeng consists entirely of single residential houses, but can be split into a low density area to the west and higher density houses to the east. Dibeng was given its name by the Tswana and means "first drinking place".

Dingleton developed in a linear form along the one side of the then main road between Upington and Kuruman. Dingleton consists almost totally of low density single residential houses. The town is surrounded by large mine activities and the resettlement of Dingleton residents is eminent due to expansions of mining activities in this direction.

Olifantshoek is south-west of Kathu, south-west of Kuruman and north-east of Upington. With the amalgamation of municipalities in 2000 Olifantshoek Municipality became part of the Tsantsabane Local Municipality, until 2006 when it was amalgamated with the Gamagara Local Municipality. The town is a low/medium density residential area, but due to new developments which are underway it will in future become a high density residential area.

Due to the expansion of mining activities in the Gamagara municipal jurisdiction, there is a high need for basic and bulk infrastructure. Population grew despite the mines retrenching workers, the increase was observed mostly in the informal settlement areas as compared to the formal towns.

2.5 GAMAGARA SPATIAL DEVELOPMENT FRAMEWORK³

Map 2.3 indicates the residential development proposed at the time of the Gamagara SDF (2010). In total, 23 302 stands were planned for mostly low density residential development. Since 2010, a number of these projects have been implemented. These developments were a direct result of the expansion in the mining sector. The Gamagara SDF clearly states that future planning in the municipality is based on growth in the mining industry.

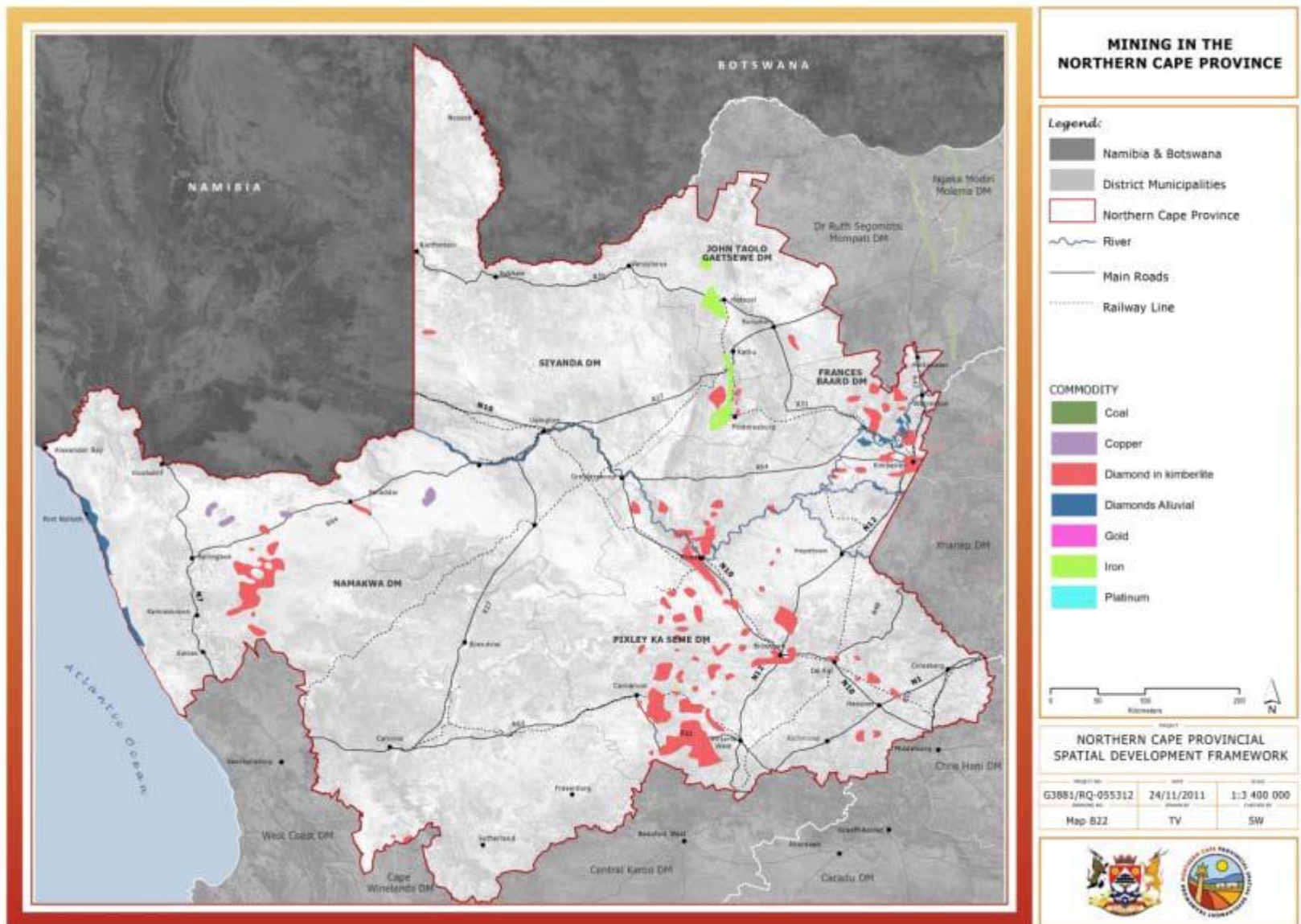
² Gamagara Local Municipal Draft Integrated Development Plan 2017

³ Gamagara Spatial Development Framework, 2010

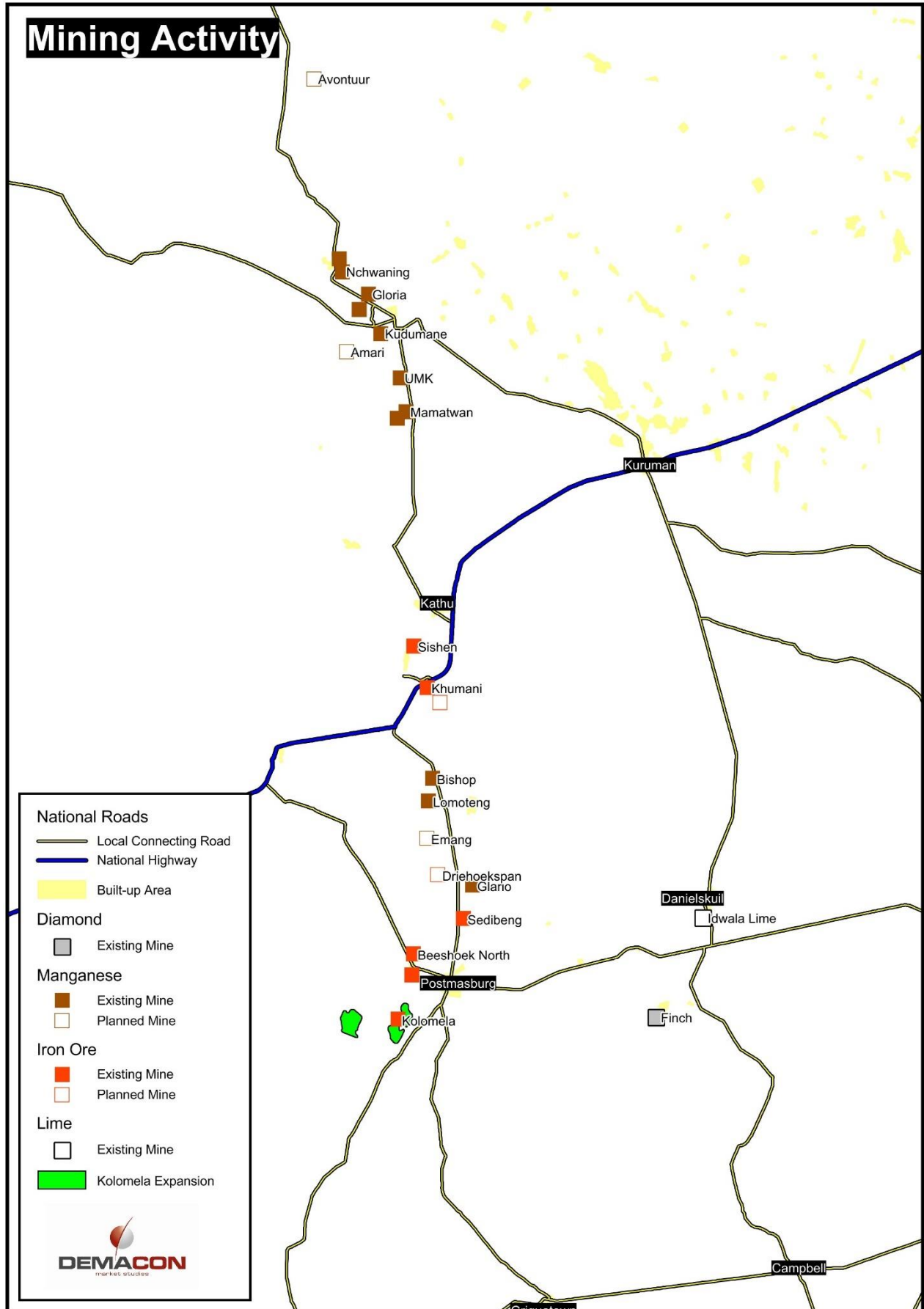
Map 2.3: Residential Development in Kathu



Map 2.4: Distribution of mineral resources and mining operations in the Northern Cape.



Map 2.5: Location of Existing and Proposed Mines



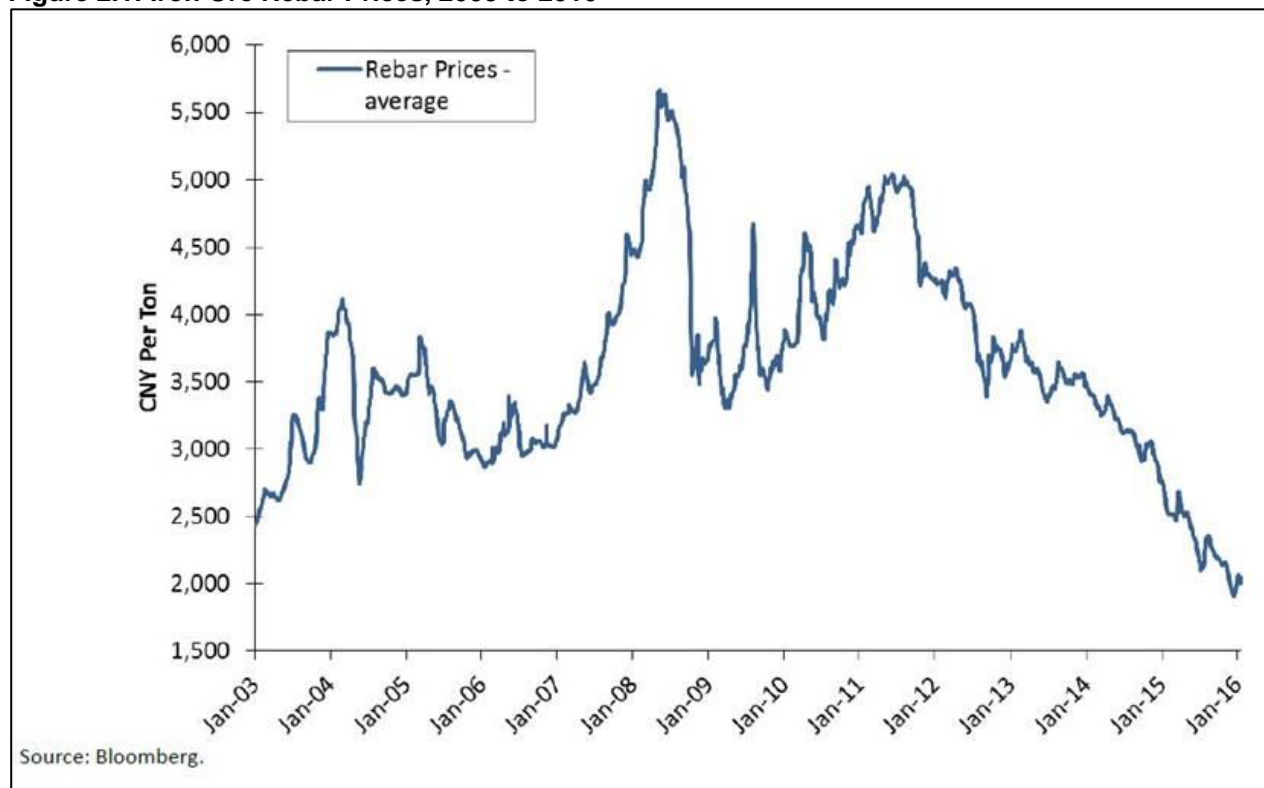
2.6 MINING IN THE NORTHERN CAPE⁴

The mining industry of the province is of national and international importance. The Northern Cape produces approximately 37% of South Africa's diamond output, 44% of its zinc, 70% of its silver, 84% of its iron-ore, 93% of its lead and 99% if its manganese.

The Northern Cape mining value chain primarily constitutes exploration, shaft set-up and mining. Processing does not take place in the province and results in an on-going loss of value-adding opportunities (LED Strategy). Mining operations are logically concentrated in the areas where the relevant minerals occur (refer to Map 2.4 and Map 2.5).

Iron-ore production growth has been outstripping demand growth for the last decade. Part of this misalignment is due to unprecedented low interest-rates which incentivized the producer to keep investing and investors to keep buying commodities. It is also due to unprecedented Chinese Infrastructure Investment in Response to the Global Financial Crisis post 2009. It is said that China has poured more concrete in the 5 years since than the US did in 150 years of industrialization. More-over, China's share of world sea-borne Iron-ore imports stood at about 60%. Clearly more than just the marginal price driver. The effects of the Chinese stimulus began to fade in 2012/2013, as could be seen in the fall in the price of Re-bar in China. Chinese Re-bar and sea-borne Iron-ore have, for reasons outlined above, a strong correlation. Iron-ore price subsequently plummeted. Producers have only recently begun to curtail production and oversupply still exists. More-over high-cost Chinese producers are being kept alive as State Owned Enterprises, thus operating at a loss and perpetuating price distortions. Chinese growth in Infrastructure Investment, and thus demand for Iron-ore, is also unlikely to recover. 2013 to 2015 was perhaps the first (and most violent) down cycle in what may turn out to be a structural bear market for Iron-ore.

Figure 2.1: Iron Ore Rebar Prices, 2003 to 2016

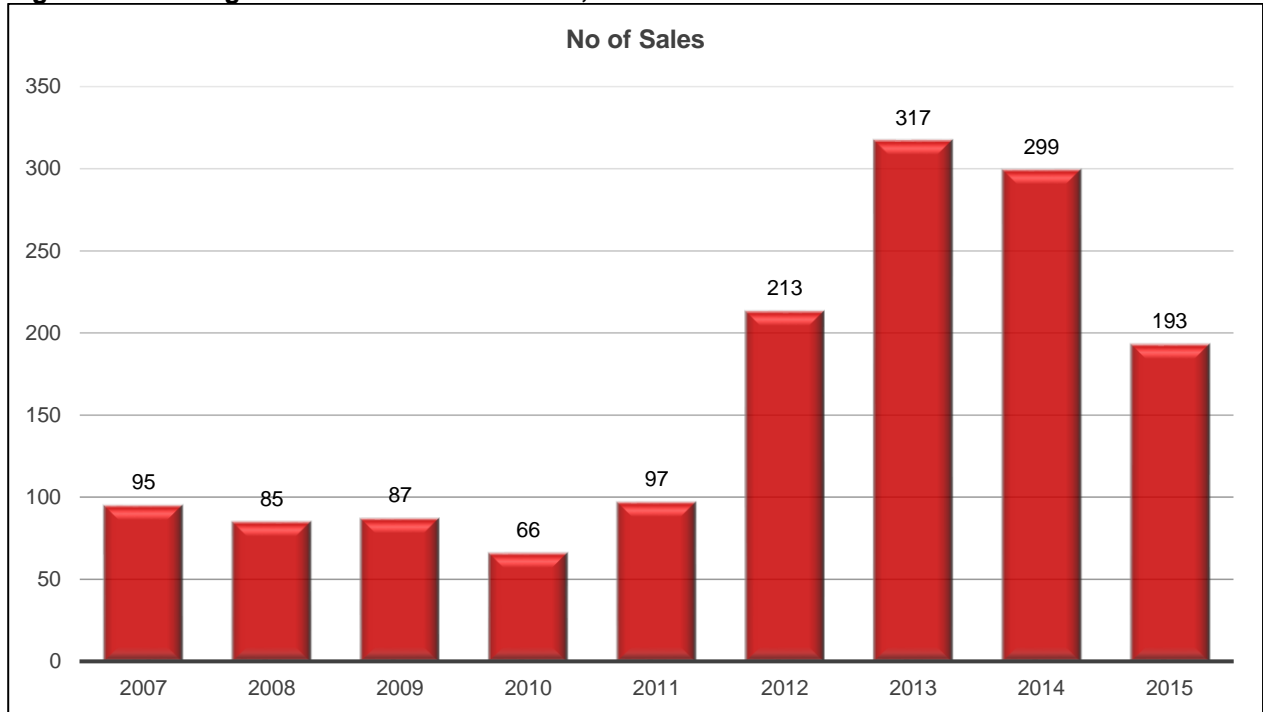


⁴ Northern Cape Spatial Development Framework, 2012

2.7 RESIDENTIAL PROPERTY TRENDS

This section provides an overview of the residential property trends experienced in Kathu. The following figure indicates the number of sales for the period 2007 to 2015.

Figure 2.2: Average number of sales in Kathu, 2007 to 2015



Source: Demacon ex Property 24, 2017

The average number of sales per annum increased from 95 in 2007 to 317 in 2013. The effect of the contraction in the mining sector can be seen in the number of sales decreasing from 2013 onwards. A lag effect can be seen in the average sales price as indicated in Figure 2.3.

Figure 2.3: Average Sales Price, 2007 to 2016

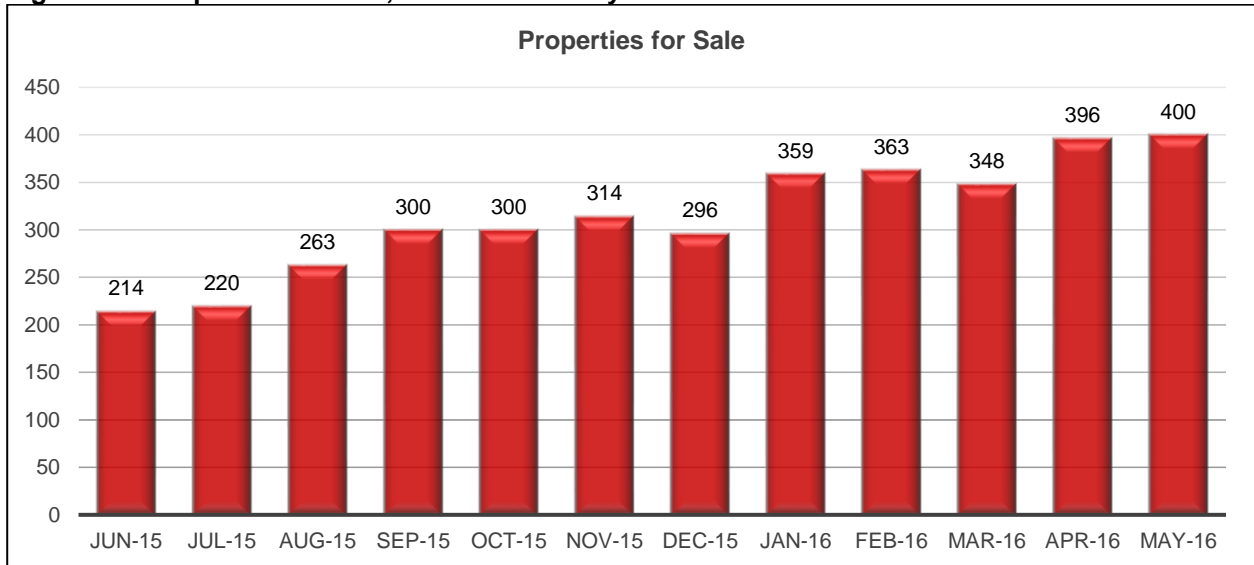


Source: Demacon ex Property 24, 2017

A degree of elasticity and a resultant lag effect in particular, can be observed with property prices increasing up to 2015. In 2016 a notable decreasing price trend can be observed. This is a normal trend that illustrates how property prices typically lag economic performance. Within a matter of a few months residential property prices have decelerated by 6.9%. The full price impact is not yet reflected, but could continue beyond 30% to 2012 / 2013 price levels.

The following figure provides an indication of the properties for sale in Kathu.

Figure 2.4: Properties for Sale, June 2015 to May 2016



Source: Demacon ex Property 24, 2017

From the figure above, it can be observed that the properties for sale in Kathu has doubled since June 2015 – from 214 properties for sale in June 2015 to 400 properties for sale in May 2016.

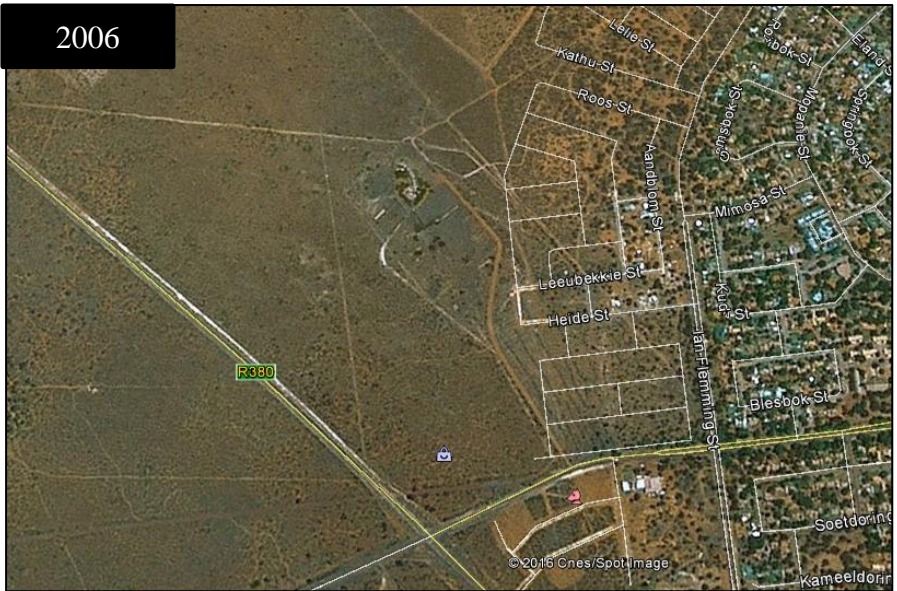
With the doubling of available stock, “for sale” prices have depreciated as the downward trend continues.

Coupled with the above, the rate of sales is also decelerating – typical signs of a market in which supply exceeds demand on account of economic conditions.

The following set of images indicates the growth experienced in Kathu over the past 10 years.







2.8 SYNTHESIS

This chapter provided a spatial overview of the district and local municipality. Sishen is situated with the Gamagara Local Municipality in the John Taolo Gaetsewe District Municipality. The integration of Kathu and Dingleton is a crucial aspect of the district SDF.

The Johan Taolo Gaetsewe SDF furthermore categorises Kathu as a regional node. Since the effect of contraction in the mining sector will first be felt in Kathu, there will be a ripple effect in the remainder of the district.

Housing developments in the area is positively correlated with mining activity. The establishment of most of the settlements located in the Gamagara Local Municipality are a direct result of expansions in mining activity over the years. The converse also holds true, *i.e.* a slowdown in mining activity will have a similar detrimental effect on local property markets.

An assessment of local and district spatial development frameworks and associated policy documents essentially reflect:

- ❖ the significance of mining on the spatial structure of the town
- ❖ but on account of the nature and dating of these documents, cannot fully respond and / or anticipate short term cyclical fluctuations (in particular a contraction) of mining activity.

3

CHAPTER 3: ECONOMIC ANALYSIS

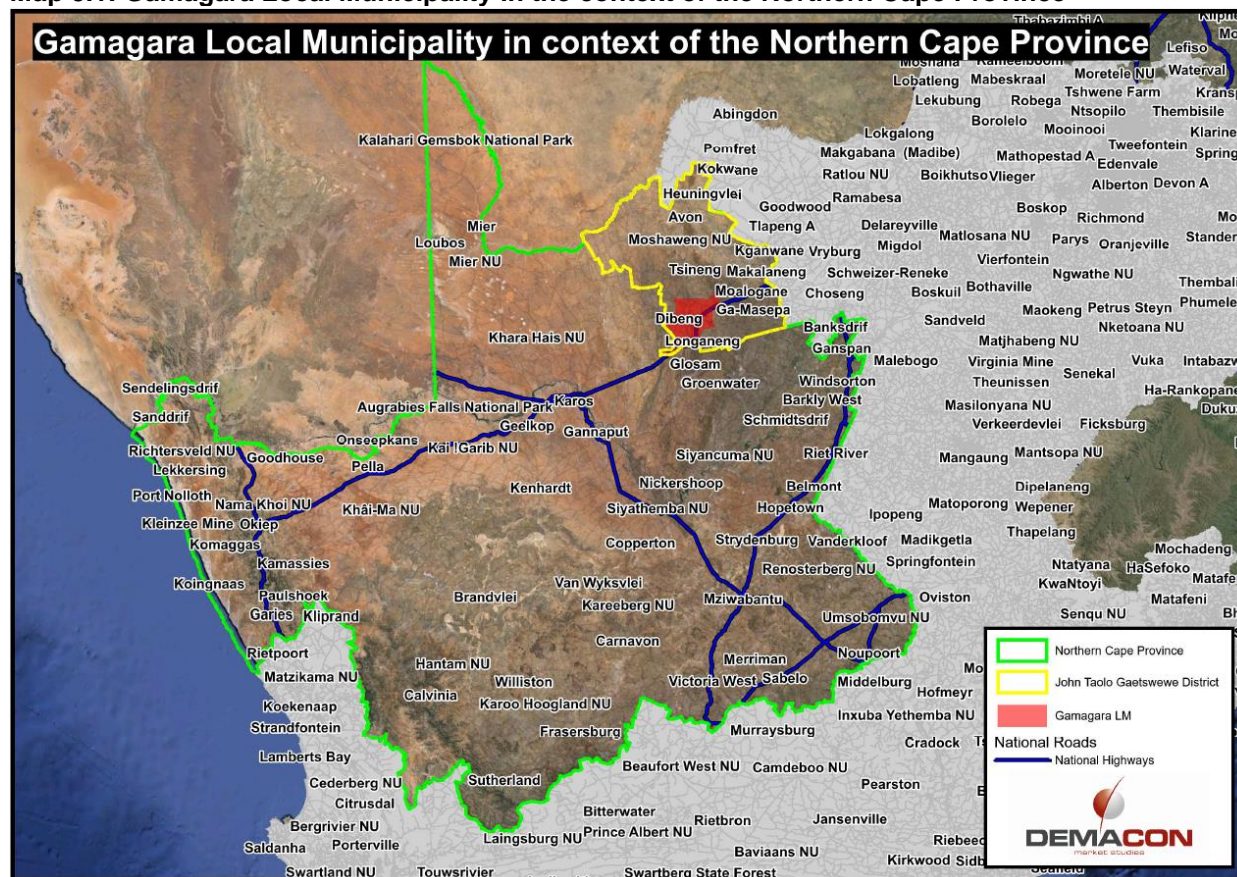
3.1 INTRODUCTION

The aim of this chapter is to identify the size and drivers of the local. This section does not provide a forecast of future opportunities. It is, instead, an examination of past trends and based on historical trends, how it will impact on the local economy if the mining sector contracts.

3.2 ECONOMIC STRUCTURE AND PERFORMANCE OF THE STUDY AREA

The purpose of this sub-section is to profile the structure and performance of the John Taolo Gaetsewe District Municipality and the Gamagara Local Municipality. Map 3.1 indicates the location of the local and district municipal areas within the Northern Cape province.

Map 3.1: Gamagara Local Municipality in the context of the Northern Cape Province

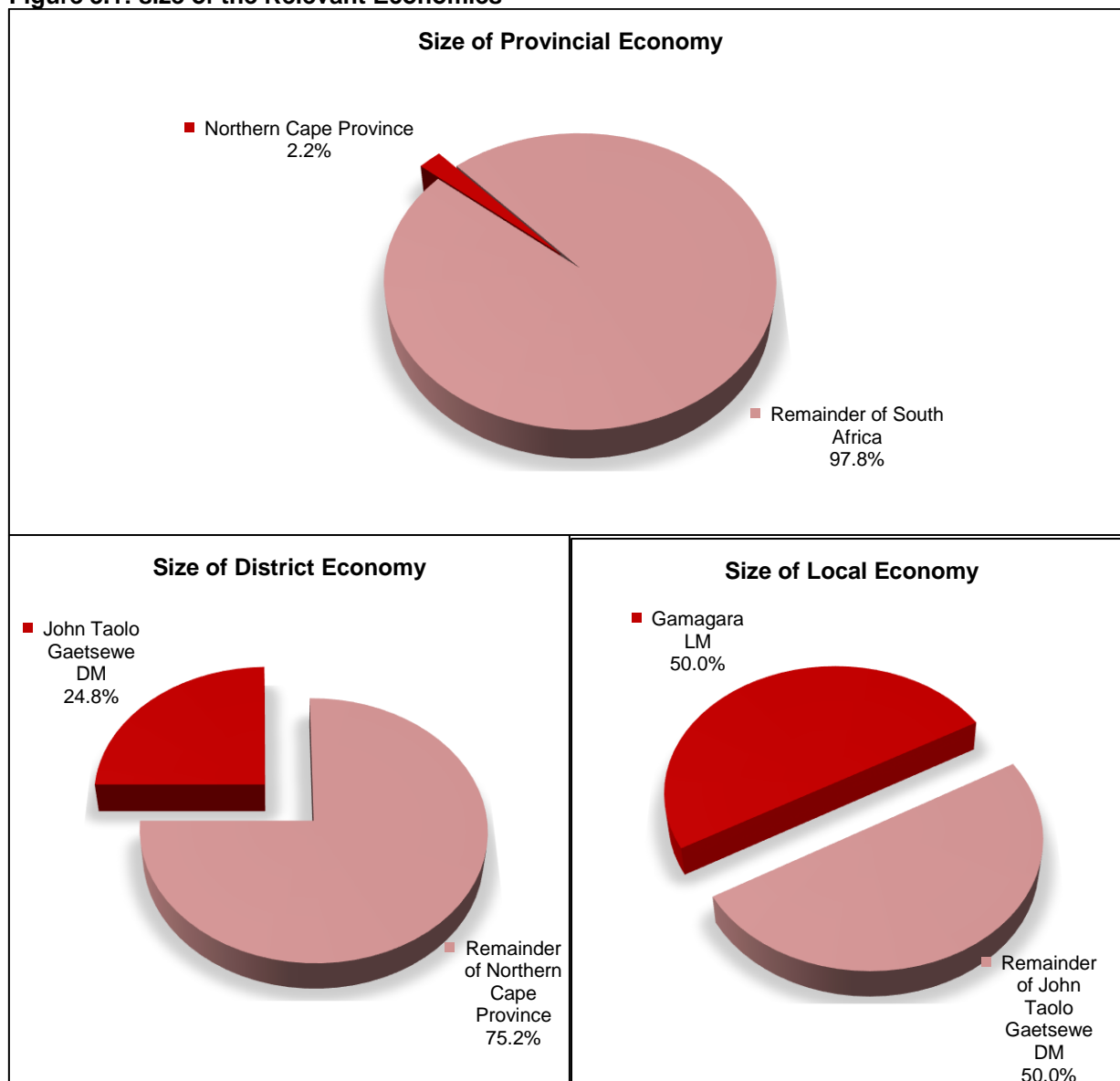


3.2.1 Economic Activity & Size

Gross Value Added (GVA) - The level of economic activities within a specific area. GVA is calculated as the difference between output and intermediate consumption in the economy. That is the difference between the value of goods and services produced and the cost of raw materials and other inputs, which are used up in production by all sectors of an economy.

The economic size of the local and district economies is compared to the Northern Cape Province and illustrated in Figure 3.1.

Figure 3.1: size of the Relevant Economies

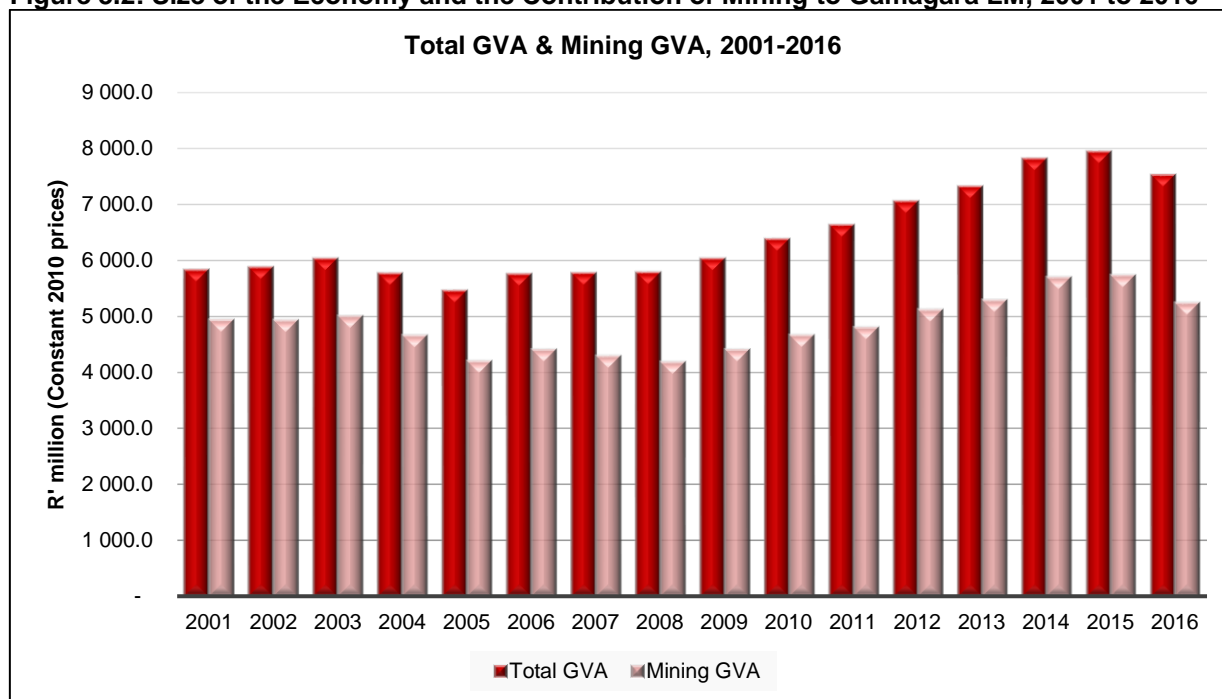


Source: Demacon ex. StatsSA (seasonally adjusted), 2017

The Gamagara LM contributed approximately 50.0% to the district municipality in 2016. The district municipality contributed approximately 24.8% to the total Northern Cape economy in 2016.

The size of the Gamagara LM and the relative size of mining for the Gamagara LM over a 15 year period is illustrated in Figure 3.2.

Figure 3.2: Size of the Economy and the Contribution of Mining to Gamagara LM, 2001 to 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

The size of the Gamagara LM mining GVA remained steady for 2001 to 2003, after which a decline can be observed from 2003 to 2008. Total GVA began to increase again from 2008 to 2015 after which a slight decline can be seen in 2016. As a result of the dominance of mining in the local economy, the total GVA reflected the same trends over this period.

3.2.2 Economic Sector Definitions⁵

Subsequent paragraphs define the main economic sectors according to the Standard Industrial Classification (SIC) of all economic activities.

❖ AGRICULTURE, FORESTRY, FISHERY

The Agriculture, Forestry, Fishing and Hunting sector comprises establishments primarily engaged in growing crops, raising animals, harvesting timber, and harvesting fish and other animals from a farm, ranch, or their natural habitats.

The establishments in this sector are often described as farms, ranches, dairies, greenhouses, nurseries, orchards, or hatcheries. A farm may consist of a single tract of land or a number of separate tracts which may be held under different tenures. For example, one tract may be owned by the farm operator and another rented. It may be operated by the operator alone or with the assistance of members of the household or hired employees, or it may be operated by a partnership, corporation, or other type of organization. When a landowner has one or more tenants, renters, croppers, or managers, the land operated by each is considered a farm.

The sector distinguishes two basic activities: agricultural production and agricultural support activities. Agricultural production includes establishments performing the complete farm or ranch operation, such as farm owner-operators, tenant farm operators, and sharecroppers. Agricultural support activities include establishments that perform one or more activities associated with farm operation, such as soil preparation, planting, harvesting, and management, on a contract or fee basis.

⁵ <http://www.bizminer.com/resources/glossaries/economic-sectors.php>

❖ MINING AND QUARRYING

The Mining, Quarrying, and Oil and Gas Extraction sector comprises establishments that extract naturally occurring mineral solids, such as coal and ores; liquid minerals, such as crude petroleum; and gases, such as natural gas. The term mining is used in the broad sense to include quarrying, well operations, beneficiating (e.g., crushing, screening, washing, and flotation), and other preparation customarily performed at the mine site, or as a part of mining activity.

The Mining, Quarrying, and Oil and Gas Extraction sector distinguishes two basic activities: mine operation and mining support activities. Mine operation includes establishments operating mines, quarries, or oil and gas wells on their own account or for others on a contract or fee basis. Mining support activities include establishments that perform exploration (except geophysical surveying) and/or other mining services on a contract or fee basis (except mine site preparation and construction of oil/gas pipelines).

Establishments in the Mining, Quarrying, and Oil and Gas Extraction sector are grouped and classified according to the natural resource mined or to be mined. Industries include establishments that develop the mine site, extract the natural resources, and/or those that beneficiate (i.e., prepare) the mineral mined. Beneficiation is the process whereby the extracted material is reduced to particles that can be separated into mineral and waste, the former suitable for further processing or direct use. The operations that take place in beneficiation are primarily mechanical, such as grinding, washing, magnetic separation, and centrifugal separation. In contrast, manufacturing operations primarily use chemical and electrochemical processes, such as electrolysis and distillation. However, some treatments, such as heat treatments, take place in both the beneficiation and the manufacturing (i.e., smelting/refining) stages. The range of preparation activities varies by mineral and the purity of any given ore deposit. While some minerals, such as petroleum and natural gas, require little or no preparation, others are washed and screened, while yet others, such as gold and silver, can be transformed into bullion before leaving the mine site.

❖ UTILITIES (ELECTRICITY AND WATER)

The Utilities sector comprises establishments engaged in the provision of the following utility services: electric power, natural gas, steam supply, water supply, and sewage removal. Within this sector, the specific activities associated with the utility services provided vary by utility: electric power includes generation, transmission, and distribution; natural gas includes distribution; steam supply includes provision and/or distribution; water supply includes treatment and distribution; and sewage removal includes collection, treatment, and disposal of waste through sewer systems and sewage treatment facilities.

Excluded from this sector are establishments primarily engaged in waste management services classified in Subsector 562, Waste Management and Remediation Services. These establishments also collect, treat, and dispose of waste materials; however, they do not use sewer systems or sewage treatment facilities.

❖ CONSTRUCTION

The construction sector comprises establishments primarily engaged in the construction of buildings or engineering projects (e.g., highways and utility systems). Establishments primarily engaged in the preparation of sites for new construction and establishments primarily engaged in subdividing land for sale as building sites also are included in this sector.

Construction work done may include new work, additions, alterations, or maintenance and repairs. Activities of these establishments generally are managed at a fixed place of business, but they usually perform construction activities at multiple project sites. Production responsibilities for establishments in this sector are usually specified in (1) contracts with the owners of

construction projects (prime contracts) or (2) contracts with other construction establishments (subcontracts).

Establishments primarily engaged in contracts that include responsibility for all aspects of individual construction projects are commonly known as general contractors, but also may be known as design-builders, construction managers, turnkey contractors, or (in cases where two or more establishments jointly secure a general contract) joint-venture contractors. Construction managers that provide oversight and scheduling only (i.e., agency) as well as construction managers that are responsible for the entire project (i.e., at risk) are included as general contractor type establishments. Establishments of the "general contractor type" frequently arrange construction of separate parts of their projects through subcontracts with other construction establishments.

Establishments primarily engaged in activities to produce a specific component (e.g., masonry, painting, and electrical work) of a construction project are commonly known as specialty trade contractors. Activities of specialty trade contractors are usually subcontracted from other construction establishments, but especially in remodelling and repair construction, the work may be done directly for the owner of the property.

❖ **MANUFACTURING**

The Manufacturing sector comprises establishments engaged in the mechanical, physical, or chemical transformation of materials, substances, or components into new products. The assembling of component parts of manufactured products is considered manufacturing, except in cases where the activity is appropriately classified in Sector 23, Construction.

Establishments in the Manufacturing sector are often described as plants, factories, or mills and characteristically use power-driven machines and materials-handling equipment. However, establishments that transform materials or substances into new products by hand or in the workers home and those engaged in selling to the general public products made on the same premises from which they are sold, such as bakeries, candy stores, and custom tailors, may also be included in this sector. Manufacturing establishments may process materials or may contract with other establishments to process their materials for them. Both types of establishments are included in manufacturing.

The materials, substances, or components transformed by manufacturing establishments are raw materials that are products of agriculture, forestry, fishing, mining, or quarrying as well as products of other manufacturing establishments. The materials used may be purchased directly from producers, obtained through customary trade channels, or secured without recourse to the market by transferring the product from one establishment to another, under the same ownership.

❖ **WHOLESALE AND RETAIL TRADE, CATERING AND ACCOMMODATION**

The Wholesale Trade sector comprises establishments engaged in wholesaling merchandise, generally without transformation, and rendering services incidental to the sale of merchandise. The merchandise described in this sector includes the outputs of agriculture, mining, manufacturing, and certain information industries, such as publishing.

The wholesaling process is an intermediate step in the distribution of merchandise. Wholesalers are organized to sell or arrange the purchase or sale of (a) goods for resale (i.e., goods sold to other wholesalers or retailers), (b) capital or durable non-consumer goods, and (c) raw and intermediate materials and supplies used in production.

The Retail Trade sector comprises establishments engaged in retailing merchandise, generally without transformation, and rendering services incidental to the sale of merchandise.

The retailing process is the final step in the distribution of merchandise; retailers are, therefore, organized to sell merchandise in small quantities to the general public. This sector comprises two main types of retailers: store and non-store retailers.

1. Store retailers operate fixed point-of-sale locations, located and designed to attract a high volume of walk-in customers. In general, retail stores have extensive displays of merchandise and use mass-media advertising to attract customers. They typically sell merchandise to the general public for personal or household consumption, but some also serve business and institutional clients. These include establishments, such as office supply stores, computer and software stores, building materials dealers, plumbing supply stores, and electrical supply stores. Catalogue showrooms, gasoline stations, automotive dealers, and mobile home dealers are treated as store retailers.

2. Non-store retailers, like store retailers, are organized to serve the general public, but their retailing methods differ. The establishments of this subsector reach customers and market merchandise with methods, such as the broadcasting of "infomercials," the broadcasting and publishing of direct-response advertising, the publishing of paper and electronic catalogues, door-to-door solicitation, in-home demonstration, selling from portable stalls (street vendors, except food), and distribution through vending machines. Establishments engaged in the direct sale (non-store) of products, such as home heating oil dealers and home delivery newspaper routes are included here.

The buying of goods for resale is a characteristic of retail trade establishments that particularly distinguishes them from establishments in the agriculture, manufacturing, and construction industries. For example, farms that sell their products at or from the point of production are not classified in retail, but rather in agriculture. Similarly, establishments that both manufacture and sell their products to the general public are not classified in retail, but rather in manufacturing. However, establishments that engage in processing activities incidental to retailing are classified in retail. This includes establishments, such as optical goods stores that do in-store grinding of lenses, and meat and seafood markets.

❖ TRANSPORTATION AND COMMUNICATION

The Transportation and Warehousing sector includes industries providing transportation of passengers and cargo, warehousing and storage for goods, scenic and sightseeing transportation, and support activities related to modes of transportation. Establishments in these industries use transportation equipment or transportation related facilities as a productive asset. The type of equipment depends on the mode of transportation. The modes of transportation are air, rail, water, road, and pipeline.

The Transportation and Warehousing sector distinguishes three basic types of activities: subsectors for each mode of transportation, a subsector for warehousing and storage, and a subsector for establishments providing support activities for transportation. In addition, there are subsectors for establishments that provide passenger transportation for scenic and sightseeing purposes, postal services, and courier services.

The Information sector comprises establishments engaged in the following processes: (a) producing and distributing information and cultural products, (b) providing the means to transmit or distribute these products as well as data or communications, and (c) processing data.

The main components of this sector are the publishing industries, including software publishing, and both traditional publishing and publishing exclusively on the Internet; the motion picture and sound recording industries; the broadcasting industries, including traditional broadcasting and those broadcasting exclusively over the Internet; the telecommunications industries; Web search portals, data processing industries, and the information services industries.

❖ FINANCE AND BUSINESS SERVICES

The Finance and Business services sector comprises establishments primarily engaged in financial transactions (transactions involving the creation, liquidation, or change in ownership of financial assets) and/or in facilitating financial transactions. Three principal types of activities are identified:

1. Raising funds by taking deposits and/or issuing securities and, in the process, incurring liabilities. Establishments engaged in this activity use raised funds to acquire financial assets by making loans and/or purchasing securities. Putting themselves at risk, they channel funds from lenders to borrowers and transform or repackage the funds with respect to maturity, scale, and risk. This activity is known as financial intermediation.
2. Pooling of risk by underwriting insurance and annuities. Establishments engaged in this activity collect fees, insurance premiums, or annuity considerations; build up reserves; invest those reserves; and make contractual payments. Fees are based on the expected incidence of the insured risk and the expected return on investment.
3. Providing specialized services facilitating or supporting financial intermediation, insurance, and employee benefit programs.

In addition, monetary authorities charged with monetary control are included in this sector.

3.2.3 Sectoral Analysis

Subsequent paragraphs provide a detailed disaggregated assessment of the above sectors.

The main sectors that contribute to the local and district economies are illustrated in Figure 3.3 and Figure 3.4.

The major drivers in the district municipality include (2016):

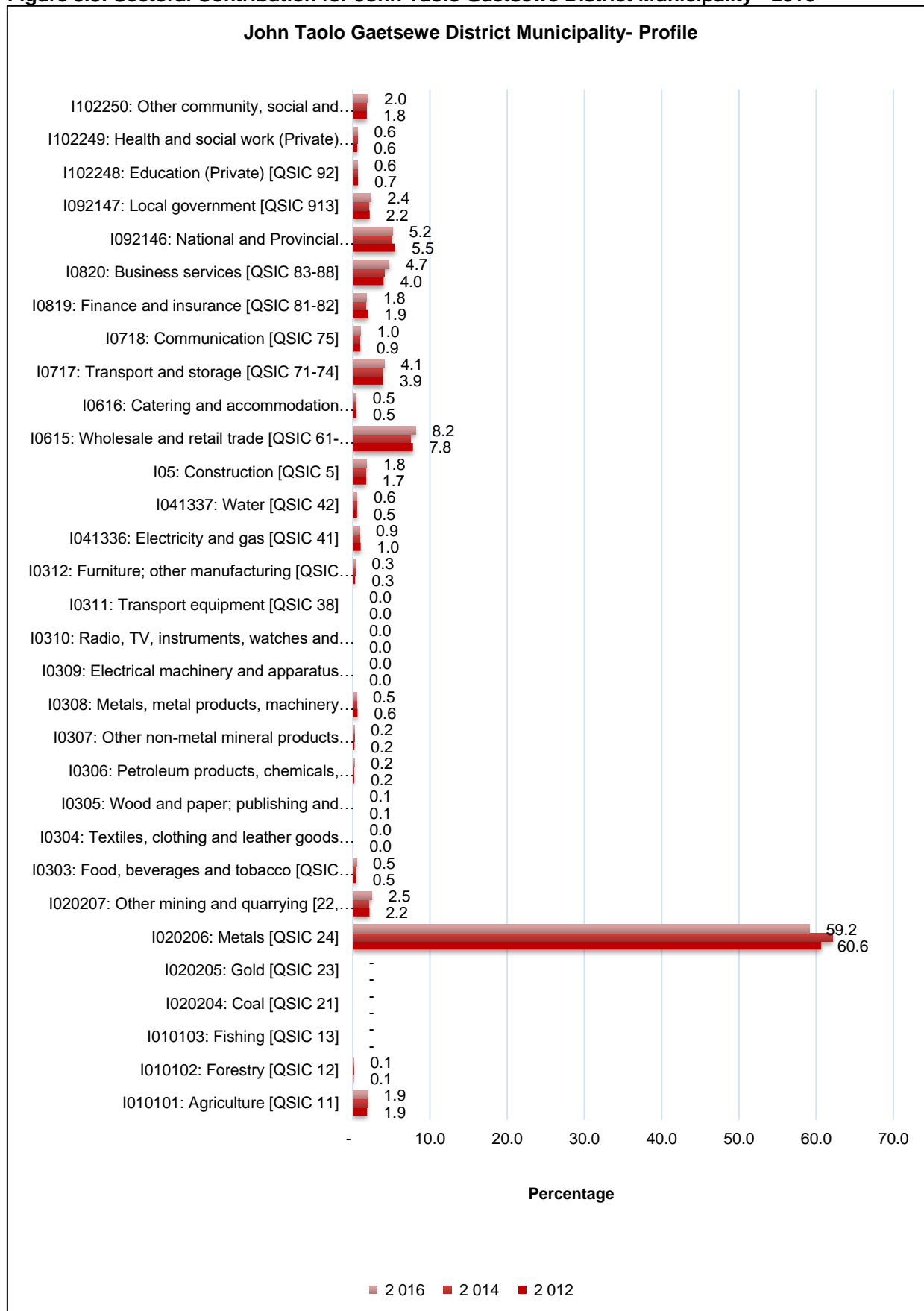
- ✓ Metal mining – 59.2%
- ✓ Trade – 8.7%
- ✓ General government services – 7.6%

The major drivers in the local municipality include (2016):

- ✓ Metal mining – 67.9%
- ✓ Trade – 8.0%

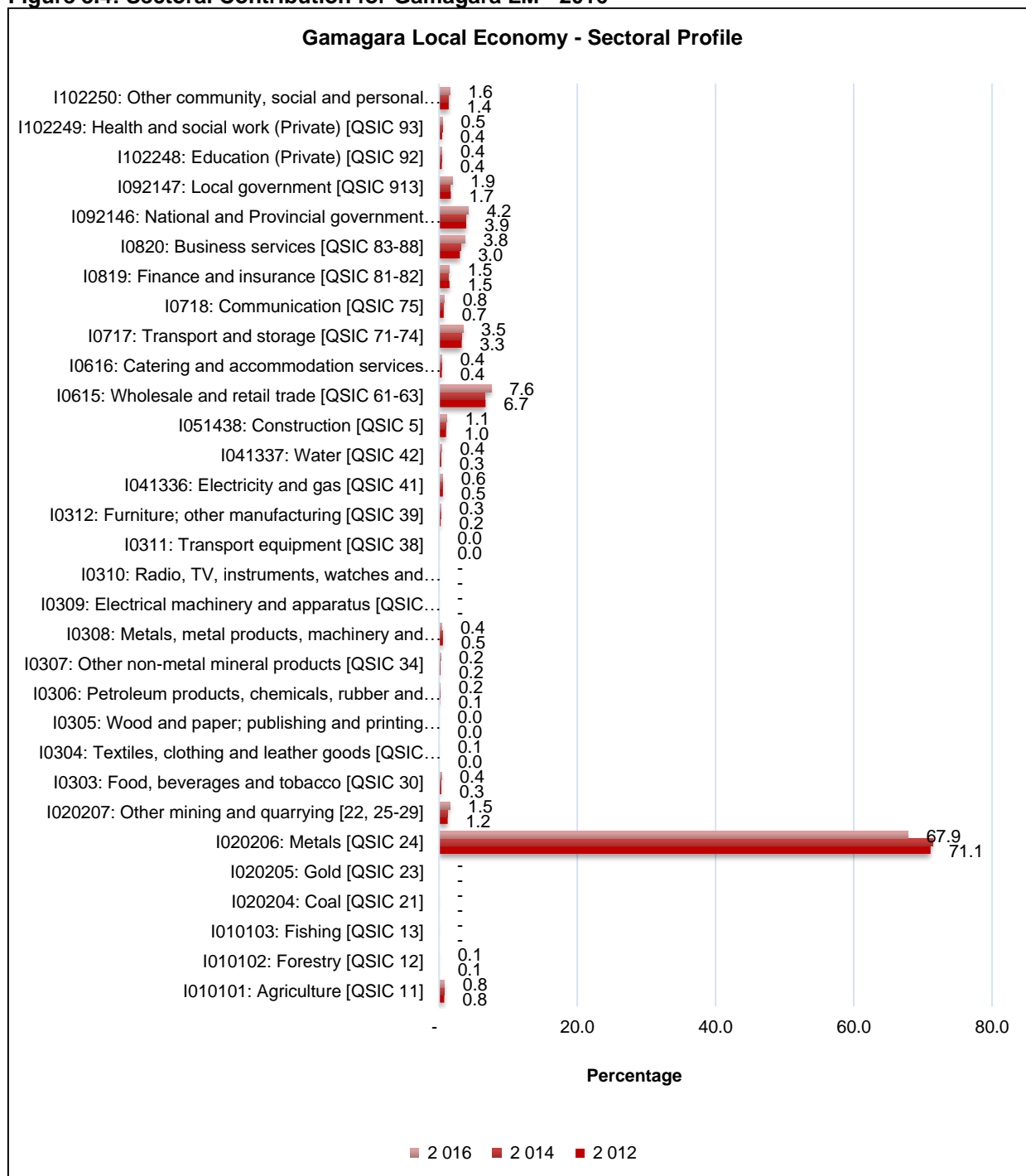
The figures indicate, not only the reliance on mining, but that the other dominant sectors are all trade related – supporting the mining industry.

Figure 3.3: Sectoral Contribution for John Taolo Gaetsewe District Municipality - 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Figure 3.4: Sectoral Contribution for Gamagara LM - 2016

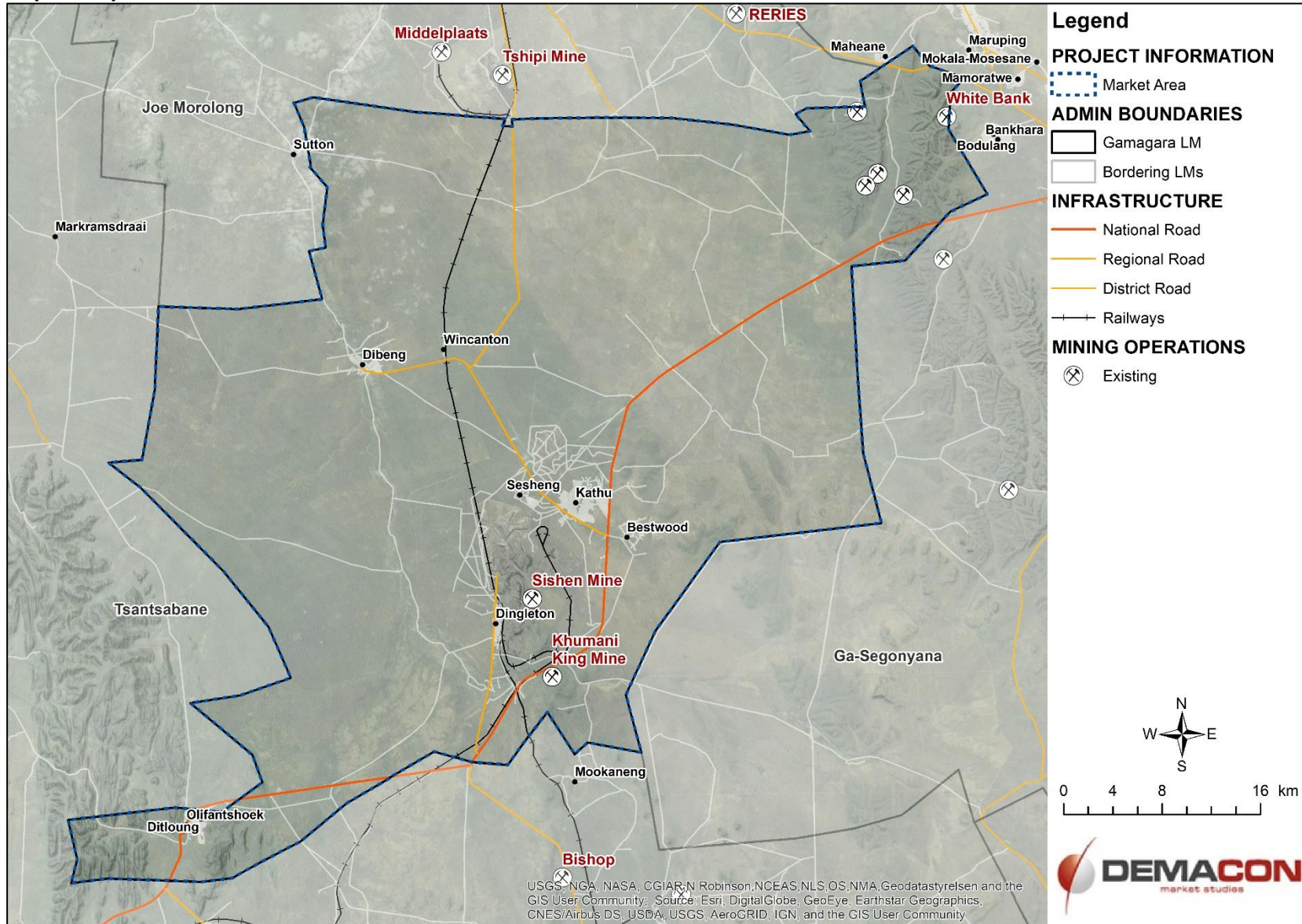


Source: Demacon ex. StatsSA (seasonally adjusted), 2017

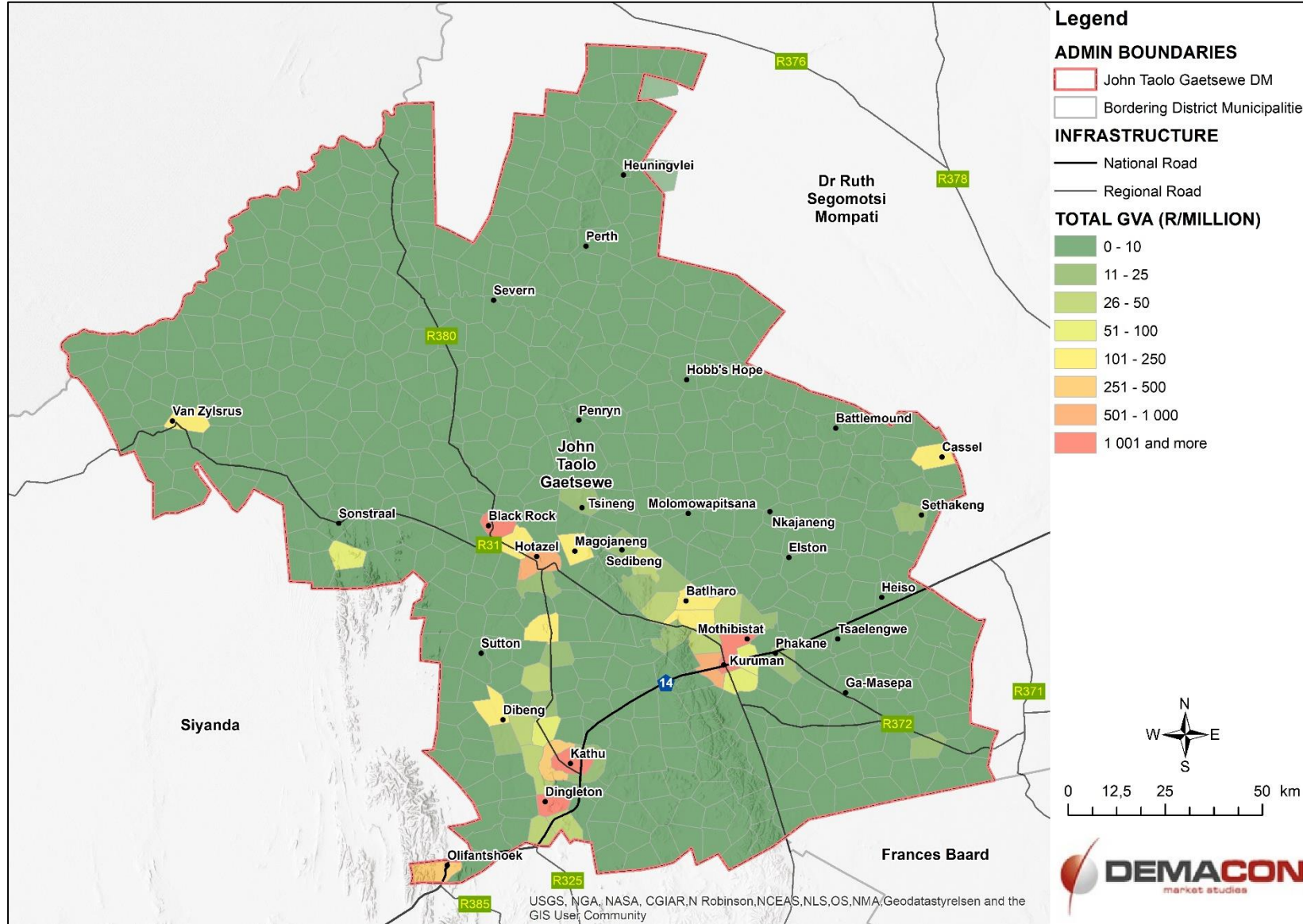
Map 3.2 provides the location of the operational mines in the area. The main mines contributing to the local municipality’s GVA is Sishen and Khumani. Map 3.3 provides an indication of the location and size of total economic activity in the local and district municipality, while Map 3.4 indicates the sectors that contribute to the local and district economies and per mesozone⁶. It is evident from the map that mining is the major economic activity and is mainly located at Sishen and Khumani.

⁶ The economic trends on a micro level are determined by using the mesozone data base. Mesozones are the lowest level of data that indicates economic activity throughout South Africa. Mesozones are the result of dividing a geographical area into a grid of similarly sized small areas – taking into consideration major boundaries and barriers within the geographical area. These small areas/zones allow for more detailed area overviews, minimising trend generalisation that typically occurs when working with larger geographical areas such as suburbs, main places, municipalities etc.

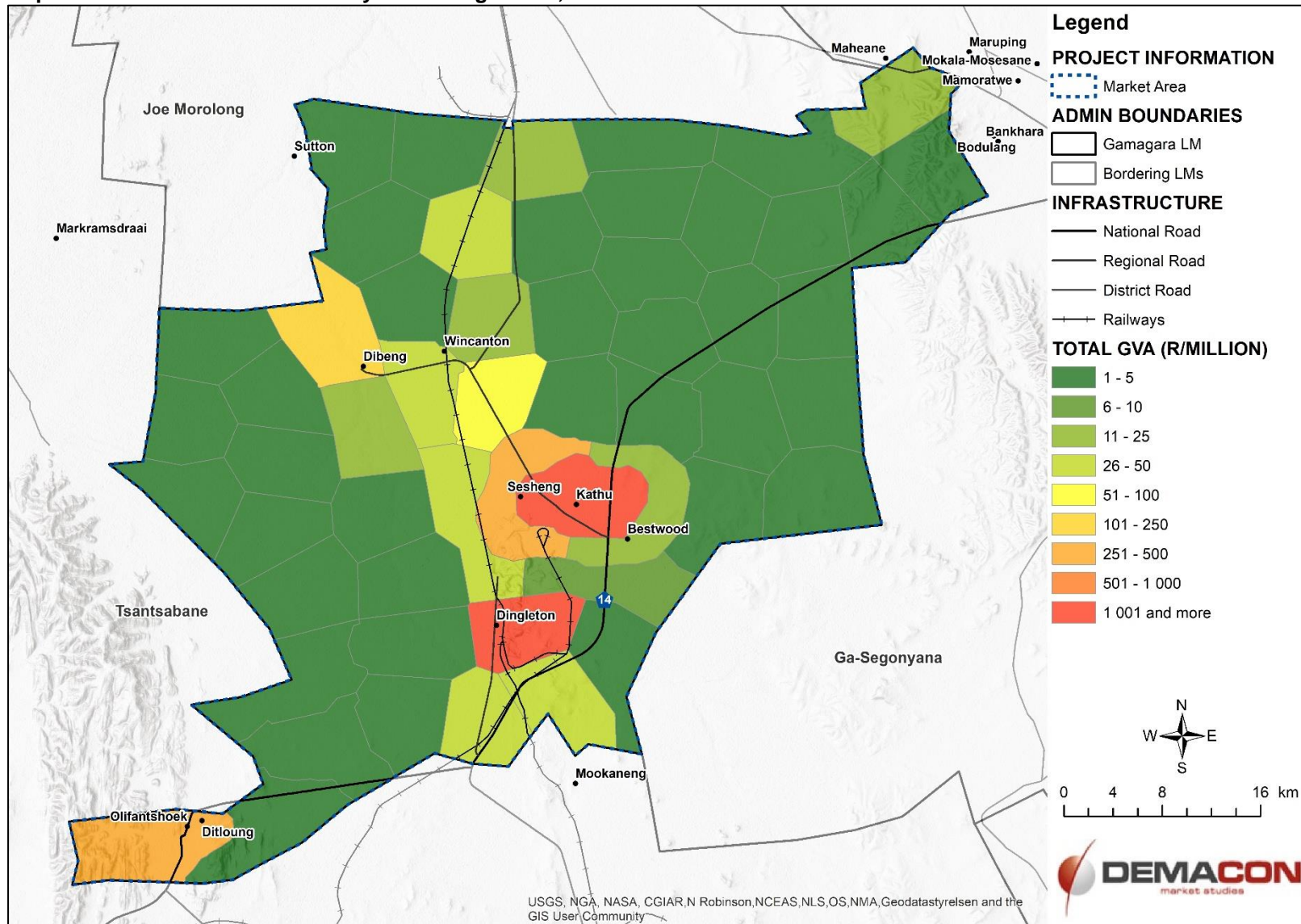
Map 3.2: Operational mines within the area



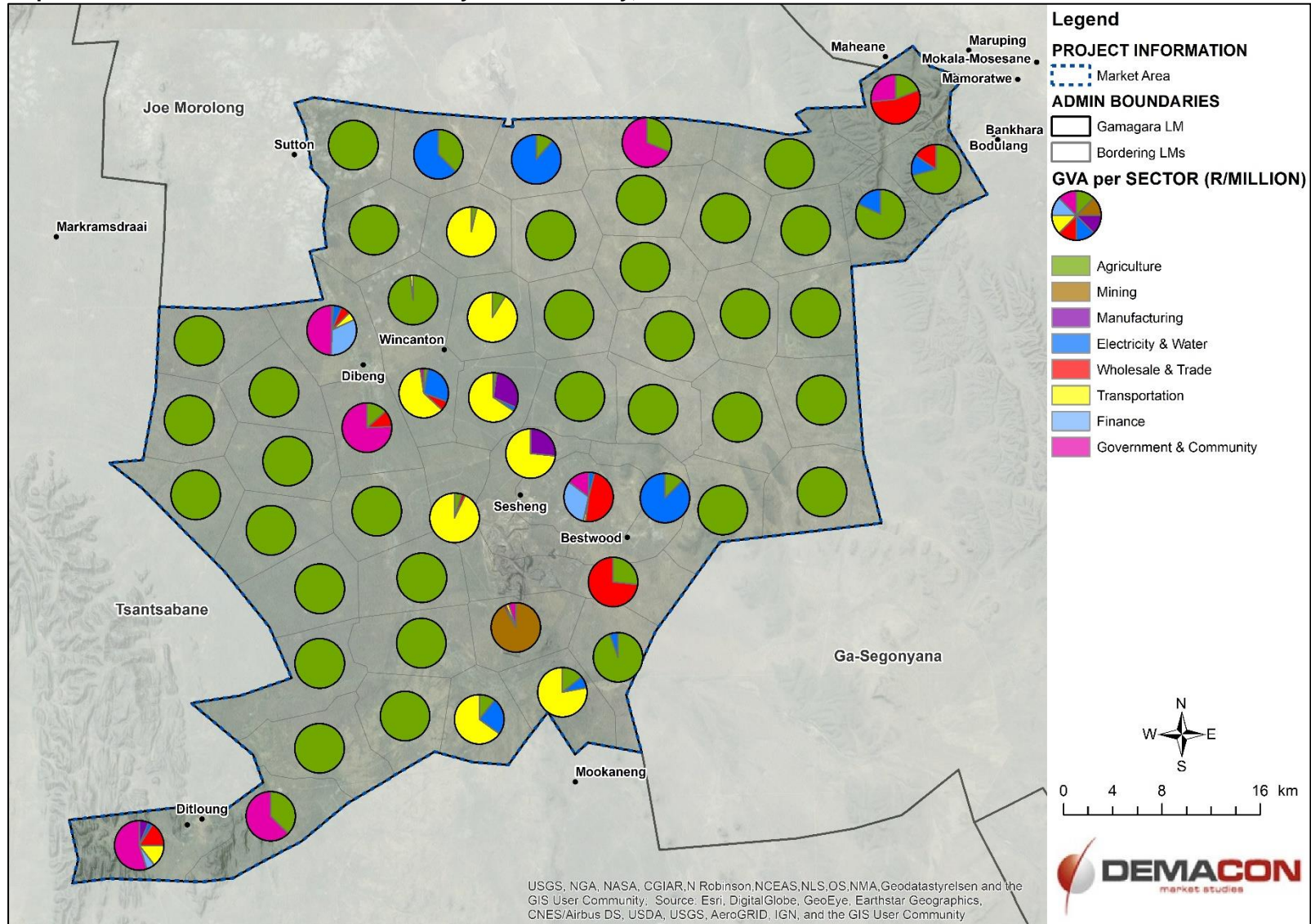
Map 3.3: Value of Economic Activity for John Taolo Gaetsewe DM, 2016



Map 3.4: Value of Economic Activity for Gamagara LM, 2016



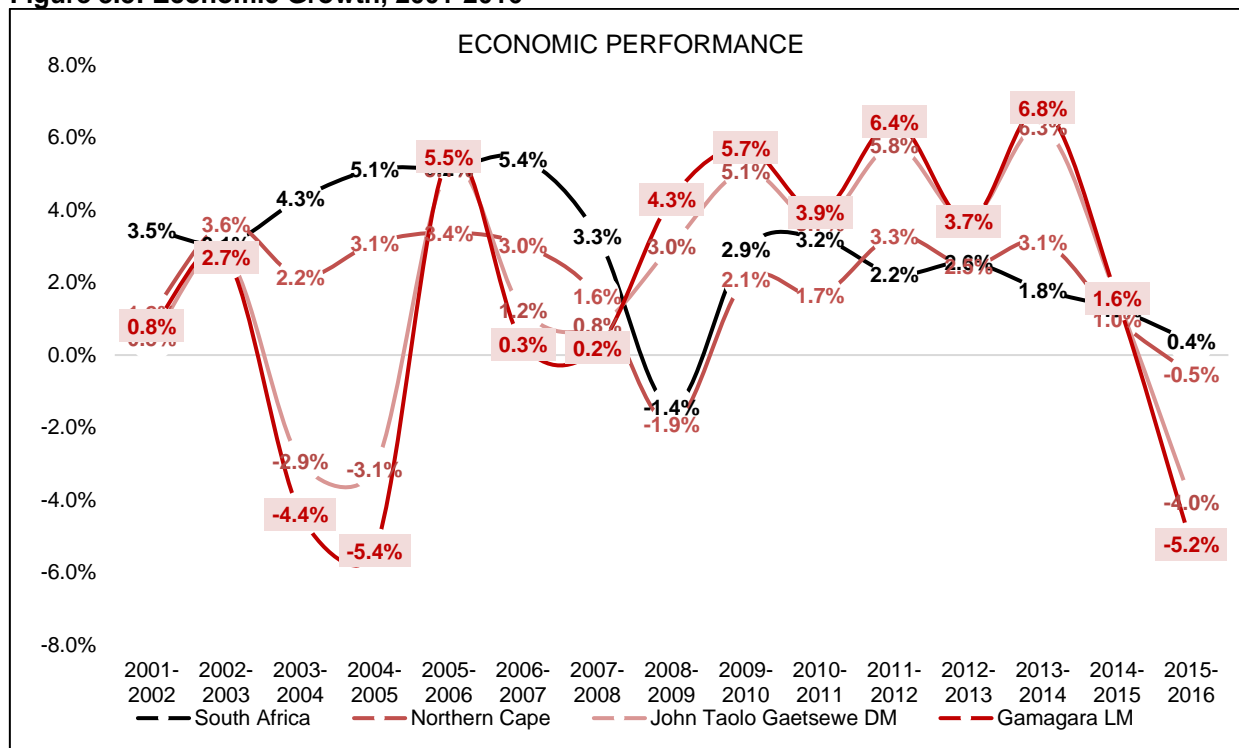
Map 3.5: Sectors that Contribute to the Study Area Economy, 2016



3.2.4 Economic Growth

The economic growth rates for the local, district, provincial and national economies are illustrated in Figure 3.5.

Figure 3.5: Economic Growth, 2001-2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

The economic growth for Gamagara Local Municipality has fluctuated between high negative growth rates (2003 to 2005, 2015 to 2016) to high positive growth rates (2005 to 2006, 2009 to 2010, 2011 to 2012, 2013 to 2014). The average economic growth rate for the local municipal area between 2001 and 2016 was 1.8% per annum. The district and provincial growth rate over the corresponding period was 2.0% per annum. The growth trends over the past 15 years for the Gamagara, district, provincial and national economies are illustrated in Table 3.1.

Table 3.1: Economic Growth, 2001 to 2016

Period	Gamagara Local Municipality	John Taolo Gaetsewe District Municipality	Northern Cape Province	South Africa
2001 to 2016	1.8%	2.0%	2.0%	2.9%
2006 to 2016	2.8%	2.7%	1.6%	2.2%
2011 to 2016	2.7%	2.7%	1.9%	1.6%

Source: Demacon ex. StatsSA (seasonally adjusted), 2017

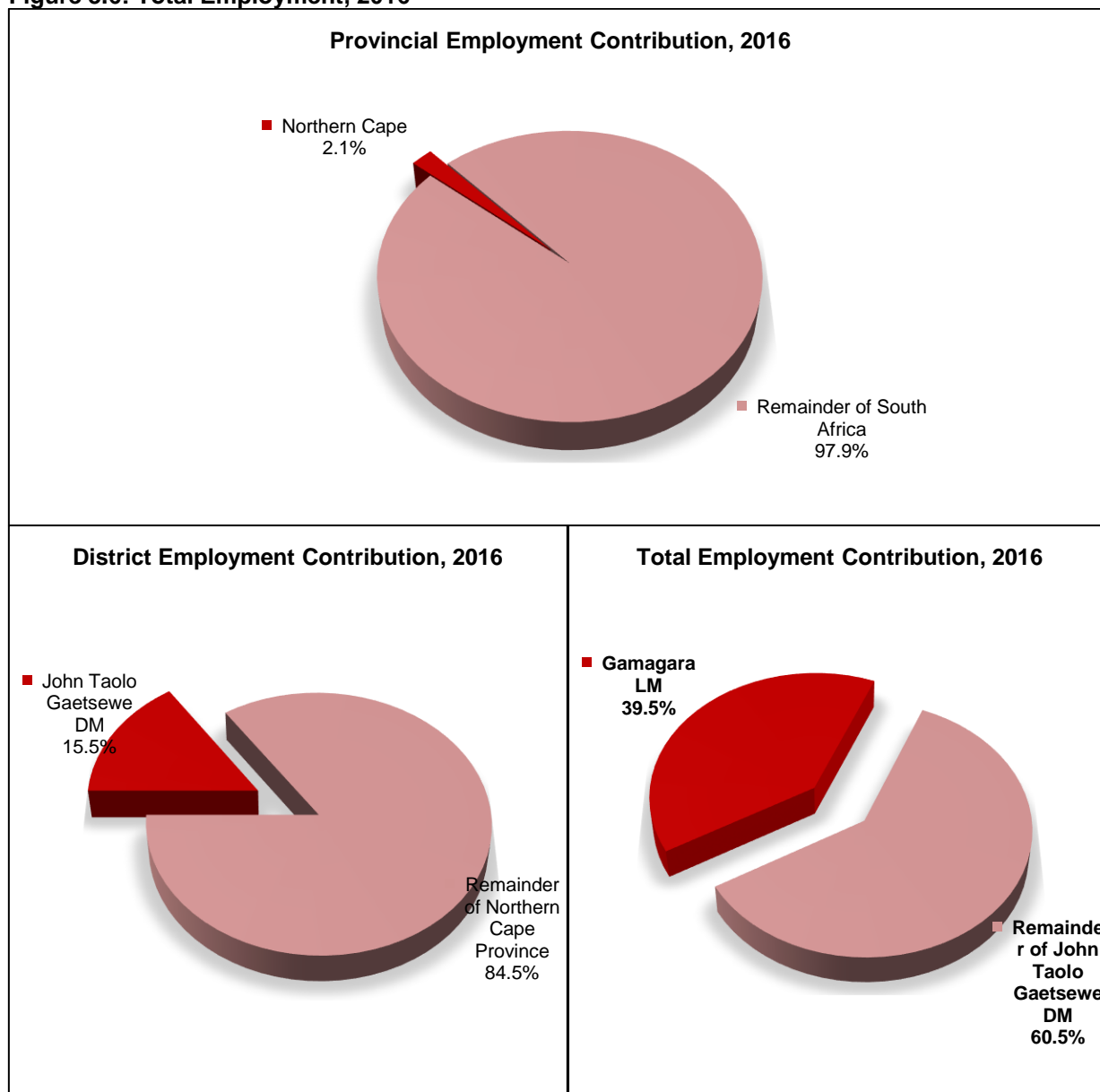
The short term economic growth was positive, and above the provincial and national growth rates. The long term growth (15 years) for Gamagara LM was positive, albeit still lower than the national average (2.9%) over the corresponding period.

3.2.5 Employment Trends

The total employment for the local compared to the district economy, and the district economy compared to the province is provided in Figure 3.6.

Gamagara Local Municipality accounted for approximately 39.5% of the district employment in 2016. The district municipality accounted for approximately 15.5% of the Northern Cape Province employment during 2016.

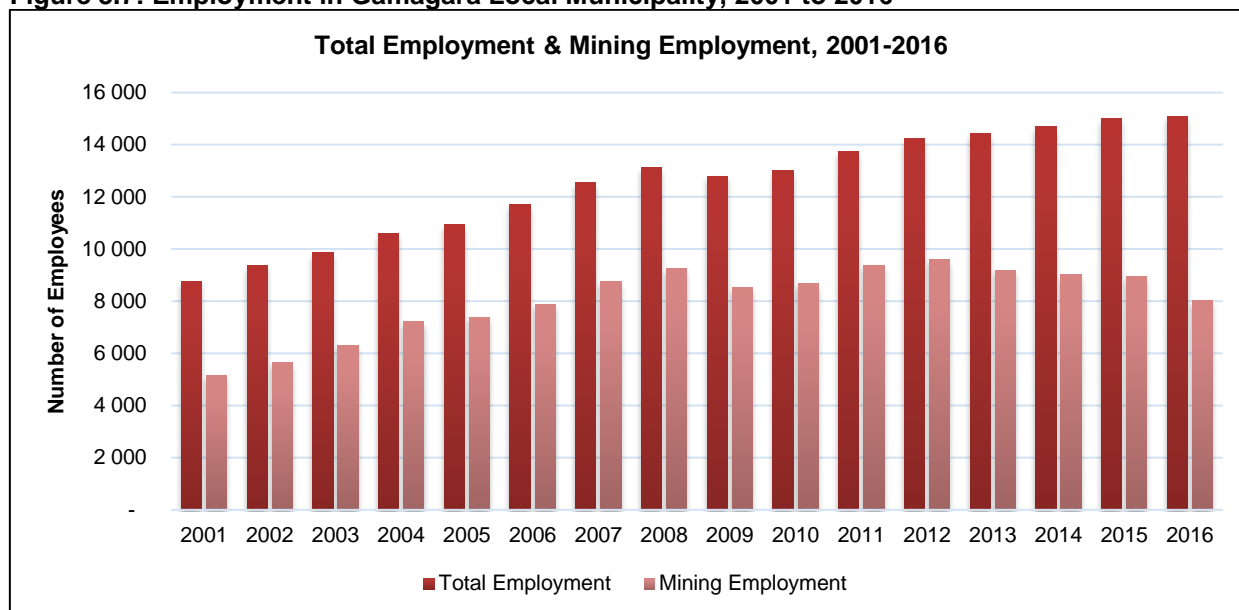
Figure 3.6: Total Employment, 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

The total number of people employed since 2001 is shown in Figure 3.7.

Figure 3.7: Employment in Gamagara Local Municipality, 2001 to 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

From Figure 3.7, it is evident that total employment in the local municipality has increased steadily from 8 742 in 2001 to 15 067 in 2016. Mining employment, however, has fluctuated from 2001 to 2016, reaching a high of 9 271 in 2008. Mining employment has decreased year-on-year from 2012 and totals 8 018 in 2016.

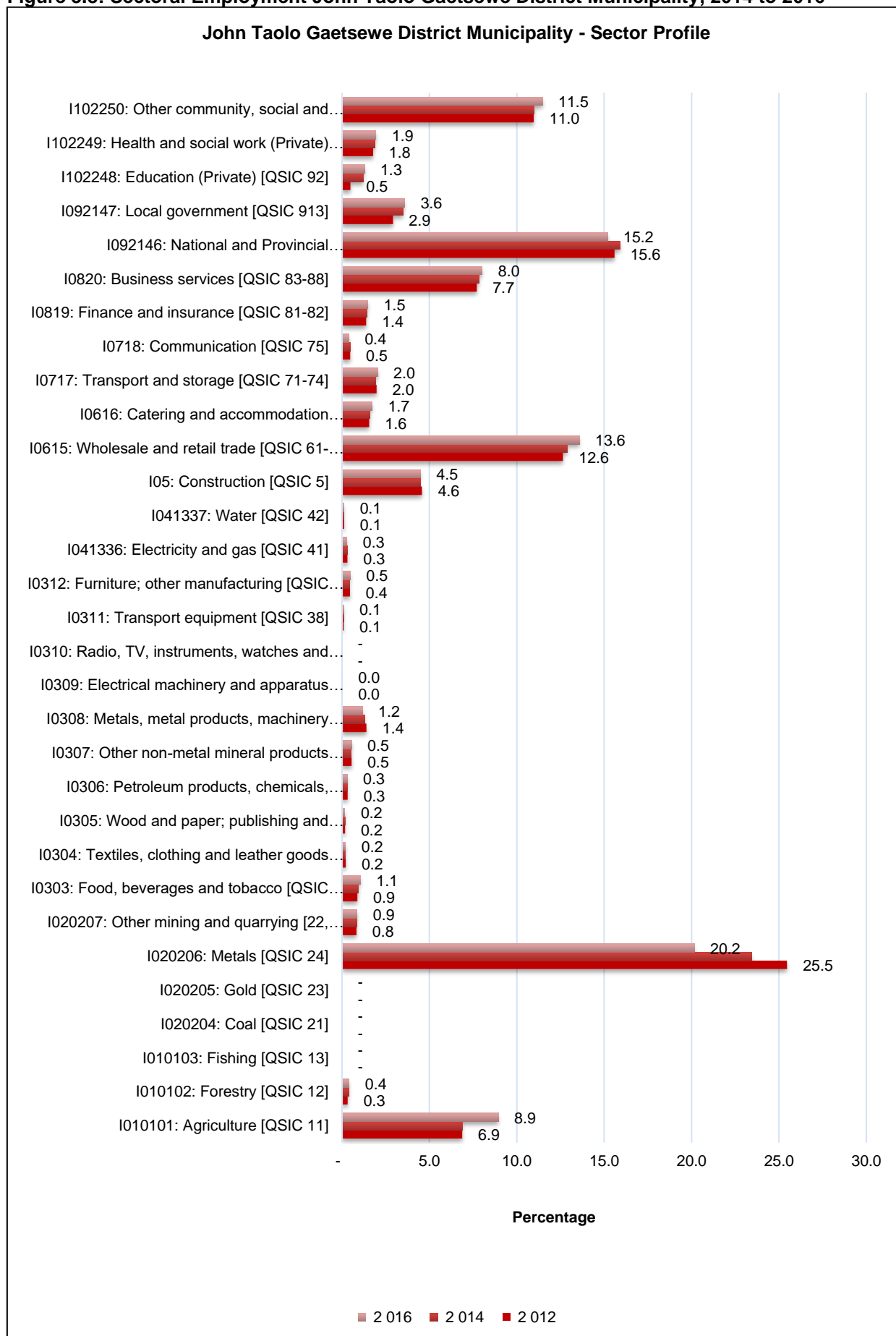
The employment per sector is illustrated in Figure 3.8 and Figure 3.9.

The **metal mining sector** is the **largest employer in the district municipal economy (20.2%)**, its contribution has, however, decreased proportionally since 2014. The general government services sector (18.8%) is the second largest contributor. Overall, the tertiary sector (consisting of the wholesale and retail trade services, transport and communication services, finance and business services, community, social and other services, and general government services) contributes 60.7% to employment.

The **mining sector** is the **largest employer in the local municipality (24.3%)** and its contribution has contracted considerably from 2014. The general government services (18.9%) and the trade sector (17.5%) are the other dominant sectors in the local municipal employment.

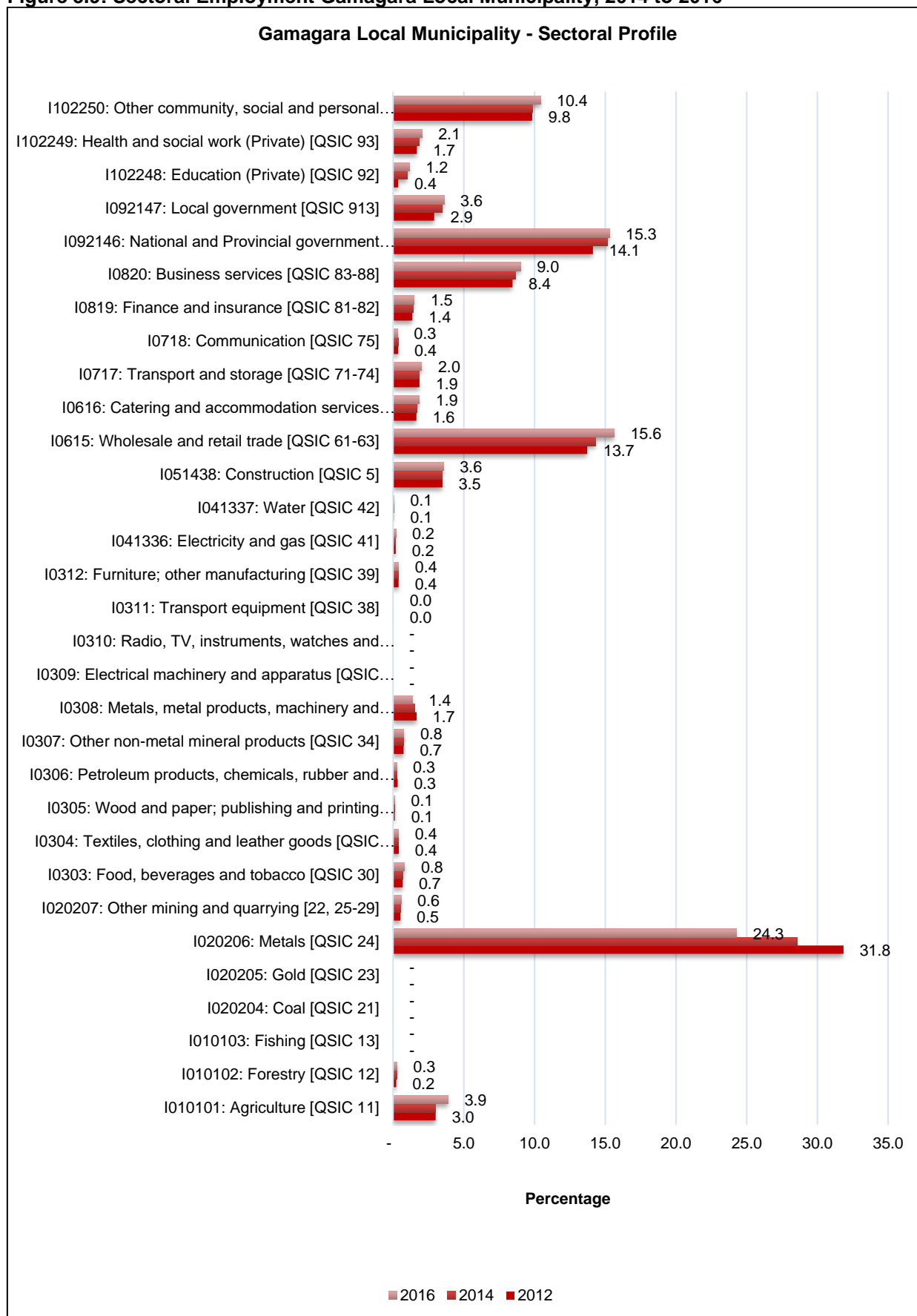
Map 3.6 illustrates the total employment per sector within the local municipality. The major employment nodes correlate with the economic nodes and are located at the major mining operations in the municipal area.

Figure 3.8: Sectoral Employment John Taolo Gaetsewe District Municipality, 2014 to 2016



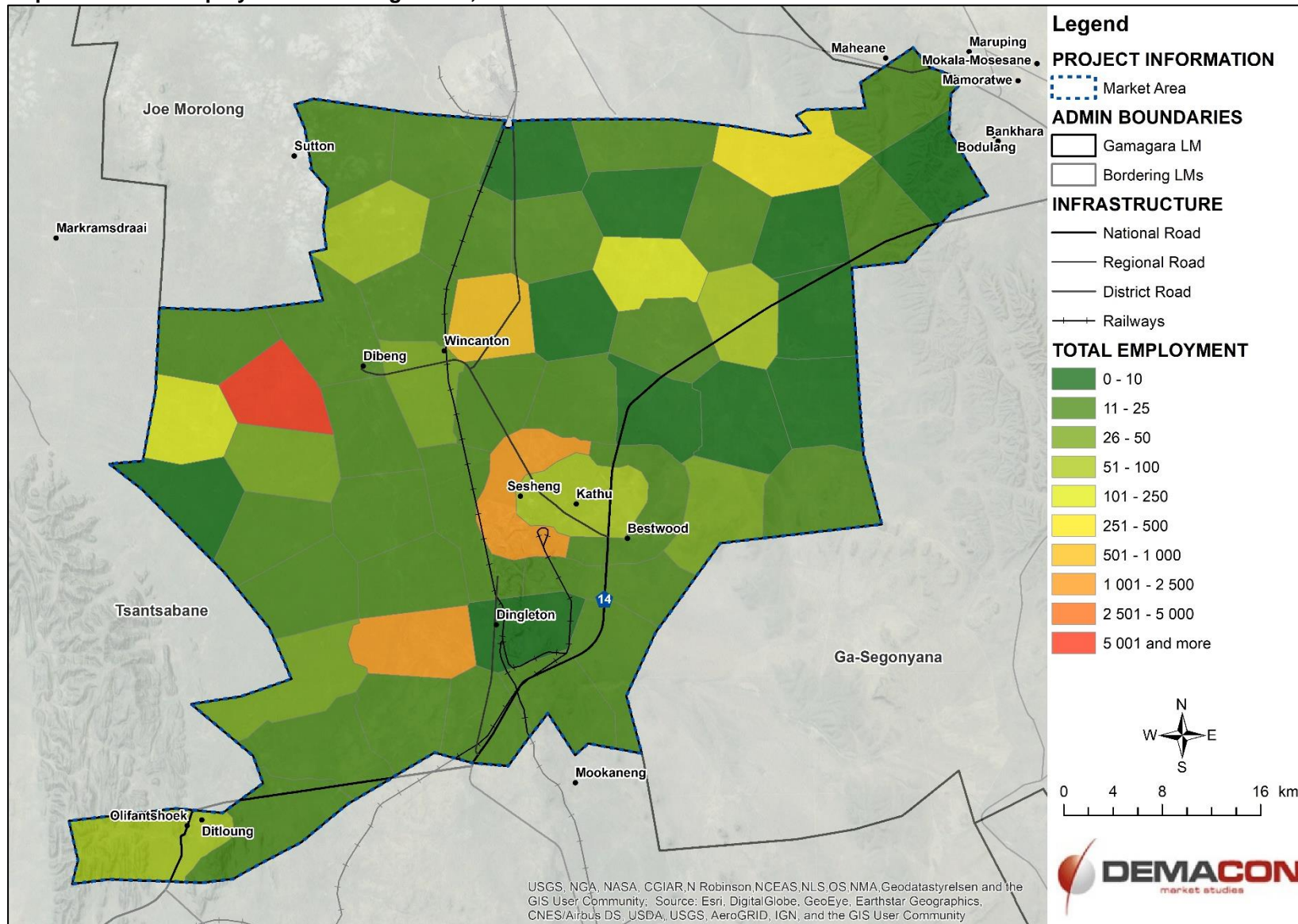
Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Figure 3.9: Sectoral Employment Gamagara Local Municipality, 2014 to 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

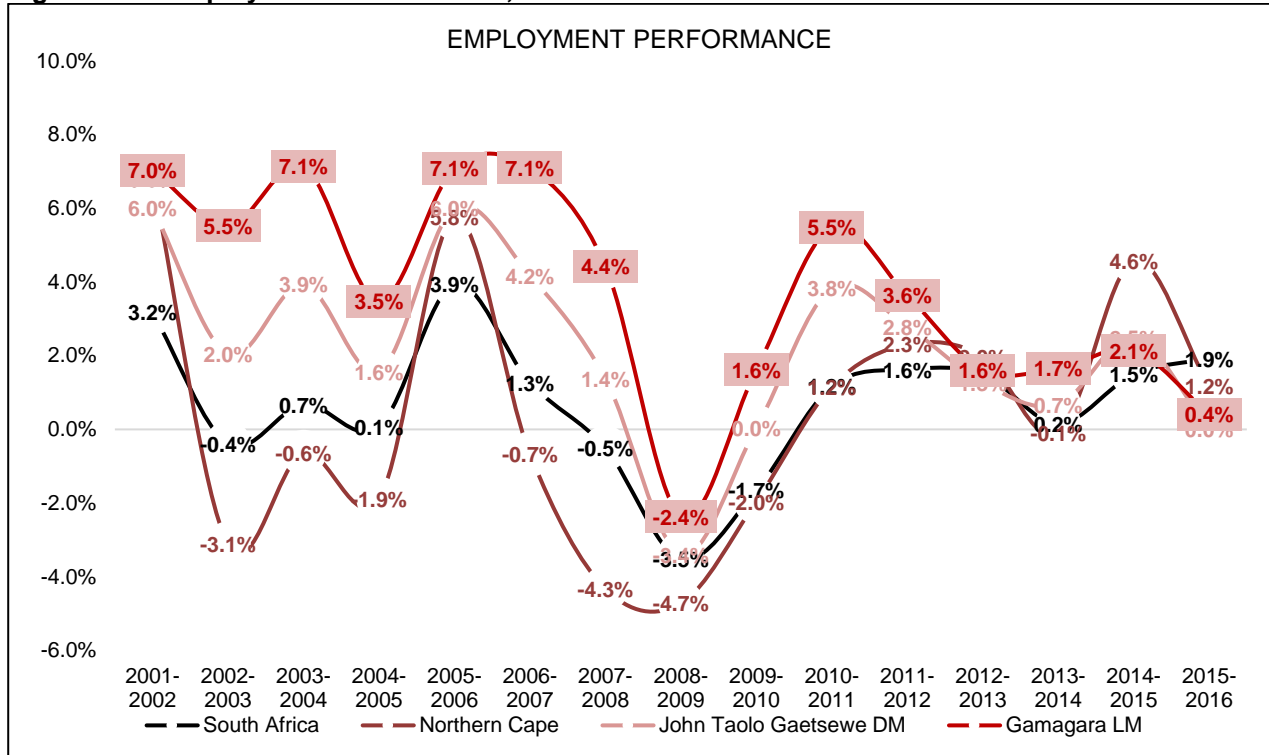
Map 3.6: Formal Employment in Gamagara LM, 2016



3.2.6 Employment Growth

The employment growth rates for the local, district, provincial and national municipalities are illustrated in Figure 3.10.

Figure 3.10: Employment Growth Rates, 2001 to 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Figure 3.10 illustrates that formal employment growth in Gamagara Local Municipality has reached record high levels in 2003 to 2004 (7.1%) and again in 2005 to 2007 (7.1%). The average employment growth for the local, district, provincial and national economies are illustrated in Table 3.2.

Table 3.2: Employment Growth

Period	Gamagara LM Growth	John Taolo Gaetsewe DM Growth	Northern Cape Growth	South Africa
2001 to 2016	3.7%	2.2%	0.4%	0.7%
2006 to 2016	2.6%	1.3%	-0.1%	0.3%
2011 to 2016	1.9%	1.4%	2.0%	1.3%

Source: Demacon ex. StatsSA (seasonally adjusted), 2017

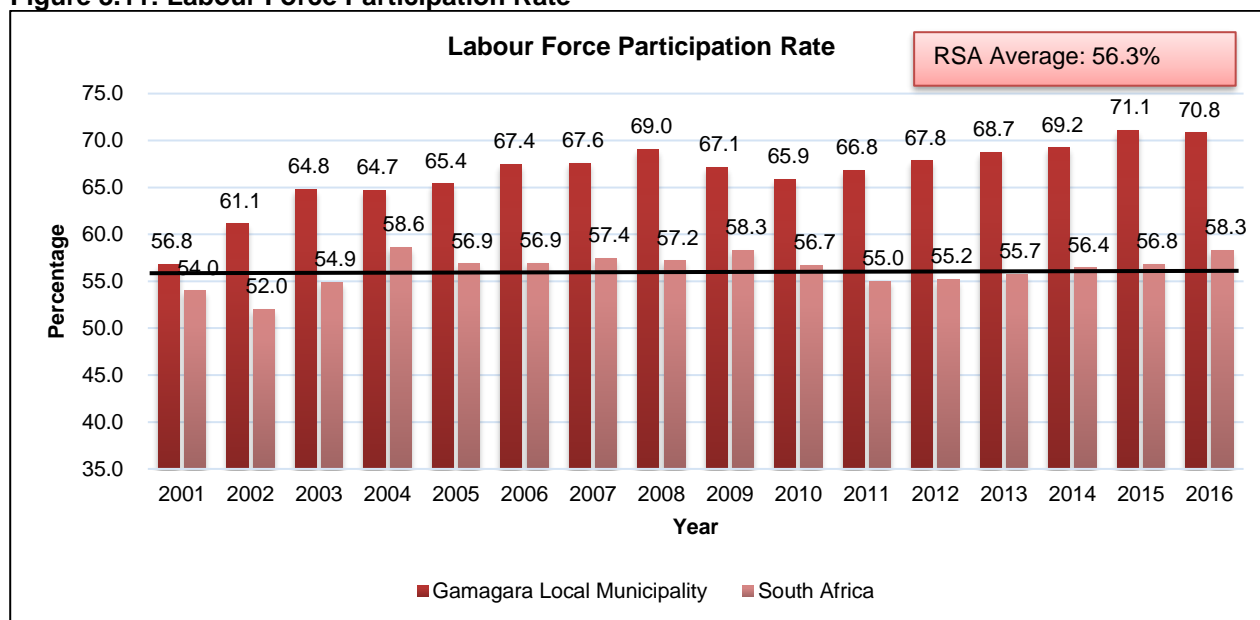
The long term growth trend of Gamagara Local Municipality illustrates a growth rate of 3.7% and the 10 year growth rate is at 2.6%. The short term (5 years) growth is lower at 1.9%. The short term growth rate, albeit lower than the long term average, is still higher than the national average of 1.3%.

The following sub-section illustrates how an individual’s skill level influence the level of employment.

3.2.7 Labour Participation Rate

The following figure indicates the labour participation rate for the Gamagara Local Municipality for the period 2001 to 2016.

Figure 3.11: Labour Force Participation Rate



Source: Demacon ex StatsSA (seasonally adjusted), 2017

The labour force participation rate for Gamagara Local Municipality fluctuated between 56.8% (2001) and a high of 71.1% in 2015. The average labour force participation rate for the long term (2001 to 2016) amounted to 66.5% – higher than the national average of 56.3%. The Gamagara Local Municipality labour force participation rate for 2016 amounts to 70.8% – higher than the national labour force participation rate of 58.3%.

The following table illustrates the labour absorption within Gamagara Local Municipality for 2006 and 2016. The table illustrates the average net gain / loss in employment for the different skills segments, including informal employment.

Table 3.3: Labour Absorption within Gamagara Local Municipality, 2006 to 2016

	Employment Level	2006	2016	Net gain / loss	Average gain / loss per annum
Formal	Highly Skilled	2 188	2 995	807	81
	Skilled	6 060	7 358	1 298	130
	Semi- & Unskilled	3 475	4 714	1 239	124
	Formal Total	11 723	15 067	3 344	334
Informal		1 157	3 311	2 154	215
Total		12 880	18 378	5 498	550

Source: Demacon ex StatsSA (seasonally adjusted), 2017

A total of 3 344 formal jobs were created during the past ten years (from 2006 to 2016) in Gamagara Local Municipality, which translates to approximately 334 formal employment opportunities created per annum. The number of highly skilled employment increased at an average of 81 new jobs per annum. The informal sector increased with approximately 2 154 jobs during the past ten years (from 2006 to 2016), which translates to approximately 215 new informal jobs per annum.

Whereas Table 3.3 indicates the demand for labour, Table 3.4 illustrates the supply side dynamic.

Table 3.4: Economically Active Population Growth, 2006 to 2016

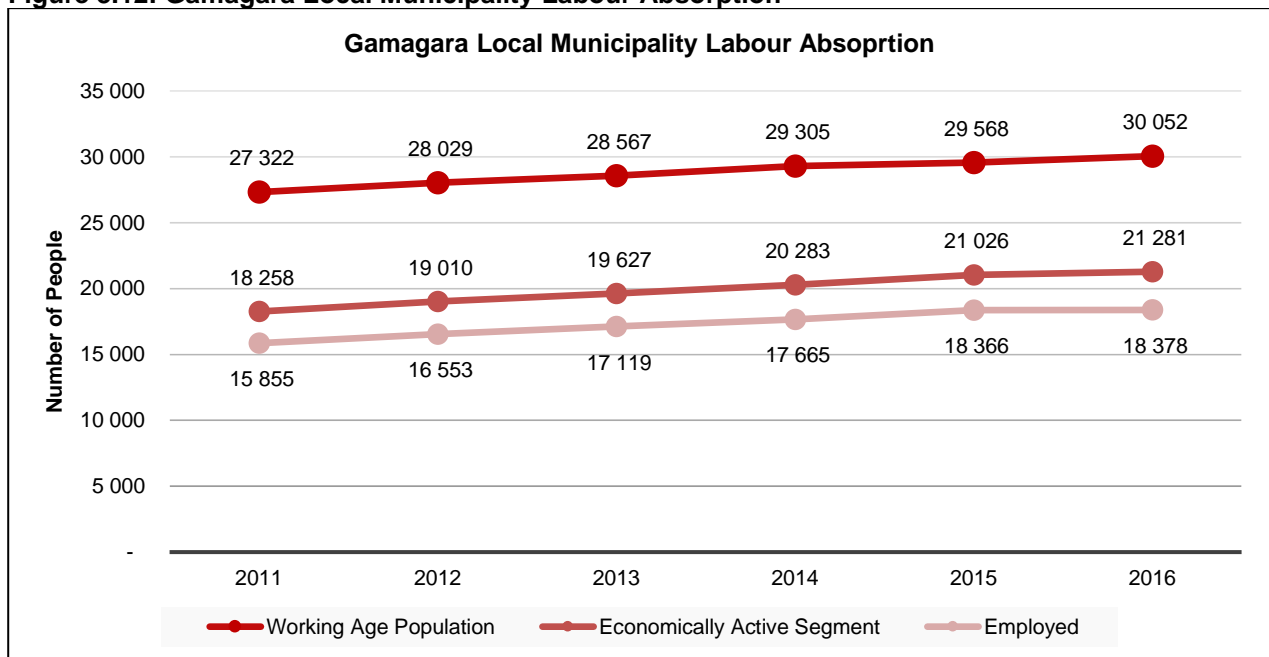
	2006	2016	Net gain / loss	Average gain / loss per annum
Working Age Population	22 159	30 052	7 893	789
Not economically active	7 214	8 771	1 557	156
Economically Active	14 945	21 281	6 336	634
Total Employment (formal & informal)	12 880	18 378	5 498	550
Unemployment	2 065	2 903	838	84

Source: Demacon ex StatsSA (seasonally adjusted), 2017

The economically active segment increased by 6 336 people between 2006 and 2016 which translates into an annual increase of 634 people within Gamagara Local Municipality. It is evident that the economically active segment is growing slightly faster than what the local economy can absorb – of the 634 people looking for work per annum, approximately 550 will be able to find work in the area, of which 334 will be formal employment opportunities.

Figure 3.12 illustrates the widening gap between the expanding population (economically active segment) and the total employment from 2001 to 2016.

Figure 3.12: Gamagara Local Municipality Labour Absorption



Source: Demacon ex StatsSA (seasonally adjusted), 2017

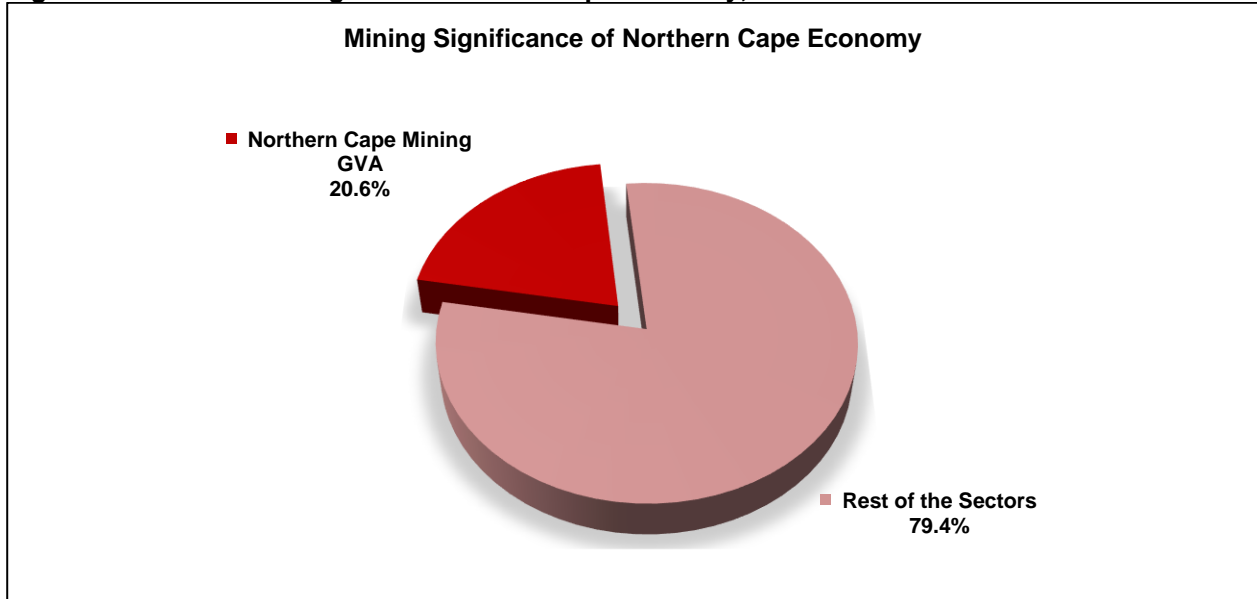
3.3 SIGNIFICANCE OF SISHEN MINE

3.3.1 Economic Significance

The quantitative analysis illustrated that the benefit of the mine is spread across the entire economy while a significant part of this benefit is provided locally. In this context, this sub-section will illustrate the economic significance of the Sishen mine within the context of the provincial economy. It should be noted that the significance of Sishen in the Northern Cape is portrayed, applying base data, for 2013. This aggregated 2014 sectoral data for local and district municipalities would only be available towards the end of July 2016.

Figure 3.13 shows the size of mining within the provincial economy.

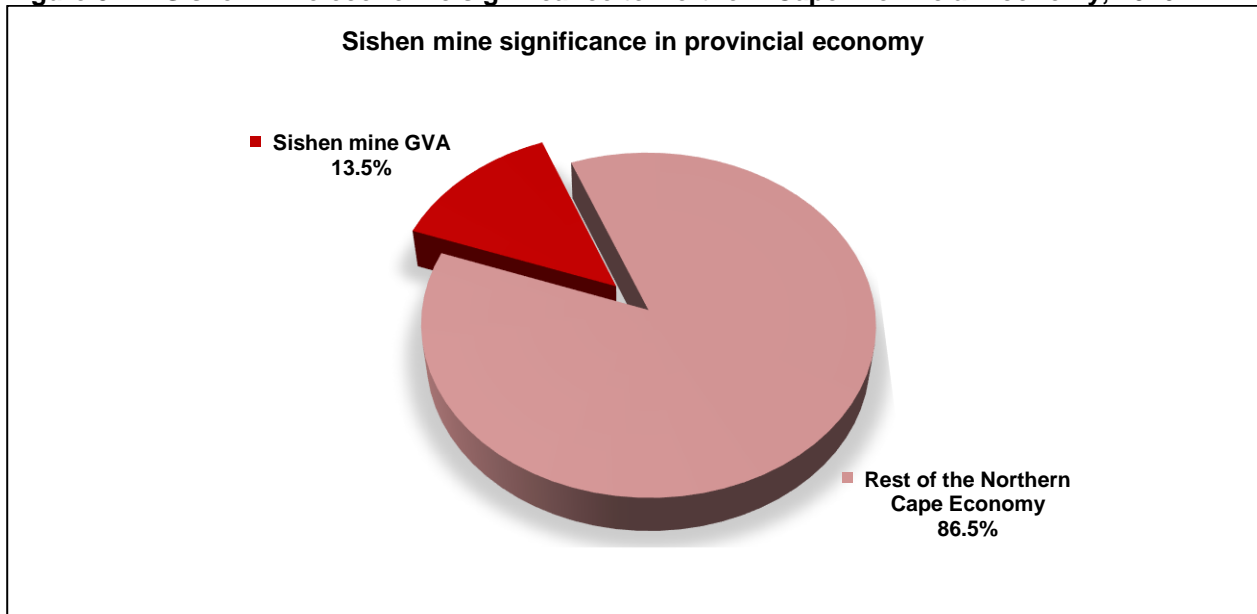
Figure 3.13: Size of mining in the Northern Cape economy, 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Mining contributes 28.4% towards the provincial economy, illustrating that mining is the main economic driver in the provincial economy. The following figure shows the contribution of the Sishen mine towards the mining sector and the contribution to the total provincial economy.

Figure 3.14: Sishen mine economic significance to Northern Cape Provincial Economy, 2016



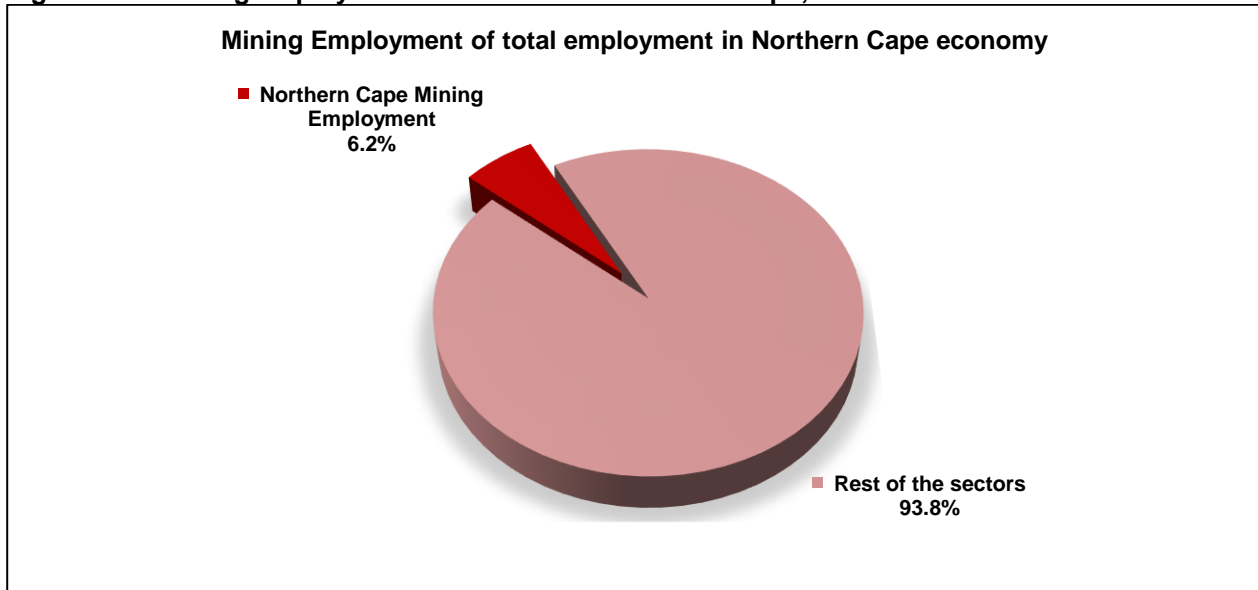
Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Considering the total size of the provincial economy, the mine accounts for 12.7% of the provincial economy. It is evident that Sishen mine is a main driver in the local, and even provincial economy.

3.3.2 Employment Significance

With regards to employment it is evident that the mine provided a total of 5 466 employment opportunities (4 040 permanent employees, 1 426 contractors) in 2016. Figure 3.15 shows the number of employed within the provincial economy and the contribution of mining.

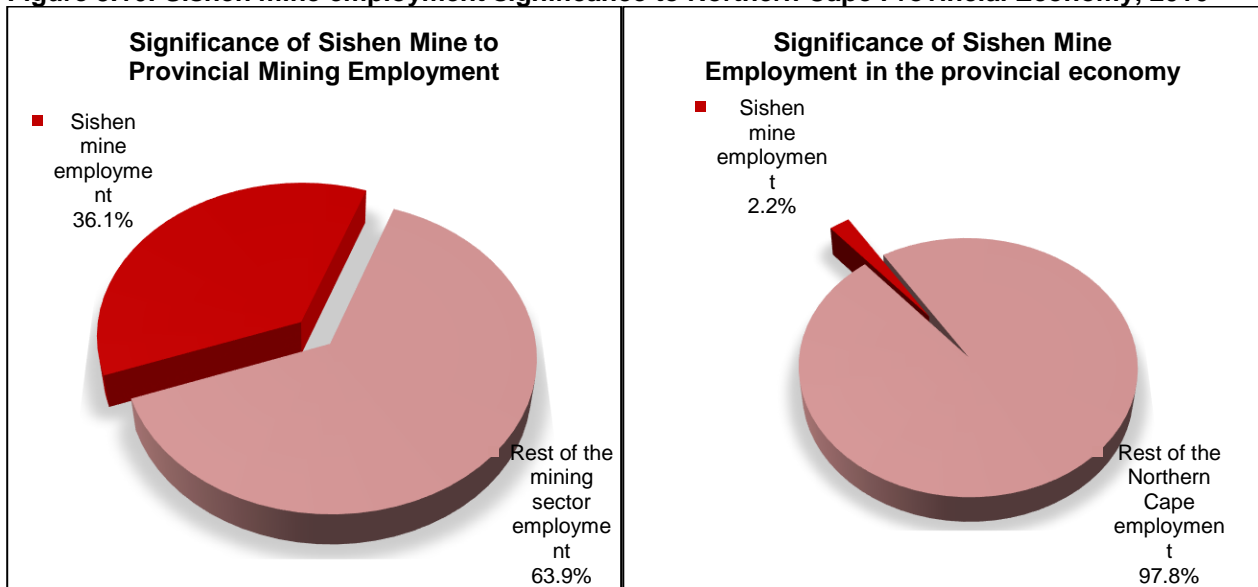
Figure 3.15: Mining employment contribution in Northern Cape, 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

Mining provides 6.2% of employment within the provincial area, this equates to 15 143 jobs of the total 246 219 (2016). Figure 3.16 shows the contribution of the Sishen mine to total employment and total mining employment in the provincial economy.

Figure 3.16: Sishen mine employment significance to Northern Cape Provincial Economy, 2016



Source: Demacon ex. StatsSA (seasonally adjusted), 2017

The mine may only account for 2.2% of employment in the province, but the mine accounts for 36.1% of total mining employment in the province. These numbers bely the significance of the downstream effects on other sectors.

In summary, it is evident, based on the above analysis that the Sishen mine fulfils a pivotal role in the local, as well the district economy regarding GVA and employment. The significance on a provincial basis is similarly appreciable. To further illustrate the downstream impacts on other sectors, economic impact modelling of mining activity at Sishen mine is conducted in Chapter 5.

Although Sishen contributes only 2.2% of employment in the Northern Cape Province, between 60 000 (2013) and 54 000 (2016) employees are impacted by the mine. For every employee

working at the mine, approximately 5 other people (working force) are affected. These include, *inter alia*, employment in the following sectors:

- Shipment / transport
- First round beneficiation
- Insurance services
- Education facilities
- Health care facilities
- Automotive industry (auto sales, servicing and repair)
- Police services
- Private security
- Retail and fuel sales industry
- Banking and insurance
- Property brokers
- Hospitality industry (including catering and accommodation)

3.4 COMPETITIVE AND COMPARATIVE ADVANTAGE ANALYSIS

Competitive Advantage Analysis (CAA) is an assessment of the structure and performance of the economy of an area, to identify local strengths (“competitive advantages”) and potential for economic development. Actually, a full competitive advantage analysis would include an examination of local infrastructure, markets, labour force, amenities, access to transportation routes, etc. The approach outlined here doesn’t go that far. Instead, it focuses on examining local industries/sectors to identify leading and lagging sectors and their prospects for employment growth.

3.4.1 Location Quotient

A location quotient identifies the level of specialisation in a geographic region. In simple terms, it measures the concentration of certain industry sectors in the region relative to the aggregate / reference economy⁷.

$$LQ = (Local\ Employment\ in\ Industry / Total\ Local\ Employment) / (National\ Employment\ in\ Industry / Total\ National\ Employment)^8.$$

The interpretation of location quotients is not particularly complex; we are simply measuring employment concentration in the region. Industry groups that dominate in the region will have higher location quotients and ones that are relatively scarce will have lower location quotients.

Table 3.5 shows the key to interpreting location quotients including the range and subsequent interpretation. Note that a low (or high) location quotient does not necessarily mean the industry group is small (or large), unimportant (or important) in the region – simply that it is less so or more so compared with the reference economy. As such, a location quotient is used to calculate comparative advantages. A location quotient of 1 and more typically illustrates a comparative advantage.

Table 3.5: Interpretation of Location Quotient

Location Quotient	Label	Interpretation
Less than 0.75	Low	Local needs are not being met and goods and services are imported
0.75 to 1.24	Medium	Most local needs are being met by the sector. The region will probably be both importing and exporting goods and services in this sector.

⁷ Source: www.citiesalliance.org/doc/resources/led

⁸ Source: Florida State University Department of Urban and Regional Planning. Planning Methods III: Forecasting

1.25 to 4.99	High	Sector is serving the needs that extend beyond the boundaries of the municipality - likely to export goods and services
More than 5.00	Very High	High level of local dependence on the sector – typically a single industry community.

Source: Sask Trends Monitor, March 2007

The following table illustrates the LQ of the local economy to the national economy. This is done in order to identify how concentrated the local economy is within the reference economy (national). Table 3.6 indicates the location quotient for the local economy with reference to the national economy for 2006 and 2016.

Table 3.6: Local Municipality to National - Location Quotients, 2006 and 2016

	2006	2016	Change
Agriculture, forestry and fishing	0.30	0.37	Increased
Mining	6.56	8.89	Increased
Manufacturing	0.10	0.12	Decreased
Food, beverages and tobacco	0.08	0.13	Increased
Textiles, clothing and leather goods	0.06	0.14	Increased
Wood and paper; publishing and printing	0.03	0.03	Same
Petroleum products, chemicals, rubber and plastic	0.05	0.05	Same
Other non-metal mineral products	0.23	0.39	Increased
Metals, metal products, machinery and equipment	0.23	0.19	Decreased
Electrical machinery and apparatus	-	-	Same
Radio, TV, instruments, watches and clocks	-	-	Same
Transport equipment	0.01	0.01	Same
Furniture and other manufacturing	0.14	0.27	Increased
Utilities	0.22	0.42	Increased
Construction	0.23	0.30	Increased
Wholesale & retail trade; catering and accommodation	0.38	0.54	Increased
Wholesale & retail trade	0.38	0.54	Increased
Catering and accommodation	0.39	0.49	Increased
Transport & communication	0.37	0.47	Increased
Finance and business services	0.17	0.25	Increased
Finance and insurance	0.19	0.22	Increased
Business services	0.16	0.26	Increased
General Government Services	0.28	0.37	Increased
Community, social and other personal services	0.29	0.44	Increased

Source: Demacon, 2017

It is evident from Table 3.6 that the local municipality has only one sector that has a high LQ rating; mining. The high LQ ratings indicate that the sectors are serving the needs that extend beyond the boundaries of the local economy and export goods and services to the rest of the country.

When compared to the national economy, the local municipality has a **high concentration of mining activity which** has stayed high and increased within the local municipality. The LQ illustrates that mining dominates local activity and as a result is by far the most competitive sector in the local municipality and is exporting the produce. The mining sector in the local municipality has a clear competitive advantage over other sectors in the economy.

Although the location quotients are still low, most of the sectors had a slight increase, except for manufacturing.

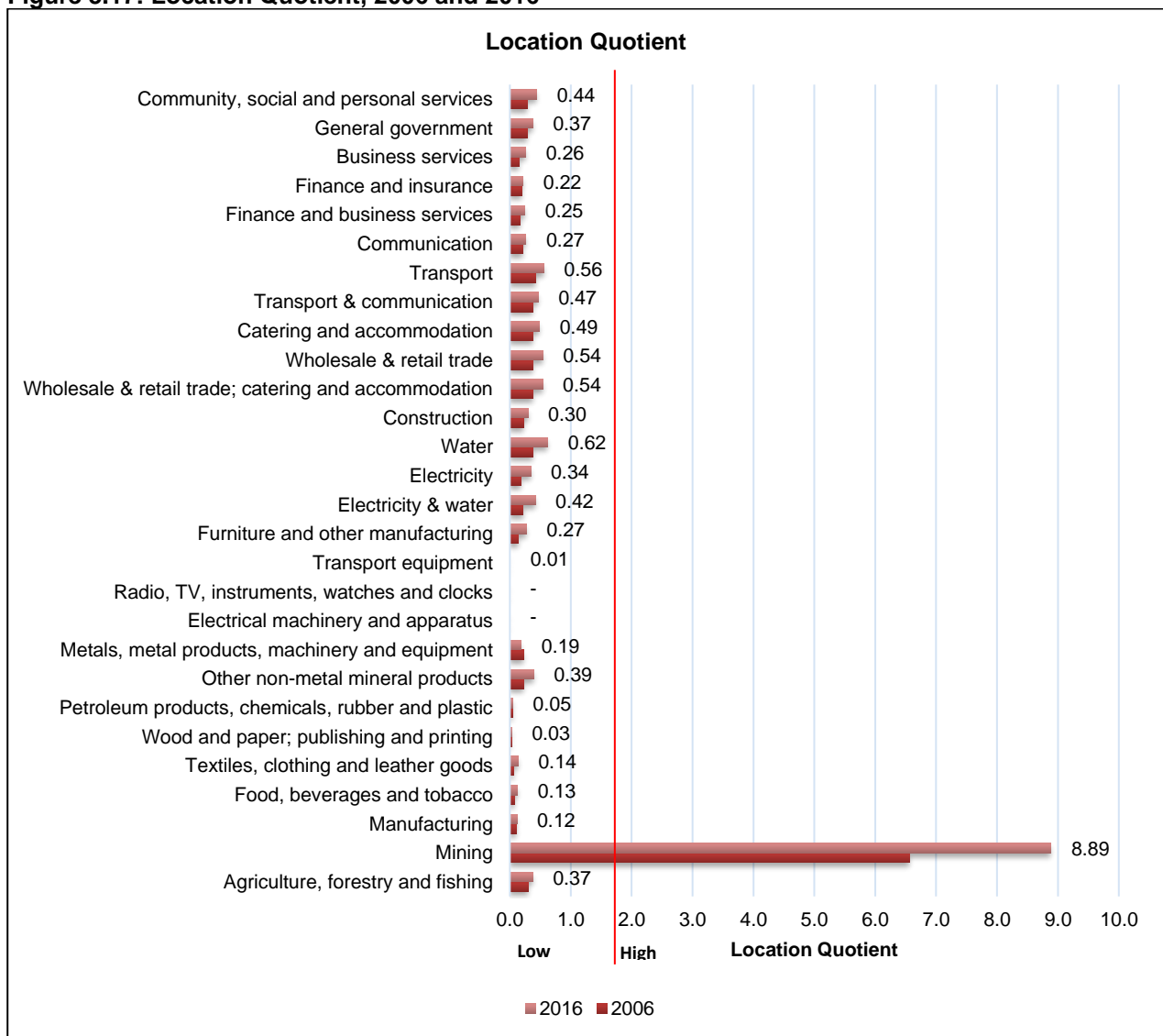
A location quotient of 1 and higher is indicative of a comparative advantage. Between 2006 and 2016, the Gamagara Local Municipal **mining sector location quotient** increased from **6.56 to 8.89**. The inter-relatedness between mining and other economic sectors can similarly be observed in location quotient movements for other main sectors:

- Construction increased from 0.23 to 0.30
- Wholesale increased from 0.38 to 0.54
- Transport increased from 0.37 to 0.47
- Finance and business increased from 0.17 to 0.25
- Utilities increased from 0.22 to 0.42.

This dataset underscores the absolute importance of mining activity in the local municipal economy as well as the limited extent to which other sectors could be independently diversified.

Figure 3.17 shows the LQ for the local municipality between 2006 and 2016.

Figure 3.17: Location Quotient, 2006 and 2016



Source: Demacon, 2017

3.4.2 Industry Target Classification

This classification is based on a combination of the location quotient, district sector growth and local sector relative growth (LSRG) values and it is expressed qualitative not quantitative. It is somewhat different in the way that it classifies the sectors, the categories are phrases that suggest the kind of prospects for growth that could be expected and in some cases, whether the sector should be a retention target.

There are eight categories in this classification system:

DSRG	National Growth	Location Quotient	Classification	Definition
Leading	Positive	Medium or High (> 0.75)	Current Strength	Sector currently growing strong
		Low (<0.75)	Emerging Strength	Indication that a sector is experiencing growth and can be classified as having definite development potential
	Negative	Medium or High (> 0.75)	Prospects limited by external trends	External trends represent a multitude of elements that strain development and growth and include competitiveness, exchange rate, fluctuations, performance of international economies, oil prices etc.
		Low (<0.75)	Prospects limited by external trends and weak base	A weak base is an indication that the sector is structurally not particularly strong and limited in its diversification. This along with external trends strain the development prospects
Lagging	Positive	Medium or High (> 0.75)	High priority retention target	Indication of a previously dominant or economically important sector that needs to retain its positive economic position – making it a priority for growth and development.
		Low (<0.75)	Prospects limited by weak base and declining competitiveness	A weak base indicates a need for diversification and declining competitiveness reflects that it might not be structural as strong as is needed for development potential
	Negative	Medium or High (> 0.75)	Prospects limited by external trends and declining competitiveness	External trends hinder development, supported by declining levels of competitiveness.
		Low (<0.75)	Prospects limited overall	Growth prospects are limited to a minimum for this sector and the economy should rather focus on other economic sectors.

Source: Sask Trends Monitor, 2007

Table 3.7: Local Economy Industry Targeting Classification, 2006 to 2016

	LQ		District Sector % Growth		LSRG		Industry Targeting
	Value	Class	Value	Class	Value	Class	
I100: Agriculture, forestry and fishing	0.4	Low	29.2%	Positive	13.0%	Leading	Emerging Strength
I200: Mining	8.9	High	24.5%	Positive	-5.6%	Lagging	High priority retention target
I300: Manufacturing	0.1	Low	12.7%	Positive	4.7%	Leading	Emerging Strength
I301: Food, beverages and tobacco	0.1	Low	50.8%	Positive	21.3%	Leading	Emerging Strength
I302: Textiles, clothing and leather goods	0.1	Low	112.9%	Positive	30.9%	Leading	Emerging Strength

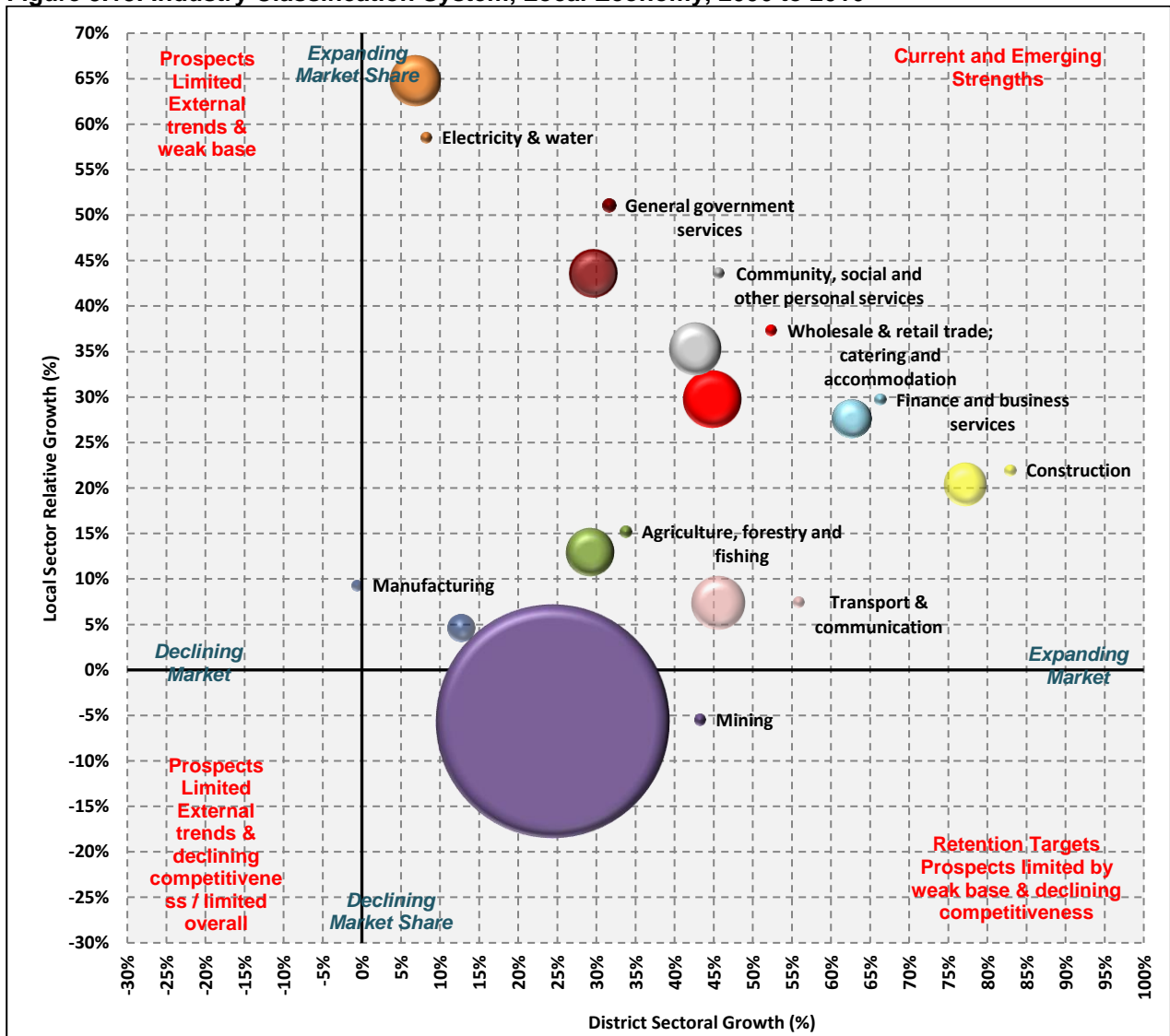
	LQ		District Sector % Growth		LSRG		Industry Targeting
	Value	Class	Value	Class	Value	Class	
I303: Wood and paper; publishing and printing	0.0	Low	29.8%	Positive	-14.3%	Lagging	Prospects limited by weak base and declining competitiveness
I304: Petroleum products, chemicals, rubber and plastic	0.0	Low	33.8%	Positive	-11.5%	Lagging	Prospects limited by weak base and declining competitiveness
I305: Other non-metal mineral products	0.4	Low	21.8%	Positive	21.5%	Leading	Emerging Strength
I306: Metals, metal products, machinery and equipment	0.2	Low	-31.8%	Negative	3.8%	Leading	Prospects limited by weak base and external trends
I307: Electrical machinery and apparatus	-	Low	313.3%	Positive	#DIV/0!	Lagging	Prospects limited by weak base and declining competitiveness
I308: Radio, TV, instruments, watches and clocks	-	Low	166.7%	Positive	#DIV/0!	Lagging	Prospects limited by weak base and declining competitiveness
I309: Transport equipment	0.0	Low	22.8%	Positive	-11.1%	Lagging	Prospects limited by weak base and declining competitiveness
I310: Furniture and other manufacturing	0.3	Low	76.6%	Positive	9.6%	Leading	Emerging Strength
I400: Electricity & water	0.4	Low	6.9%	Positive	64.8%	Leading	Emerging Strength
I401: Electricity	0.3	Low	-7.6%	Negative	62.1%	Leading	Prospects limited by weak base and external trends
I402: Water	0.6	Low	40.5%	Positive	65.1%	Leading	Emerging Strength
I500: Construction	0.3	Low	77.2%	Positive	20.4%	Leading	Emerging Strength
I600: Wholesale & retail trade; catering and accommodation	0.5	Low	44.8%	Positive	29.8%	Leading	Emerging Strength
I601: Wholesale & retail trade	0.5	Low	45.7%	Positive	31.1%	Leading	Emerging Strength
I602: Catering and accommodation	0.5	Low	31.6%	Positive	10.2%	Leading	Emerging Strength
I700: Transport & communication	0.5	Low	45.7%	Positive	7.3%	Leading	Emerging Strength
I701: Transport	0.6	Low	38.7%	Positive	6.9%	Leading	Emerging Strength
I702: Communication	0.3	Low	81.2%	Positive	17.8%	Leading	Emerging Strength
I800: Finance and business services	0.2	Low	62.7%	Positive	27.6%	Leading	Emerging Strength
I801: Finance and insurance	0.2	Low	18.4%	Positive	19.2%	Leading	Emerging Strength
I802: Business services	0.3	Low	90.2%	Positive	34.4%	Leading	Emerging Strength
I900: Community, social and other personal services	0.4	Low	29.6%	Positive	43.6%	Leading	Emerging Strength
I902: General government services	0.4	Low	42.7%	Positive	35.3%	Leading	Emerging Strength

Source: Demacon, 2017

- ✓ None of the sectors are regarded as current strengths.
- ✓ The mining sector is regarded as a high priority retention target, whilst all the other main sectors are regarded as emerging strengths.
- ✓ The mining sector is regarded as a high priority retention target because growth in the local economy is below mining growth in the district economy.

The industry target classification is displayed graphically in Figure 3.18. The size of each data point reflects the location quotient value. The y-axis quantifies market share movements, whereas the x-axis quantifies market size.

Figure 3.18: Industry Classification System, Local Economy, 2006 to 2016



Source: Demacon, 2017

Sectors located in the top and bottom left quadrants are considered having limited prospects because these industries are declining in the aggregate (national) economy. If they are small they have additional challenges and if they are within the negative range in terms of LSRG, they also suffer from declining competitiveness.

Sectors falling within the lower right quadrant are classified as retention targets (if large enough) because they are growing in the aggregate economy, but more slowly locally. Smaller industry groups in this quadrant are deemed to have limited prospects.

Sectors within the upper right quadrant are growing in the aggregate economy and locally. These industries represent the strengths and emerging strengths of the local economy. If the circles are large, it represents current strengths and if the circles are smaller then it reflects emerging strengths.

From the figure, it can be seen that mining is the dominant sector. It is situated in the lower right quadrant and is therefore growing in the aggregate economy, but not locally. This indicates that

the mining sector should become more efficient through mechanisation or other methods to ensure that the core economic sector of the local municipality is seen as a current strength.

From the small sizes relative to mining, it is clear that the other sectors are dependent on mining and should mining become irrelevant / inefficient in the local economy, the other sectors will be negatively impacted. All of the other sectors are situated in the top right quadrant, indicating that they are growing in the aggregate economy and locally.

3.5 SYNTHESIS

Gamagara Local Municipality is situated within **John Taolo Gaetsewe District Municipality** in the Northern Cape Province and is one of the main mining areas in the province. The district is largely reliant on mining, and even more so the local economy – mining contributes **59.2%** to the district economy, but **67.9%** to the local municipal economy.

The major drivers in the district municipality include (2016):

- ✓ Metal mining – 59.2%
- ✓ Trade – 8.7%
- ✓ General government services – 7.6%

The major drivers in the local municipality include (2016):

- ✓ Metal mining – 67.9%
- ✓ Trade – 8.0%

The **metal mining sector** is the **largest employer in the district municipal economy (20.2%)**, its contribution has, however, decreased proportionally since 2014. The general government services sector (18.8%) is the second largest contributor. Overall, the tertiary sector (consisting of the wholesale and retail trade services, transport and communication services, finance and business services, community, social and other services, and general government services) contributes 60.7% to employment.

The **mining sector** is the **largest employer in the local municipality (24.3%)** and its contribution has contracted considerably from 2014. The general government services (18.9%) and the trade sector (17.5%) are the other dominant sectors in the local municipal employment.



CHAPTER 4: SOCIO-ECONOMIC OVERVIEW

4.1 INTRODUCTION

The purpose of this chapter is to provide a socio-economic overview of the host municipality, as well as the sending municipalities. This information provides insight regarding the number of people employed, their household income, education levels, dwelling type, tenure type and employment status.

4.2 STUDY AREA DELINEATION

Map 4.1 shows the John Taolo Gaetsewe District Municipality with the host municipality – Gamagara Local Municipality, and the two main sending municipalities – Joe Morolong Local Municipality and Ga-Segonyana Local Municipality.

4.3 POPULATION SIZE

The following tables provide population figures of the local and district municipalities. Table 4.1 provides a concise summary of 2011 population figures for the respective local municipalities and district municipality.

Table 4.1: Population size of the district municipality (2011)

Area	Population	Household	Household Size
Gamagara LM	41 613	10 806	3.9
Ga-Segonyana LM	93 617	26 798	3.5
Joe Morolong LM	89 487	23 683	3.8
John Taolo Gaetsewe DM	224 718	61 286	3.7

Source: StatsSA (seasonally adjusted), 2011

Table 4.2 provides an updated population estimate for the same areas, for the year 2017.

Table 4.2: Population size of the district municipality (2017)

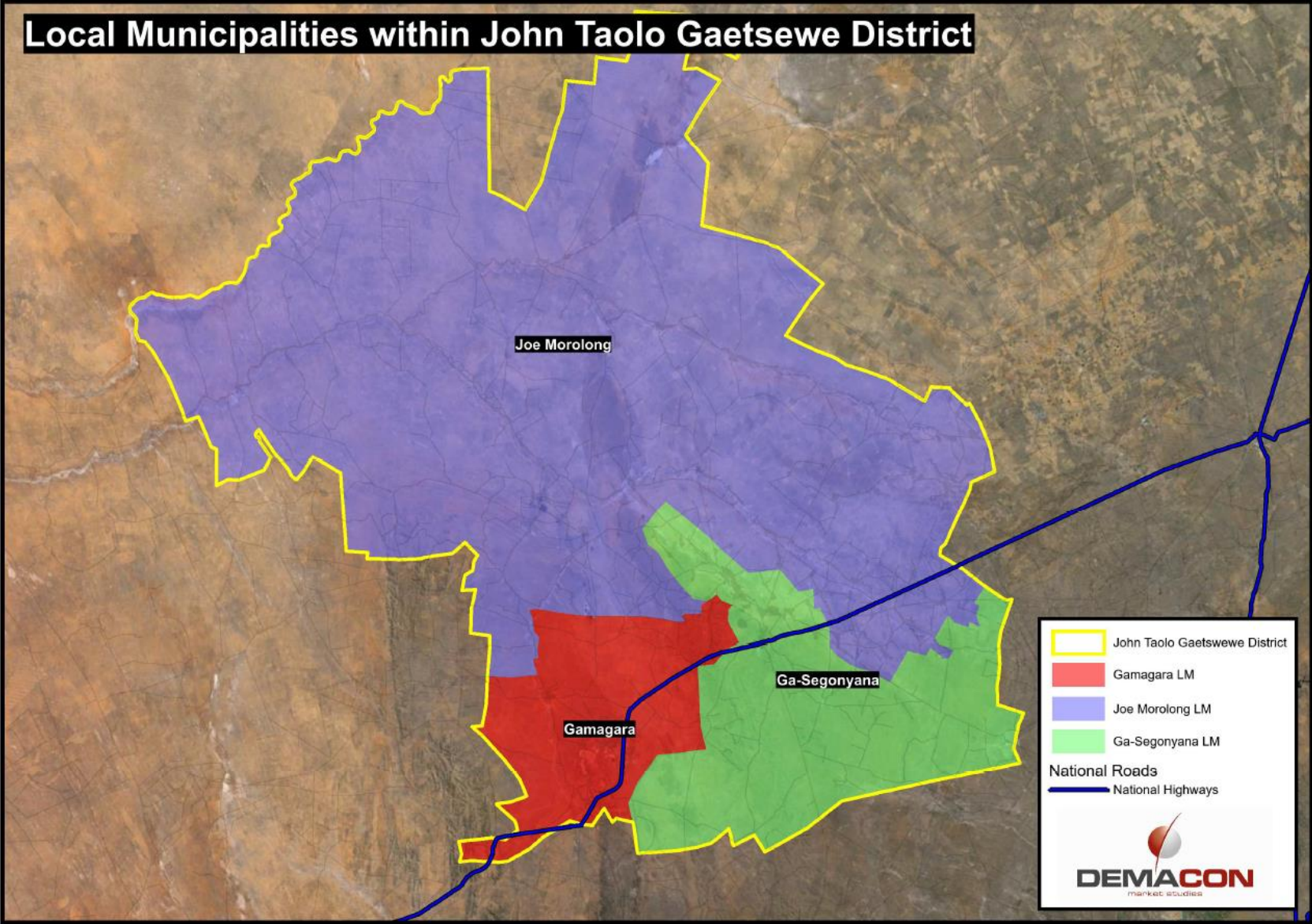
Area	Population	Household	Household Size
Gamagara LM	51 719	13 092	4.0
Ga-Segonyana LM	106 813	31 830	3.4
Joe Morolong LM	84 353	24 366	3.5
John Taolo Gaetsewe DM	242 884	69 288	3.5

Source: Demacon ex StatsSA (seasonally adjusted), 2017

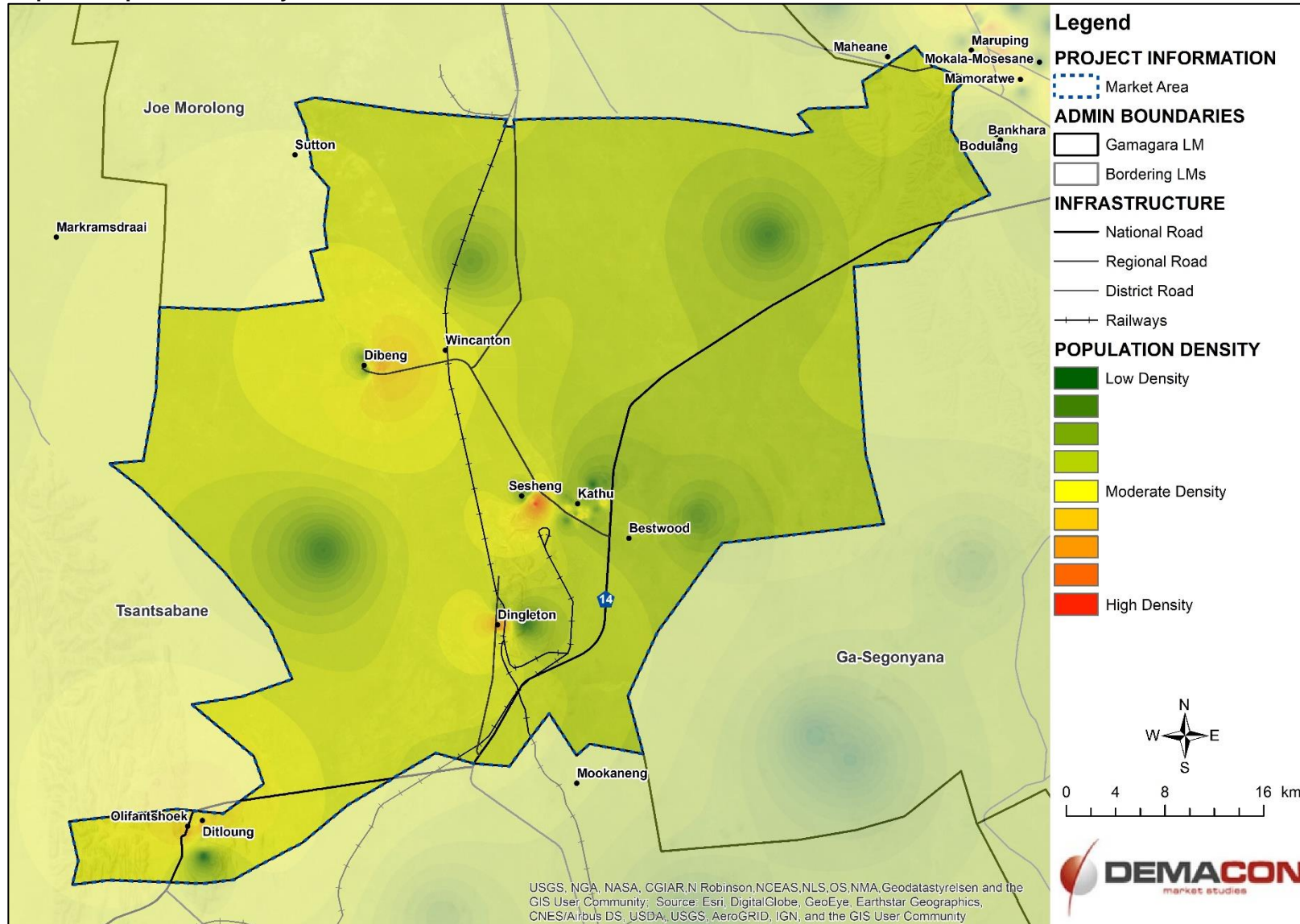
Findings: (Table 4.1 & Table 4.2)

- ✓ In the **John Taolo Gaetsewe District Municipality**, there are approximately **242 884 people**, which amounts to **69 288 households**.
- ✓ There are approximately **51 719 people** residing in the **Gamagara Local Municipality** which amounts to **13 092 households**.
- ✓ There are approximately **106 813 people** residing in the **Ga-Segonyana Local Municipality** which amounts to **31 830 households**.
- ✓ There are approximately **84 353 people** residing in the **Joe Morolong Local Municipality** which amounts to **24 366 households**.

Map 4.1: Location of Local Municipalities relative to John Taolo Gaetsewe District Municipality

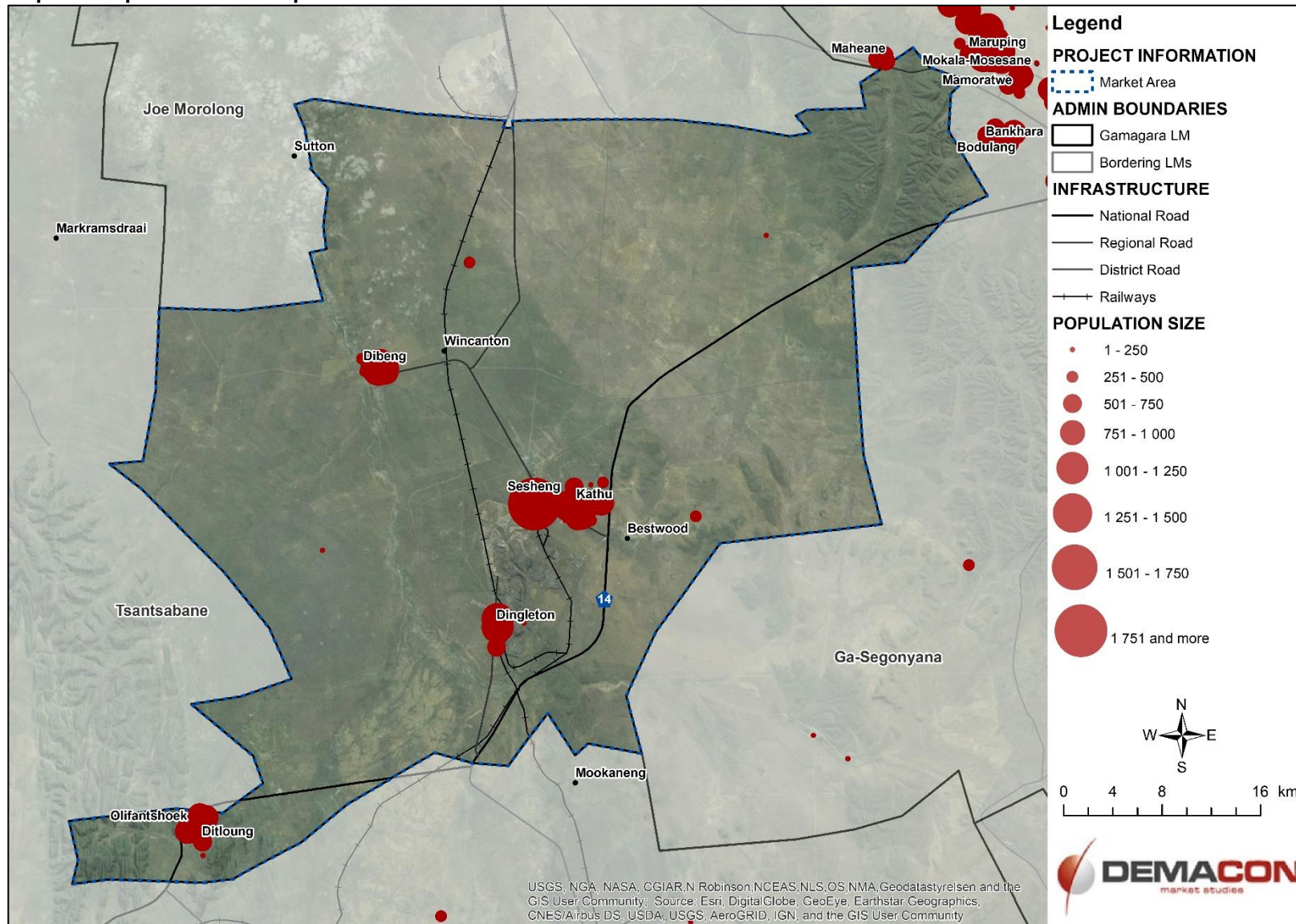


Map 4.2: Population Density



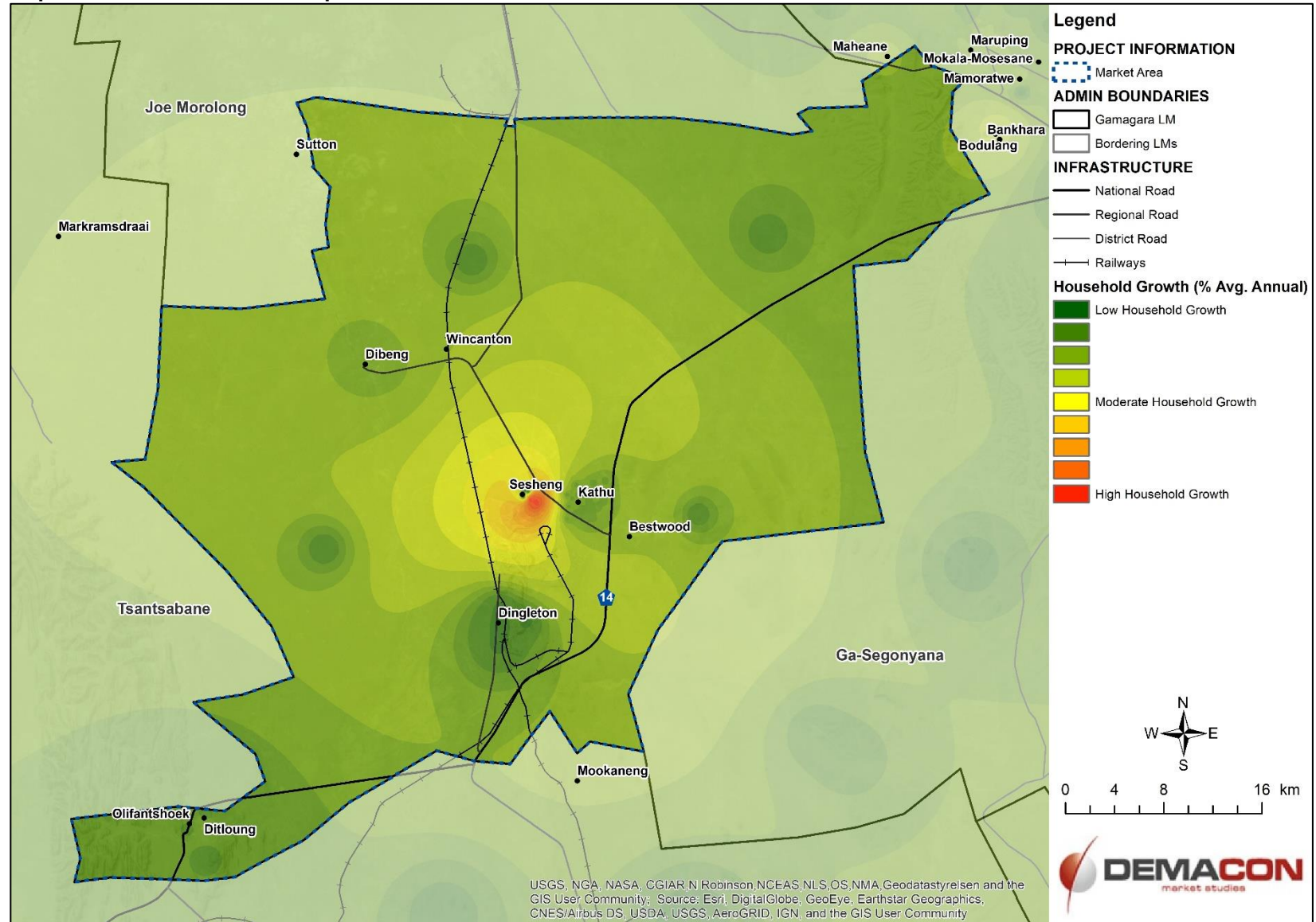
Source: Demacon, 2017

Map 4.3: Population Size Map



Source: Demacon, 2017

Map 4.4: Household Growth Map

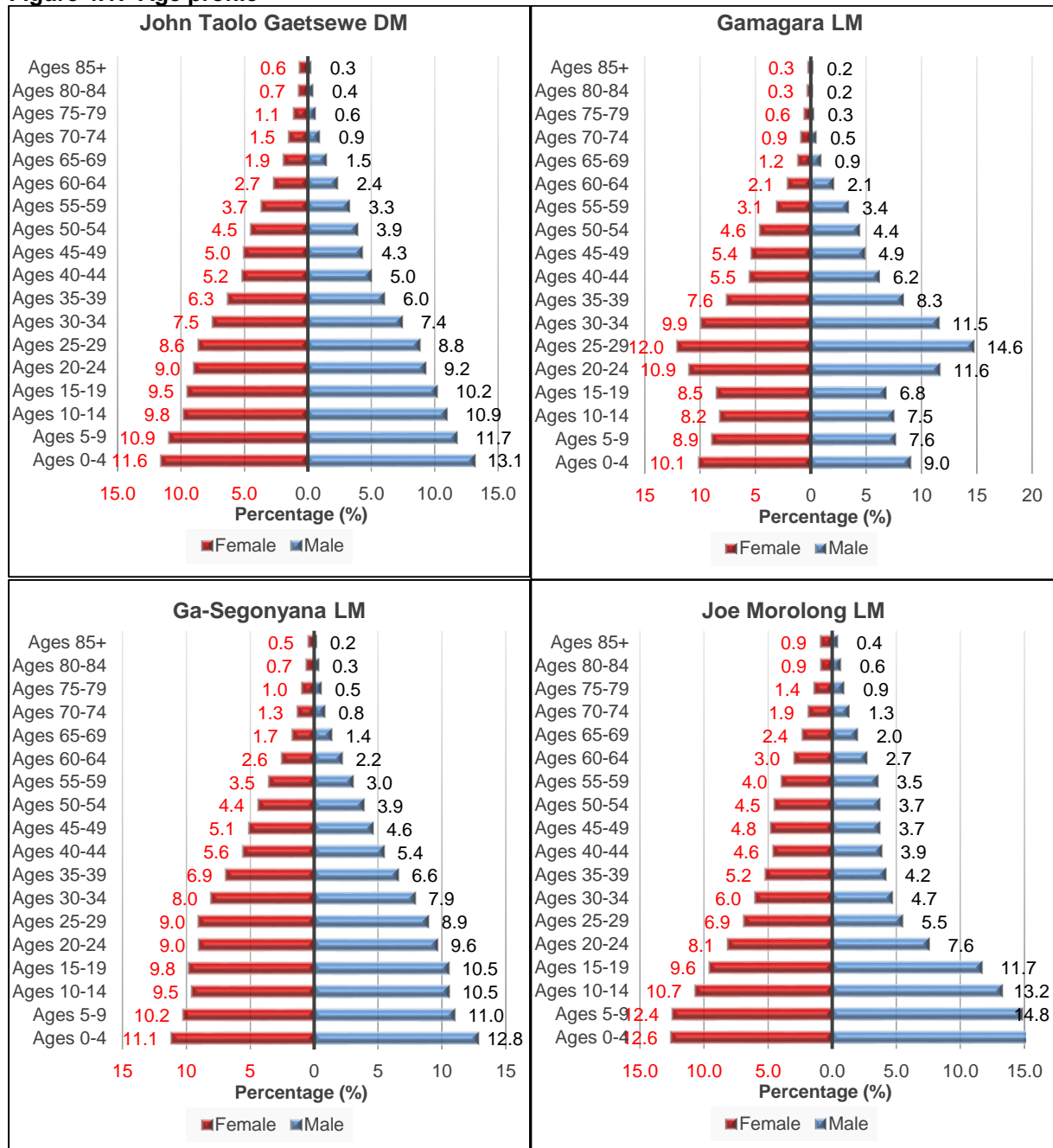


Source: Demacon, 2017

4.4 AGE PROFILE

The age distribution of a specific area also serves as an important indicator, with reference to consumer demand behaviour and preferences - in particular the dominant age groups. Figure 4.1 illustrates the age profile.

Figure 4.1: Age profile



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings: (Figure 4.1)

- ✓ The district municipality and the Ga-Segonyana LM and Joe Morolong LM are characterised by a developing age pyramid, whilst the Gamagara Local Municipality has a large population between the ages of 20 and 35 years – this relates to the mine employees.
- ✓ The **John Taolo Gaetsewe District Municipality** has a large age group of **0 – 19 years**, **45.9%** of males and **41.7%** of females within this group.

- ✓ **31.5%** of males and **31.4%** of females in the **secondary area** fall between the ages of **20 – 39 years**.
- ✓ **30.9%** of the males and **35.6%** of the females in the **Gamagara Local Municipality** fall between the ages of **0 – 19 years**.
- ✓ **46.1%** of males and **40.4%** of females in the **Gamagara Local Municipality** fall between the ages of **20 – 39 years**.
- ✓ **44.8%** of the males and **40.6%** of the females in the **Ga-Segonyana Local Municipality** fall between the ages of **0 – 19 years**.
- ✓ **32.9%** of males and **32.9%** of females in the **Ga-Segonyana Local Municipality** fall between the ages of **20 – 39 years**.
- ✓ **55.3%** of the males and **45.2%** of the females in the **Joe Morolong Local Municipality** fall between the ages of **0 – 19 years**.
- ✓ **21.9%** of males and **26.3%** of females in the **Joe Morolong Local Municipality** fall between the ages of **20 – 39 years**.

Development implications:

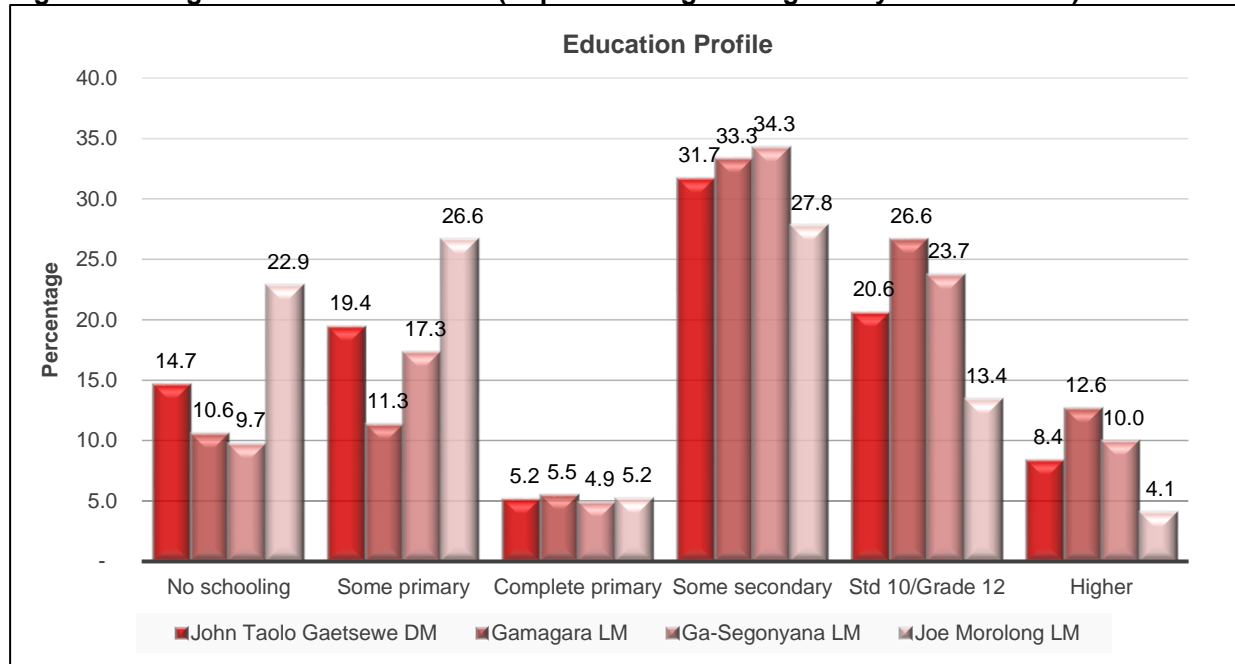
In comparison with the two labour sending local municipalities, the Gamagara LM has significantly more people between the ages of 20 and 39 years. As Sesheng and Kathu are “mining towns” a large number of these employees are working at mines or contractors to mines, but there also are high numbers of job hopefuls attracted to the Gamagara area. Such individuals tend to be of a post-secondary school age and are often youths from Joe Morolong, or the rural parts in Ga-Segonyana, where there are very little job opportunities. They will migrate into the Gamagara area - alone or as a group of friends - leaving behind dependents (young children) who stay “at home” with the extended family. They often resort to all sorts of informal accommodation arrangements which may be a room in someone’s home or a backyard structure – feeding into the high average household size in Gamagara. Some job hopefuls may secure a job at one of the two large mines or a contractor company, but this probability decreased since 2014. Others get involved in formal trade, construction and similar employment opportunities in the town and surrounds, and a very large group stay unemployed. The resulting age profile is a disproportionately large number of kids of school going age living in Ga-Segonyana LM and Joe Morolong LM – that is relative to the working age population in these municipalities which in part explain the high incidence of community unrests, protests and violence in which learners of relatively young age actively take part.

4.5 HIGHEST LEVEL OF EDUCATION

The highest level of education serves as proxy for human development within the district. The level of employment is also an important indicator, impacting on the level of human development as well as on the level of disposable community income.

Figure 4.2 indicates the highest level of education of the population in the district municipality.

Figure 4.2: Highest level of education (Population segment aged 20 years and older)



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings: (Figure 4.2)

- ✓ The population in the **John Taolo Gaetsewe District Municipality** falls within the following education levels:
 - No schooling: **14.7%**
 - Some primary: **19.4%**
 - Complete primary: **5.2%**
 - Some secondary: **31.7%**
 - Std 10/Grade 12: **20.6%**
 - Higher education: **8.4%**

- ✓ The population in the **Gamagara Local Municipality** falls within the following education levels:
 - No schooling: **10.6%**
 - Some primary: **11.3%**
 - Complete primary: **5.5%**
 - Some secondary: **33.3%**
 - Std 10/Grade 12: **26.6%**
 - Higher education: **12.6%**

- ✓ The population in the **Ga-Segonyana Local Municipality** falls within the following education levels:
 - No schooling: **9.7%**
 - Some primary: **17.3%**
 - Complete primary: **4.9%**
 - Some secondary: **34.3%**
 - Std 10/Grade 12: **23.7%**
 - Higher education: **10.0%**

- ✓ The population in the **Joe Morolong Local Municipality** falls within the following education levels:
 - No schooling: **22.9%**

- Some primary: **26.6%**
- Complete primary: **5.2%**
- Some secondary: **27.8%**
- Std 10/Grade 12: **13.4%**
- Higher education: **4.1%**

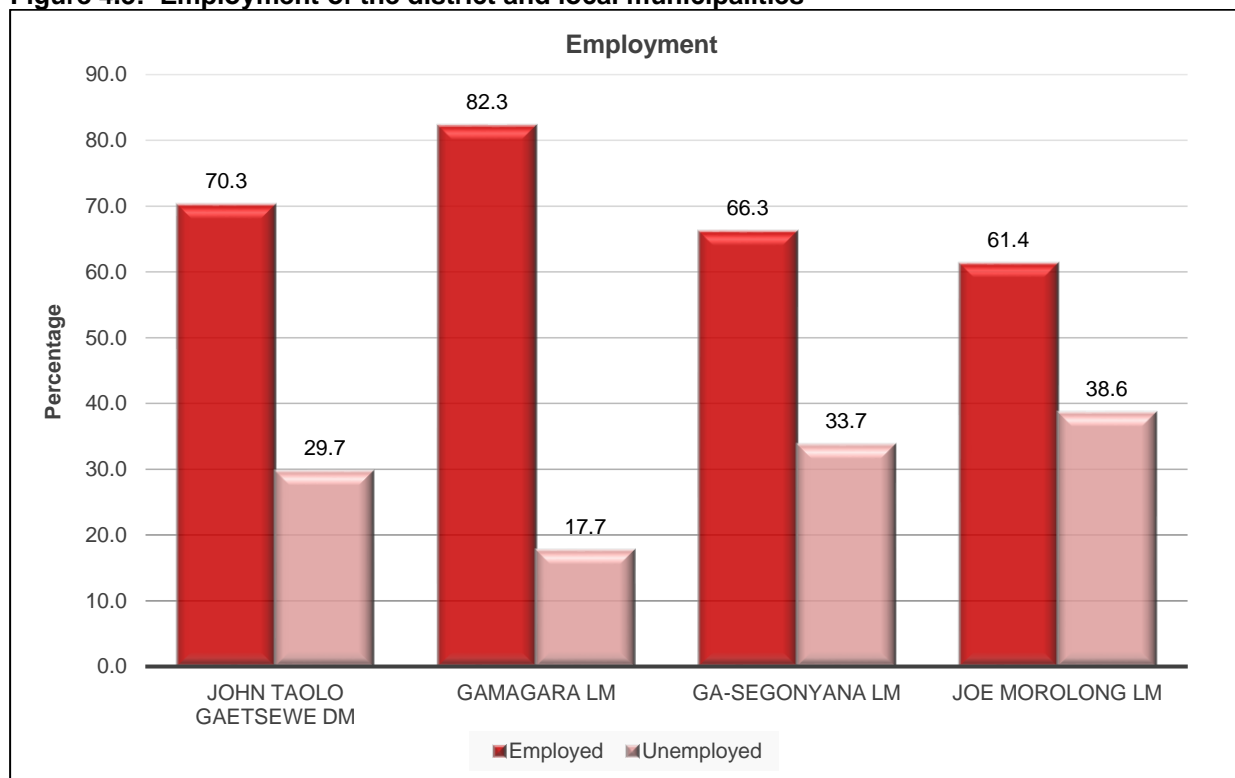
Development Implications:

A relatively large segment of the population is educated in the Gamagara Local Municipality, whilst a large segment of the sending municipalities, especially Joe Morolong LM, is uneducated. The Gamagara LM has a higher percentage of people with Grade 12 or a higher degree.

4.6 EMPLOYMENT STATUS

The level of employment reflects employment and unemployment levels in the district and local municipalities, which impacts on disposable income patterns. Level of employment, coupled to household size is also indicative of dependency ratios (refer to Figure 4.3).

Figure 4.3: Employment of the district and local municipalities



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings: (Figure 4.3)

John Taolo Gaetsewe District Municipality

✓ **45.3%** of the population is *economically active* – of these **70.3%** are employed and **29.7%** are unemployed.

Gamagara Local Municipality

✓ **65.2%** of the population is *economically active* – of these **82.3%** are employed and only **17.7%** are unemployed.

Ga-Segonyana Local Municipality

✓ **50.8%** of the population is *economically active* – of these **66.3%** are employed and **33.7%** are unemployed.

Joe Morolong Local Municipality

✓ **26.2%** of the population is *economically active* – of these **61.4%** are employed and **38.6%** are unemployed.

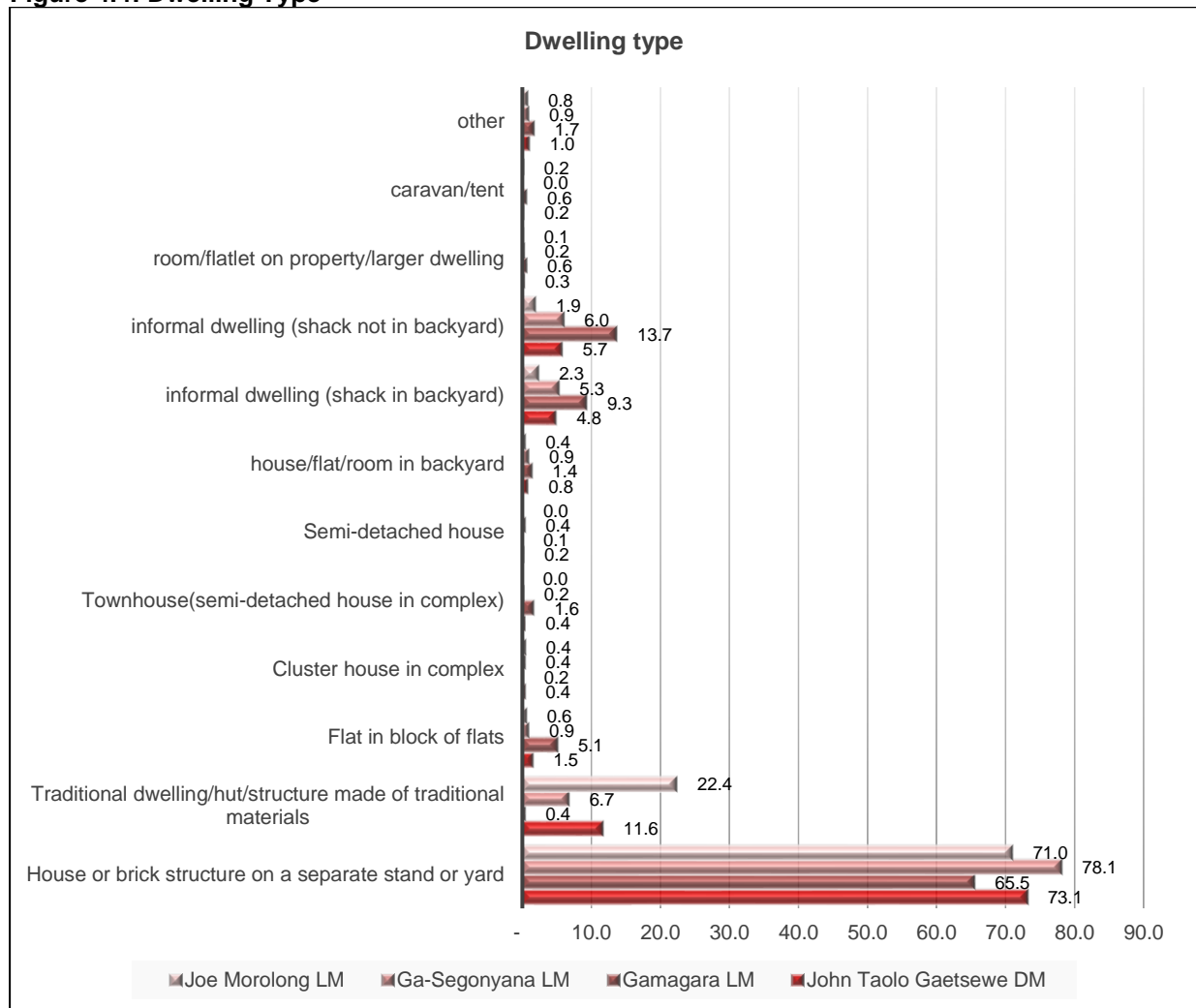
Development Implications:

The Gamagara Local Municipality has a lower unemployment level than the national average of approximately 25.0%. High employment rate, coupled with a large percentage of people economically active, are indicative of lower dependency ratios. The two sending municipalities has a higher unemployment rate, coupled with low percentage of people economically active and larger household sizes, high dependency ratios will prevail. A large number of the households in the district municipality rely on employees in the Gamagara Local Municipality.

4.7 DWELLING TYPE

The following figure indicates the different dwelling types of the population in the district and local municipalities.

Figure 4.4: Dwelling Type



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings (Figure 4.4)

- ✓ From Figure 4.4 it can be seen that the majority of households in the Gamagara Local Municipality (65.5%), Ga-Segonyana LM (78.1%), Joe Morolong LM (71.0%), and John Taolo Gaetsewe District Municipality (73.1%) occupy a **house or brick structure on a separate stand or yard**.
- ✓ 11.6% of John Taolo Gaetsewe District Municipality occupies a traditional dwelling.
- ✓ 23.0% of Gamagara Local Municipality occupies an informal dwelling.
- ✓ 11.3% of Ga-Segonyana LM occupies an informal dwelling.
- ✓ 22.4% of Joe Morolong occupies a traditional dwelling.

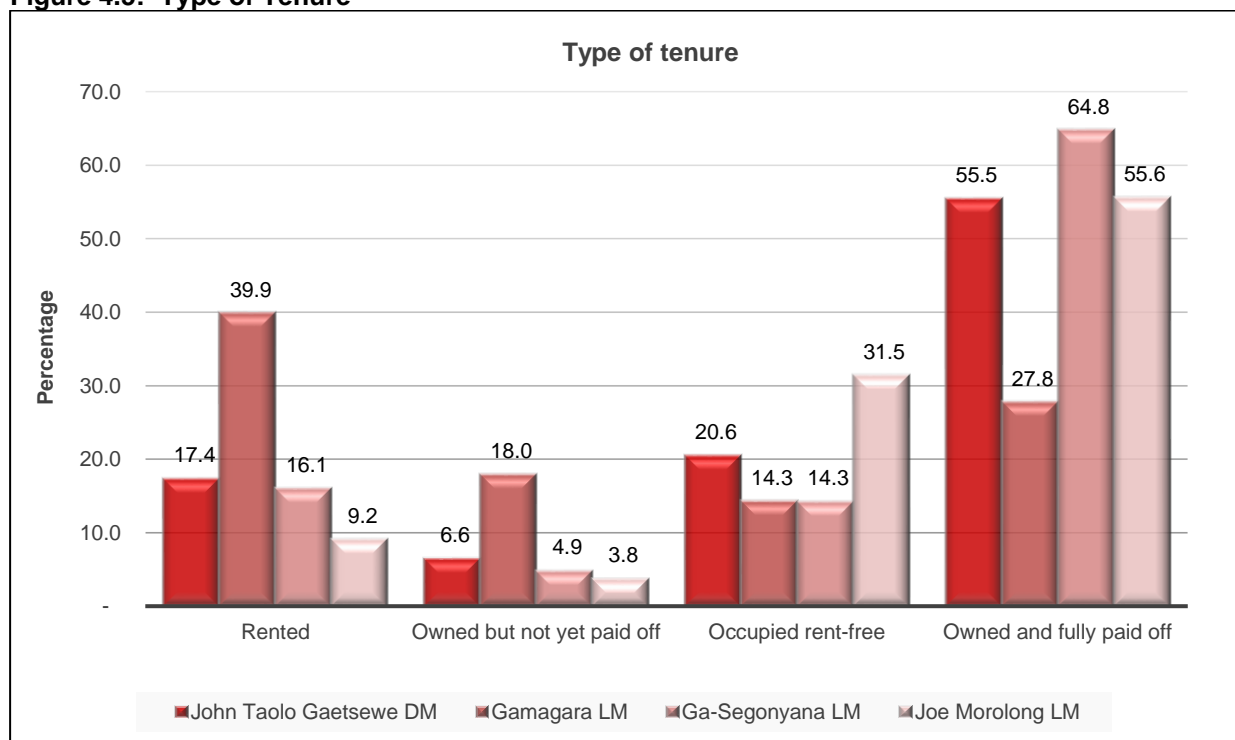
Development Implications

Due to the progressive housing policy of Kumba Iron Ore, the associated investment in housing, and ongoing drive to stimulate employee home ownership – 73% of the population in the district resides in a house or brick structure on a separate stand or yard. In Gamagara this picture is compromised by mushrooming informal structures of job hopefuls who temporarily settle while in search for a permanent (decant) job. Over the period 2012 to 2015 the high density of informal structures within lower income residential areas and on vacant space (both municipal and private land) caused huge pressure on local municipal service delivery. This stands in stark contrast with the housing situation in the large rural parts of especially Joe Morolong, and to a lesser extend Ga-Segonyana. In these areas over the past 15 years traditional dwellings in villages very complemented by formal housing as it is custom for an employed family member so start building a house at home over an extended period as and when cash is available.

4.8 TENURE STATUS

The following figure indicates the tenure status of the population in the district and local municipalities in terms of a residence that is owned and fully paid off, a residence owned but not yet paid off, rented or occupied rent-free.

Figure 4.5: Type of Tenure



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings (Figure 4.5)

- ✓ Figure 4.5 indicates that a large segment of John Taolo Gaetsewe District Municipality represents home owners – 55.5% of the households own fully paid off houses.
- ✓ The same trend is reflected in Ga-Segonyana LM and Joe Morolong LM, with 64.8% and 55.6% owning a fully paid off home respectively.
- ✓ The largest segment of Gamagara Local Municipality rent their current dwelling (39.9%).

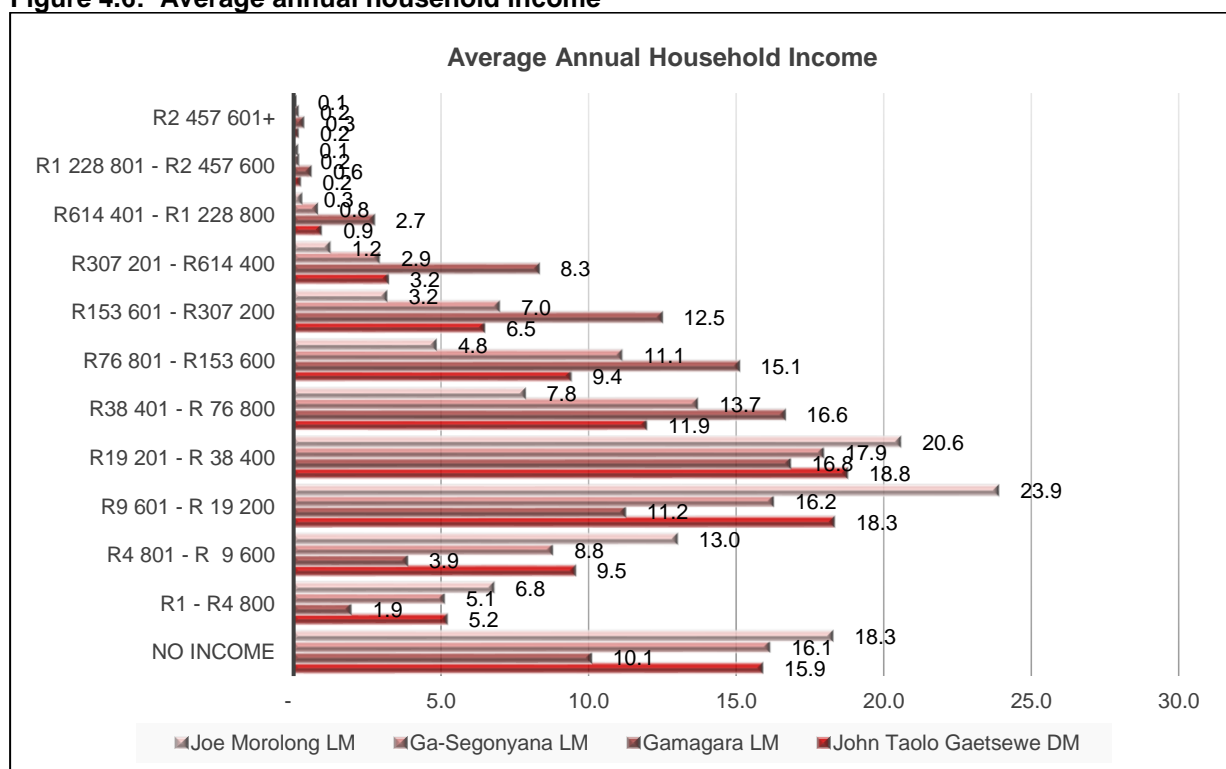
Development Implications

Renting in Gamagara is more common place than the rest of the district. This is predominantly renting of rooms in houses and back yard structures as a secondary income stream to residents. Much of these renting practices are highly criticized as exploitive and often result in the inability of municipal services to cope with the sewerage and water services needs. Stands were typically planned and developed for the average household size but can sometimes house up to 16 people. Those renting tend to be job seekers and individuals of lower income. The rent-free occupation of land in Gamagara often relates to groups settling on non-serviced land in what is known as smaller shanty towns. What is of particular concern is the less than a third of the Gamagara residents who have fully serviced their housing bonds during the mining boom period, which will have an implication on individuals losing their income. The situation in the traditional authority areas of Joe Morolong and Ga-Segonyana is very different due to communal land ownership system. In rural villages families are living in structures which they’ve built on land given to them by traditional authorities. Whilst the district municipality indicates a more permanent tenure status, only 55.5% of households are living in a household that is fully paid off – which should be considered when economy decline is forecasted.

4.9 ANNUAL HOUSEHOLD INCOME

Average household income, to an extent, reflects the living standard of a household, and influences aspects such as asset ownership.

Figure 4.6: Average annual household income



Source: Demacon ex StatsSA (seasonally adjusted), 2017

Findings: (Figure 4.6)

- ✓ The **weighted average annual household income** in the **John Taolo Gaetsewe District Municipality** for 2017 amounts to:
 - **R78 640 per annum**, which translates into **R6 553 per month (All LSM)**.
 - **R162 355 per annum**, which translates into **R13 530 per month (LSM 4 to 10+)**.
- ✓ The **weighted average annual household income** in the **Gamagara Local Municipality** for 2017 amounts to:
 - **R156 494 per annum**, which translates into **R13 041 per month (All LSM's)**.
 - **R223 746 per annum**, which translates into **R18 645 per month (LSM 4 to 10+)**.
- ✓ The **weighted average annual household income** in the **Ga-Segonyana Local Municipality** for 2017 amounts to:
 - **R78 292 per annum**, which translates into **R6 524 per month (All LSM)**.
 - **R152 306 per annum**, which translates into **R12 692 per month (LSM 4 to 10+)**.
- ✓ The **weighted average annual household income** in the **Joe Morolong Local Municipality** for 2017 amounts to:
 - **R43 514 per annum**, which translates into **R3 626 per month (All LSM)**.
 - **R118 021 per annum**, which translates into **R9 358 per month (LSM 4 to 10+)**.

Development Implications:

Over time through the development brought mainly by mining Gamagara Local Municipality, and the Kuruman area in Ga-Segonyana have developed middle income earning communities, whilst the rest of the district municipality is indicative of a low to middle income earning population. The decent jobs, benefits and share scheme offered by Sishen mine contributed to higher income profiles in developed areas. But it is fair to say that the population is widely spread throughout income ranges, with the largest part of the population in the sending municipalities earning low to middle income salaries. The vast rural areas in the district municipal geography are characterized by lower household incomes. Subsequent paragraphs indicate the living standard measurement of the district and local municipalities.

4.10 LIVING STANDARD MEASUREMENT

The LSM index is an internationally recognised instrument designed to profile a market in terms of a continuum of progressively more developed and sophisticated market segments. The LSM system is based on a set of marketing differentiators, which group consumers according to their standard of living, using criteria such as degree of urbanisation and ownership of assets (predominantly luxury goods).

Essentially, the LSM system is a wealth measure based on standard of living, rather than income alone. The market segmentation continuum is divided into ten LSM segments, where LSM 1 signifies the lowest living standard and LSM 10+ signifies the highest living standard. The LSM categories are defined and weighted in terms of the following 29 variables (refer to Table 4.3). It is important to note that the LSM system is widely applied internationally for marketing and branding purposes, and that it is therefore not an instrument developed locally to label or stereotype certain market segments.

Table 4.3: Living Standard Measurement (LSM) Variables

1	Hot running water	16	Less than 2 radio sets/household
2	Fridge/freezer	17	Hi-Fi/music centre
3	Microwave oven	18	Rural outside
4	Flush toilet in/outside house	19	Built-in kitchen sink
5	No domestic in household	20	Home security service
6	VCR	21	Deep freezer
7	Vacuum cleaner/floor polisher	22	Water in home/plot

8	No cell phone in household	23	M-net/DSTV subscription
9	Traditional hut	24	Dishwasher
10	Washing machine	25	Electricity
11	PC in home	26	Sewing machine
12	Electric stove	27	DVD player
13	TV set	28	1 cell phone per household
14	Tumble dryer	29	Motor vehicle in household
15	Home telephone		

Table 4.4 summarises the current status of the district municipality in terms of the LSM index. Essentially, the LSM index summarises the net result of socio economic indicators discussed in preceding paragraphs.

Table 4.4: Living Standard Measurement Indicator

LSM Status	LSM 1 – 3	LSM 4 – 10+
John Taolo Gaetsewe District Municipality	60.2%	39.8%
Gamagara Local Municipality	37.2%	62.8%
Ga-Segonyana Local Municipality	57.0%	43.0%
Joe Morolong Local Municipality	74.2%	25.8%

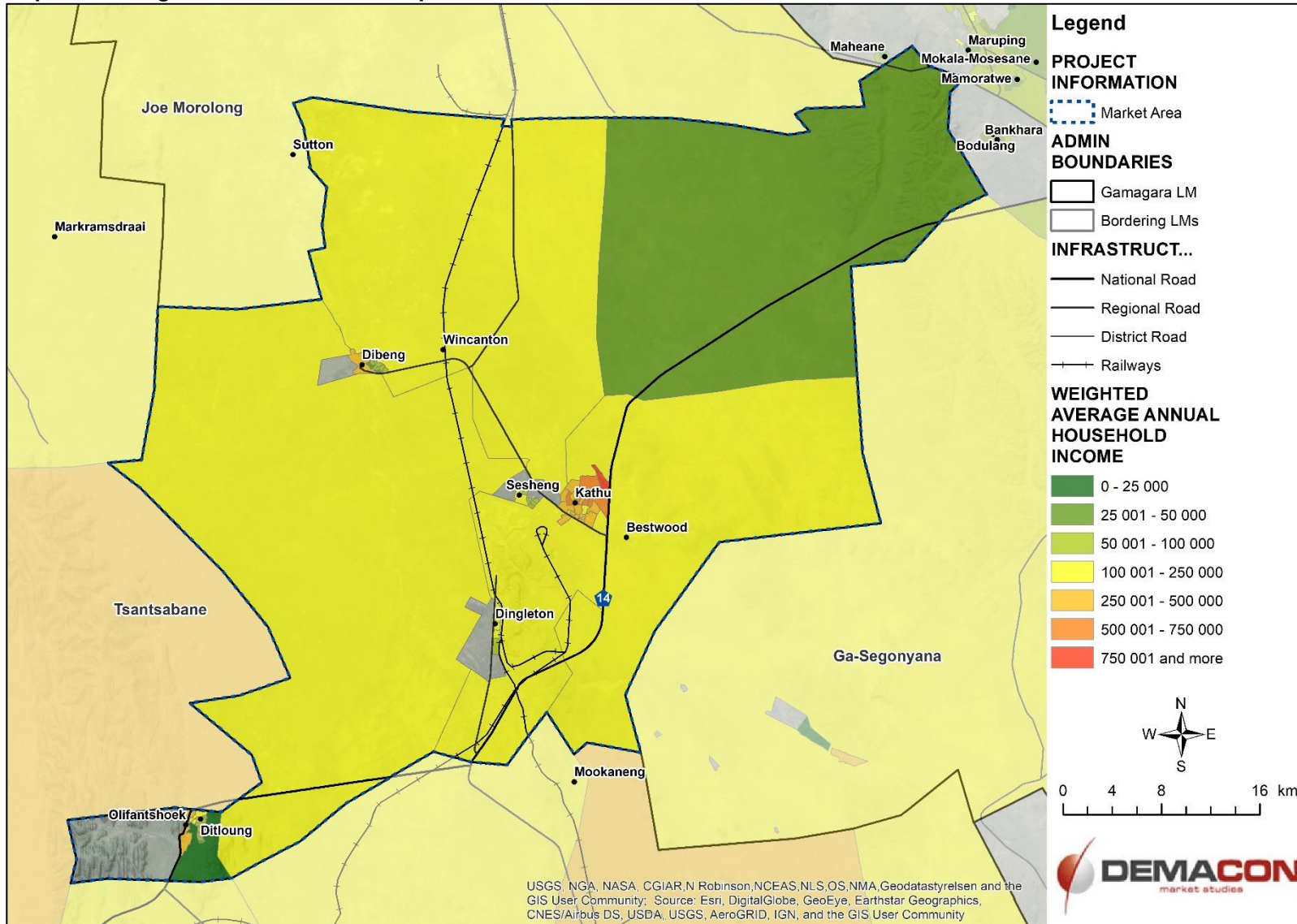
Source: Demacon calculations

Findings: (Table 4.4)

- ✓ As seen in Table 4.4, the Gamagara Local Municipality reflects a much lower percentage of households falling in the LSM 1 to 3 category. **37.2%** of Gamagara Local Municipality and **60.2%** of John Taolo Gaetsewe District Municipality falls within the **LSM 1 – 3** category.
- ✓ This is indicative of the higher salaries generally received by the mine employees living in Gamagara Local Municipality, opposed to the sending municipalities where the economically active population is much lower and resultant living conditions are lower.

Map 4.6 indicates the LSM per area.

Map 4.6: Average Household Income Map



Source: Demacon, 2017

4.11 SYNTHESIS

This section provides an overview of the socio-economic indicators for the host municipality (Gamagara LM), and the two sending municipalities (Joe Morolong LM and Ga-Segonyana LM). Composite socio-economic indicators for the district are provided to lend context.

Table 4.5: Key socio-economic indicators of the local and district municipal areas

VARIABLE	CHARACTERISTICS
Population size	<p><u>John Taolo Gaetsewe District Municipality:</u> 242 884 people 69 288 households</p> <p><u>Gamagara Local Municipality:</u> 51 719 people 13 092 households</p> <p><u>Ga-Segonyana Local Municipality</u> 106 813 people 31 830 households</p> <p><u>Joe Morolong Local Municipality</u> 84 353 people 24 366 households</p>
Household Size	<p><u>John Taolo Gaetsewe District Municipality:</u> 3.5 people / household</p> <p><u>Gamagara Local Municipality:</u> 4.0 people / household</p> <p><u>Ga-Segonyana Local Municipality:</u> 3.4 people / household</p> <p><u>Joe Morolong Local Municipality:</u> 3.5 people / household</p>
Age profile	<p><u>John Taolo Gaetsewe District Municipality</u> 45.9% of males, 41.7% of females - between 0 and 19 years 31.5% of males, 31.4% of females - between 20 and 39 years 16.5% of males, 18.3% of females – between 40 and 60 years 6.1% of males, 8.5% of females - 60 years +</p> <p><u>Gamagara Local Municipality:</u> 30.9% of males, 35.6% of females - between 0 and 19 years 46.1% of males, 40.4% of females - between 20 and 39 years 18.9% of males, 18.6% of females – between 40 and 60 years 4.2% of males, 5.3% of females - 60 years +</p> <p><u>Ga-Segonyana Local Municipality:</u> 44.8% of males, 40.6% of females - between 0 and 19 years 32.9% of males, 32.9% of females - between 20 and 39 years 16.9% of males, 18.6% of females – between 40 and 60 years 5.4% of males, 7.8% of females - 60 years +</p> <p><u>Joe Morolong Local Municipality:</u> 55.3% of males, 45.2% of females - between 0 and 19 years 21.9% of males, 26.3% of females - between 20 and 39 years 14.8% of males, 18.0% of females – between 40 and 60 years 7.9% of males, 10.5% of females - 60 years +</p>

VARIABLE	CHARACTERISTICS
Highest level of education	<p><u>John Taolo Gaetsewe District Municipality</u> No schooling: 14.7% Some primary: 19.4% Complete primary: 5.2% Some secondary: 31.7% Std 10/Grade 12: 20.6% Higher education: 8.4%</p> <p><u>Gamaqara Local Municipality:</u> No schooling: 10.6% Some primary: 11.3% Complete primary: 5.5% Some secondary: 33.3% Std 10/Grade 12: 26.6% Higher education: 12.6%</p> <p><u>Ga-Segonyana Local Municipality:</u> No schooling: 9.7% Some primary: 17.3% Complete primary: 4.9% Some secondary: 34.3% Std 10/Grade 12: 23.7% Higher education: 10.0%</p> <p><u>Joe Morolong Local Municipality:</u> No schooling: 22.9% Some primary: 26.6% Complete primary: 5.2% Some secondary: 27.8% Std 10/Grade 12: 13.4% Higher education: 4.1%</p>
Level of employment	<p><u>John Taolo Gaetsewe District Municipality:</u> 45.3% Economically active of which 70.3% are employed and 29.7% are unemployed</p> <p><u>Gamaqara Local Municipality:</u> 65.2% Economically active of which 82.3% are employed and 17.7% are unemployed</p> <p><u>Ga-Segonyana Local Municipality:</u> 50.8% Economically active of which 66.3% are employed and 33.7% are unemployed</p> <p><u>Joe Morolong Local Municipality:</u> 26.2% Economically active of which 61.4% are employed and 38.6% are unemployed</p>
Dwelling type	<p><u>John Taolo Gaetsewe District Municipality:</u> 73.1% - house or brick structure on separate stand or yard 11.6% - traditional dwelling 5.7% - informal dwelling (shack not in backyard)</p> <p><u>Gamaqara Local Municipality:</u> 65.5% - house or brick structure on separate stand or yard 13.7% - informal dwelling (shack not in backyard) 9.3% - informal dwelling (shack in backyard)</p> <p><u>Ga-Segonyana Local Municipality:</u> 78.1% - house or brick structure on separate stand or yard</p>

VARIABLE	CHARACTERISTICS
	<p>6.7% - traditional dwelling 6.0% - informal dwelling (shack not in backyard) 5.3% - informal dwelling (shack in backyard)</p> <p><u>Joe Morolong Local Municipality:</u> 71.0% - house or brick structure on separate stand or yard 22.4% - traditional dwelling 2.3% - informal dwelling (shack in backyard) 1.9% - informal dwelling (shack not in backyard)</p>
Tenure status	<p><u>John Taolo Gaetsewe District Municipality:</u> 55.5% - owned and fully paid off 20.6% - occupied rent-free 17.4% - rented 6.6% - owned but not yet paid off</p> <p><u>Gamagara Local Municipality:</u> 39.9% - rented 27.8% - owned and fully paid off 18.0% - owned but not yet paid off 14.3% - occupied rent-free</p> <p><u>Ga-Segonyana Local Municipality:</u> 64.8% - owned and fully paid off 14.3% - occupied rent-free 16.1% - rented 4.9% - owned but not yet paid off</p> <p><u>Joe Morolong Local Municipality:</u> 55.6% - owned and fully paid off 31.5% - occupied rent-free 9.2% - rented 3.8% - owned but not yet paid off</p>
Average household income (2017)	<p><u>John Taolo Gaetsewe District Municipality:</u> R78 640 per annum, R6 553 per month (All LSM). R162 355 per annum, R13 530 per month (LSM 4 to 10+)</p> <p><u>Gamagara Local Municipality: (2017 values)</u> R156 494 per annum, R13 041 per month (All LSM's). R223 746 per annum, R18 645 per month (LSM 4 to 10+)</p> <p><u>Ga-Segonyana Local Municipality: (2017 values)</u> R78 292 per annum, R6 524 per month (All LSM). R152 306 per annum, R12 692 per month (LSM 4 to 10+)</p> <p><u>Joe Morolong Local Municipality: (2017 values)</u> R43 514 per annum, R3 626 per month (All LSM). R118 021 per annum, R9 358 per month (LSM 4 to 10+)</p>
LSM Profile	<p><u>John Taolo Gaetsewe District Municipality:</u> 60.2% - LSM 1 to 3 39.8% - LSM 4 to 10+</p> <p><u>Gamagara Local Municipality:</u> 37.2% - LSM 1 to 3 62.8% - LSM 4 to 10+</p> <p><u>Ga-Segonyana Local Municipality:</u> 57.0% - LSM 1 to 3</p>

VARIABLE	CHARACTERISTICS
	43.0% - LSM 4 to 10+ <u>Joe Morolong Local Municipality:</u> 74.2% - LSM 1 to 3 25.8% - LSM 4 to 10+

- ✓ From the table above, it is evident that there are approximately **51 719 people** residing in the **Gamagara Local Municipality** which amounts to **13 092 households**.
- ✓ In the **John Taolo Gaetsewe District Municipality**, there are approximately **242 884 people** residing in the district, which amounts to **69 288 households**.
- ✓ Of the total population in the **Gamagara Local Municipality**, **65.2%** are within the economically active market segment of which **82.3%** are formally employed.
- ✓ The sending municipalities indicated lower economically active segments – 50.8% are economically active in Ga-Segonyana LM and only 26.2% are economically active in Joe Morolong LM. Unemployment levels are also higher in the sending municipalities – 33.7% in Ga-Segonyana LM and 38.6% in Joe Morolong LM. Unemployment in the sending municipalities are much lower than the national average of approximately 25.0%.
- ✓ Gaging by the respective municipal LSM profiles, living standards in Gamagara LM appear to extend, by far, the living standard of the two sending municipalities – further accentuating the significance and importance of mining in Gamagara LM as the backbone of the district economy.
- ✓ It is interesting to observe, the comparatively low prevalence of informal dwellings, in particular in Ga-Segonyana and Joe Morolong local municipalities. This is, in all probability, attributable to active mining involvement in the provision of housing. One could infer that fluctuations in mining activity would therefore be felt in residential and other property markets.

5 CHAPTER 5: ECONOMIC IMPACT ASSESSMENT

5.1 INTRODUCTION

The purpose of this section is to provide an economic impact assessment that will focus on the economic impact of the Sishen mine. The section is divided into the following sub-sections:

- ✓ Effect of Increased Production
- ✓ Quantitative Impact Assessment
- ✓ Impact on Employment
- ✓ Qualitative Impact Assessment
- ✓ Synthesis

5.2 EFFECT OF INCREASED PRODUCTION

Figure 5.1 indicates the iron ore production at current levels as well as the potential higher production with the use of UHDMS. Figure 5.2 indicates the potential revenue for the LOM at the current production level as well as the increased production level.

Figure 5.1: Sishen Iron Ore Production

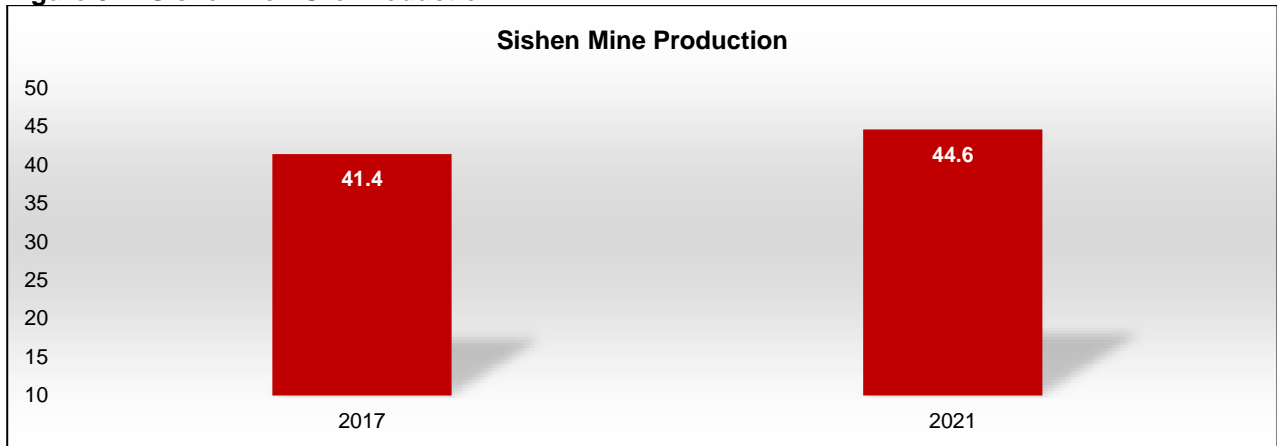
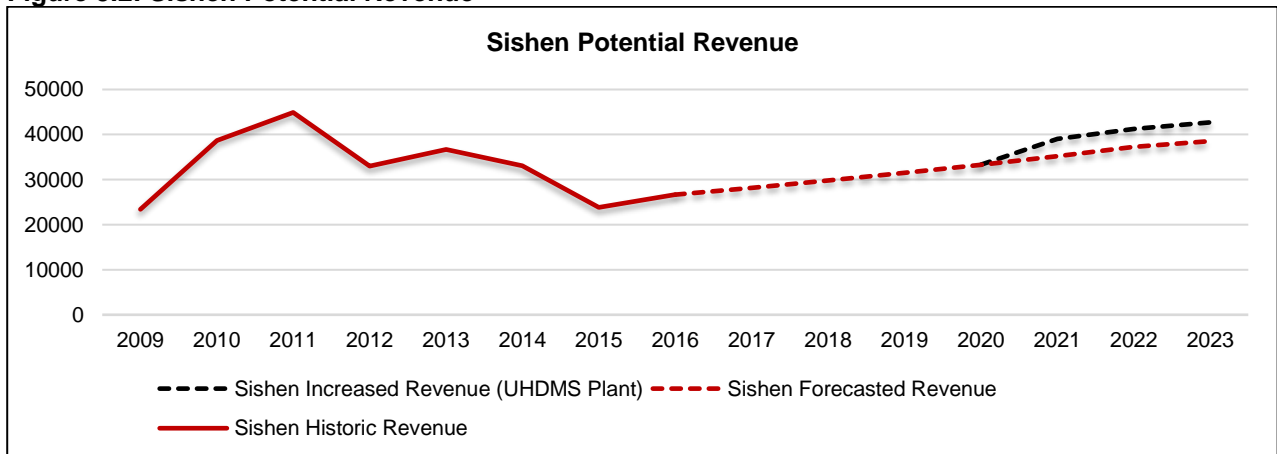


Figure 5.2: Sishen Potential Revenue



Should Ultra-High Dense Media Separation (UHDMS) technologies be utilised at Sishen, the production of an additional 3.2Mtpa of saleable product by May 2021, for the duration of LOM, will be possible. The new technology will increase current average production of 41.4 Mtpa to approximately 44.6 Mtpa.

The future income yield will be positively correlated with the higher average annual production capacity of Sishen. It is expected that the UHDMS will yield 10.8% higher revenue compared with revenue generated through the DMS process.

5.3 QUANTITATIVE IMPACT ASSESSMENT

The input-output model depicts economic relationships between different components of an economy by identifying monetary flows (expenditures, receipts) between various units. The relationship between the initial spending and the total effects generated by the spending is known as the **multiplier effect (X + N)** of the sector, or more generally as the **impact** of the sector on the economy as a whole.

Impacts are measured in terms of the following:

- ✓ **Business Sales** refers to the value of business sales (turnover) generated in the economy as a result of the mine.
- ✓ **GDP** refers to the value of all final goods and services produced during a one year period within the boundaries of a specific area as a result of the mine.
- ✓ **Total employment** reflects the number of additional jobs created by economic growth due to the mine. Note that the public costs⁹ of attracting these employment opportunities, as well as the quality thereof, are not necessarily reflected.

The following figure conceptually illustrates the economic impact that the mine has on the provincial economy in terms of additional GDP.

The impact result due to a change in output is measured through national multipliers. The multiplier effect refers to the increase in final income arising from any new injection of demand and the opposite is also true with a withdrawal of demand will lead to a downward multiplier effect. The following is evident for iron ore mining within the Northern Cape Province.

Output/Sales: For every R1 million in final demand from iron ore mining there is R1.37 million downstream variation in output/sales generated across the entire economy.

Labour Remuneration: Salaries and wages within the mining sector are on average higher than those in the agriculture sector. As a result, the economy wide impact is higher as workers earn more and can spend more money on goods and services than those in the agriculture sector. For every R1 million variation in final demand, labour remuneration either loses or gains R320 000.

Employment: A total of 2 employment opportunities are created within the formal and informal sectors across the entire economy due to a R1 million variation in mining demand. The reverse is also true, with a loss in 2 employment opportunities across the economy if there is a R1 million decrease in iron ore mining demand.

⁹ Public costs relate to infrastructure and amenities, schools, clinics, etc. needed to serve employees.

Figure 5.3: Economic impact of the development

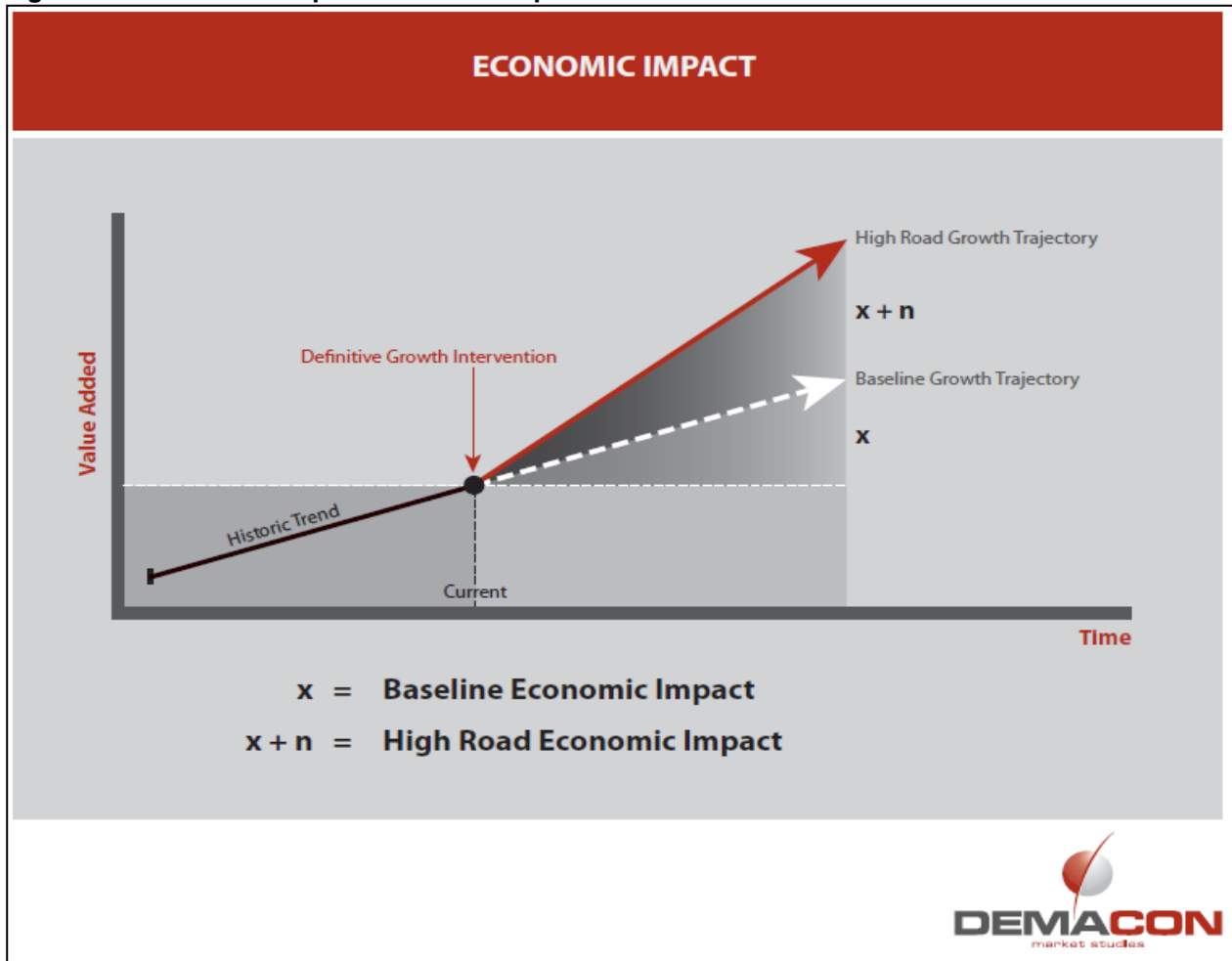


Table 5.1 summarises the multiplier effect of an Iron Ore mine on the economy.

Table 5.1: Multiplier effect for Mining

Description	Economy Wide Impact
Implication of R1 million demand	
Output/Sales	Generates R1.37 million in sales
Labour Remuneration	Higher production levels and expanding operations provide for additional labour remuneration
Employment	Create 2.04 employment opportunities

Source: Quantec, South Africa Multipliers (South African Reserve Bank)

CONSTRUCTION PHASE IMPACT

Table 5.2 indicates the economic impact based on the construction phase of converting to UHDMS technology.

Table 5.2: Economic Impact based on the construction of the UHDMS

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R2 052 832 372	R37 462 778	R643 105 936	R2 733 401 085
Additional GGP	R1 565 506 222	R16 341 569	R285 618 940	R1 867 466 731
Additional Employment	2 483	67	1 532	4 082



Variable	Total Impact
Additional Business Sales	R2.7 billion
Additional GGP	R1.9 billion
Additional Employment	4 082 (of which 2 483 direct)

Source: Demacon Economic Impact Model, 2017

Note: The economy wide impact includes the direct, indirect and induced impacts

Table 5.2 illustrates that the capital expenditure will potentially create an additional R2.7 billion in new business sales, R1.9 billion in additional GGP, as well as 4 082 short term employment opportunities. Total impact includes direct, indirect as well as induced effects.

OPERATIONAL PHASE IMPACTS

Table 5.3 indicates the economic impact resulting from the production of the additional 3.2Mtpa. The calculation is based on operational expenditure per ton product (ROM) of R162.17/ton.

Table 5.3: Economic Impact based on the increased output of 3.2Mtpa

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R532 652 521	R9 720 542	R166 867 983	R709 241 046
Additional GGP	R406 205 031	R4 240 180	R74 110 117	R484 555 328
Additional Employment	644	17	397	1 059



Variable	Total Impact
Additional Business Sales	R709.2 million
Additional GGP	R484.6 million
Additional Employment	1 059 jobs

Source: Demacon Economic Impact Model, 2017

Note: The economy wide impact includes the direct, indirect and induced impacts

Table 5.3 illustrates that the average additional operational expenditure will potentially create an additional R709.2 million in new business sales, R484.6 million in additional GGP, as well as 1 059 sustained employment opportunities. Total impact includes direct, indirect as well as induced effects.

5.4 QUALITATIVE IMPACT ASSESSMENT

Based on the assessment of the Sishen Mine, a set of key impacts were identified, some positive and some negative, of which most cannot easily be evaluated in terms of quantitative measures. This section focuses on providing a qualitative assessment of these variables.

5.4.1 Impact Assessment Tables

The evaluation of impacts is conducted in terms of the criteria detailed in Table 5.4 to Table 5.10. The various environmental impacts and benefits of this project will be discussed in terms of the status, extent, duration, probability, and magnitude of the impact. Finally, an accumulative impact and significance rating is applied to rate each identified impact in terms of its overall magnitude and significance (Table 5.11).

In order to adequately assess and evaluate the impacts and benefits associated with the project it was necessary to develop a methodology that would scientifically achieve this and to reduce the subjectivity involved in making such evaluations. For informed decision making it is necessary to assess all legal requirements and clearly defined criteria in order to accurately determine the significance of the predicted impact or benefit on the surrounding natural and social environment.

The nature or status of the impact is determined by the conditions of the environment prior to construction and operation. A discussion on the status of the impact will include a description of what causes the effect, what will be affected and how it will be affected. The status of the impact can be described as negative, positive or neutral.

Table 5.4: Status of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
Positive	A benefit to the environment ¹⁰	+
Neutral	No cost or benefit to the environment.	N
Negative	A cost to the environment.	-

Table 5.5: Extent of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Site Specific; Occurs within the site boundary.	1
Medium - Low	Local; Extends beyond the site boundary; extending only as far as local community or urban area	2
Medium	Provincial / Regional; Extends far beyond the site boundary; Widespread effect	3
Medium - High	National i.e. South Africa	4
Very High	Across International Borders	5

The duration of the impact refers to the time scale of the impact or benefit.

¹⁰ The sum total of all surroundings of a living organism, including natural forces and other living things, which provide conditions for development and growth as well as of danger and damage.

Table 5.6: Duration of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
Low	Immediate (less than a year)	1
Medium - Low	Short term (1-5 years)	2
Medium	Medium term (6-15 years)	3
Medium - High	Long term (the impact will cease after the operational life of the project)	4
High	Permanent (no mitigation measures of natural process will reduce the impact after construction)	5

The magnitude or severity of the impact is indicated.

Table 5.7: Magnitude of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
None	Where the aspect will have no impact on the environment	0
Minor	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are not affected	1
Low	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are slightly affected	2
Moderate	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes continue albeit in a modified way	3
High	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are altered to the extent that it will temporarily cease	4
Very high / don't know	Where the impact affects the environment in such a way that neutral, cultural and social functions and processes are altered to the extent that it will permanently cease	5

The probability of the impact describes the likelihood of the impact actually occurring.

Table 5.8: Probability of Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
None	Impact will not occur	0
Improbable	the possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures	1
Low Probability	There is a possibility that the impact will occur	2
Medium Probable	The impact may occur	3
Highly Probable	It is expected that the impact will occur; Chance of occurrence.	4
Definite	Impact will occur regardless of any prevention measures	5

The impact of the development is considered together with additional developments of the same or similar nature and magnitude.

Table 5.9: Cumulative Impact

RATING	DESCRIPTION	QUANTITATIVE RATING
Negligible	The net effect is the same as the single development	1
Marginal	The impact of two developments of a similar nature is less than twice the impact of a single development. This implies it is better to place the two developments in the same environment rather than in separate environments.	2
Compounding	The impact of two developments is more than twice the impact of two single developments. This implies that it is better to split the two developments into separate environments	3

The impact magnitude and significance rating is utilised to rate each identified impact in terms of its overall magnitude and significance.

Table 5.10: Impact Significance Rating

IMPACT	RATING	DESCRIPTION	QUANTITATIVE RATING
Negligible	No Impact	The impact has no impact or the impact is unknown	0
Negative / Positive	Low	The impact does not have a direct influence on the decision to develop the area	Up to 15
	Low-Medium	The impact has an influence but the impact can be mitigated	16 - 30
	Medium	The impact could influence the decision to develop in the area unless it is effectively mitigated	31 - 45
	Medium-High	The impact will have a direct influence on the decision to develop but there are means of mitigating the impact although these may be difficult as well as expensive	46 – 60
	High	Where the impact must have an influence on the decision to proceed to develop in the area	Above 60

Table 5.11 summarises the findings of the qualitative impact assessment for the Sishen expansion.

Table 5.11: Qualitative Impact Table – Sishen Mine

THEME	SPECIFIC IMPACT	STATUS OF IMPACT	IMPACT SIGNIFICANCE PRIOR TO MITIGATION					SIGNIFICANCE	DESCRIPTION & MITIGATION MEASURES	IMPACT SIGNIFICANCE POST MITIGATION
			EXTENT	DURATION	MAGNITUDE	PROBABILITY				
CONSTRUCTION PHASE										
Mining	Employment	+	3*	2	2	4	50 (Medium)	Approximately 2 070 employment opportunities will be created during the construction phase.	Medium-High	
	Economic Value Ad	+	3	2	3	4	70 (High)	If local contractors are used for construction, the construction phase will benefit the local economy as a whole.	Medium-High	
OPERATIONAL PHASE										
Mining	Employment	+	2	4	3	4	30 (Medium)	Increased production as a result of the UHDMS will create job opportunities along the product value chain.	Medium-High	
	Production	+	4	4	3	4	60 (High)	The production of an additional 3.2Mtpa will increase Sishen mine’s annual potential revenue, which will translate into additional business sales and additional GGP.	Medium-High	
	Infrastructure	+	3	4	3	4	25 (Medium)	Although no extensive municipal infrastructure upgrades would be required, increased production is set to have downstream infrastructure implications along the value chain which might stimulate further investment.	Low	
	Service Sector (e.g. retail, health care, housing, education)	+	3	4	3	4	55 (Medium)	The increased revenue and the increased employment as a result of the higher production will sustain increased demand for economic goods and services, e.g. retail, health care, housing, education, etc.	Medium-High	

Source: Demacon, 2017

5.5 SYNTHESIS

From the above, it appears that the impact of the conversion to UHDMS technology will enhance the Sishen mine production and revenue which, in turn, will be advantageous for the local and district economies. Additional production and revenue creates benefits in respect of additional business sales, additional GGP, as well as additional indirect and induced employment.

The UHDMS constitutes a process improvement which ultimately enhances efficiency with some noticeable economic benefits. In the context of concerns regarding long term sustainability of the mining sector, process improvements increase longevity and fulfil an important role in securing the economic livelihood and prosperity for local communities.

6

CHAPTER 6: CONCLUSION

6.1 INTRODUCTION

This chapter provides a synthesis of the Sishen mine economic impact assessment and provides high-level development opportunities based on the competitive advantage analysis of the local economy.

6.2 SOCIO-ECONOMIC OVERVIEW

- ✓ There are approximately **51 719 people** residing in the **Gamagara Local Municipality** which amounts to **13 092 households**.
- ✓ In the **John Taolo Gaetsewe District Municipality**, there are approximately **242 884 people** residing in the district, which amounts to **69 288 households**.
- ✓ Of the total population in the **Gamagara Local Municipality**, **65.2%** are within the economically active market segment of which **82.3%** are formally employed.
- ✓ The sending municipalities indicated lower economically active segments – 50.8% are economically active in Ga-Segonyana LM and only 26.2% are economically active in Joe Morolong LM. Unemployment levels are also higher in the sending municipalities – 33.7% in Ga-Segonyana LM and 38.6% in Joe Morolong LM. Unemployment in the sending municipalities are much lower than the national average of approximately 25.0%.
- ✓ Gaging by the respective municipal LSM profiles, living standards in Gamagara LM appear to extend, by far, the living standard of the two sending municipalities – further accentuating the significance and importance of mining in Gamagara LM as the backbone of the district economy.
- ✓ It is interesting to observe, the comparatively low prevalence of informal dwellings, in particular in Ga-Segonyana and Joe Morolong local municipalities. This is, in all probability, attributable to active mining involvement in the provision of housing. One could infer that fluctuations in mining activity would therefore be felt in residential and other property markets.

6.3 ECONOMIC IMPACT MODELLING

Should Ultra-High Dense Media Separation (UHDMS) technologies be utilised at Sishen, the production of an additional 3.2Mtpa of saleable product by May 2021, for the duration of LOM, will be possible. The new technology will increase current average production of 41.4 Mtpa to approximately 44.6 Mtpa.

The higher average production per annum will increase potential revenue of Sishen. Given an average iron ore per metric ton price of R850, revenue is set to potentially increase with approximately 10.8% per annum.

CONSTRUCTION PHASE IMPACT

Table 6.1 indicates the economic impact based on the construction phase of converting to UHDMS technology.

Table 6.1: Economic Impact based on the construction of the UHDMS

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R1 040 831 570	R18 994 460	R326 068 981	R1 385 895 011
Additional GGP	R793 746 397	R8 285 538	R144 815 141	R946 847 076
Additional Employment	1 259	34	777	2 070



Variable	Total Impact
Additional Business Sales	R2.7 billion
Additional GGP	R1.9 billion
Additional Employment	4 082 (of which 2 483 direct)

Source: Demacon Economic Impact Model, 2017

Note: The economy wide impact includes the direct, indirect and induced impacts

Table 5.2 illustrates that the capital expenditure will potentially create an additional R2.7 billion in new business sales, R1.9 billion in additional GGP, as well as 4 082 short term employment opportunities. Total impact includes direct, indirect as well as induced effects.

OPERATIONAL PHASE IMPACTS

Table 6.2 indicates the economic impact resulting from the production of the additional 3.2Mtpa. The calculation is based on operational expenditure per ton product (ROM) of R162.17/ton.

Table 6.2: Economic Impact based on the increased output of 3.2Mtpa

Variable	Direct Impact	Indirect Impact	Induced Impact	Total Impact
Additional Business Sales	R532 652 521	R9 720 542	R166 867 983	R709 241 046
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Additional Employment	644	17	397	1 059



Variable	Total Impact
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Additional Employment	1 059 jobs

Source: Demacon Economic Impact Model, 2017

Note: The economy wide impact includes the direct, indirect and induced impacts

Table 6.2 illustrates that the average additional operational expenditure will potentially create an additional R709.2 million in new business sales, R484.6 million in additional GGP, as well as 1 059 sustained employment opportunities. Total impact includes direct, indirect as well as induced effects.

From the above, it appears that the impact of the conversion to UHDMS technology will enhance the Sishen mine production and revenue which, in turn, will be advantageous for the local and district economies. Additional production and revenue creates benefits in respect of additional business sales, additional GGP, as well as additional indirect and induced employment.

The UHDMS constitutes a process improvement which ultimately enhances efficiency with some noticeable economic benefits. In the context of concerns regarding long term sustainability of the mining sector, process improvements increase longevity and fulfil an important role in securing the economic livelihood and prosperity for local communities.

Table 6.3: Impact Table – Sishen Mine

THEME	SPECIFIC IMPACT	STATUS OF IMPACT	IMPACT SIGNIFICANCE PRIOR TO MITIGATION					SIGNIFICANCE	DESCRIPTION & MITIGATION MEASURES	IMPACT SIGNIFICANCE POST MITIGATION
			EXTENT	DURATION	MAGNITUDE	PROBABILITY				
CONSTRUCTION PHASE										
Mining	Employment	+	3*	2	2	4	50 (Medium)	Approximately 2 070 employment opportunities will be created during the construction phase.	Medium-High	
	Economic Value Ad	+	3	2	3	4	70 (High)	If local contractors are used for construction, the construction phase will benefit the local economy as a whole.	Medium-High	
OPERATIONAL PHASE										
Mining	Employment	+	2	4	3	4	30 (Medium)	Increased production as a result of the UHDMS will create job opportunities along the product value chain.	Medium-High	
	Production	+	4	4	3	4	60 (High)	The production of an additional 3.2Mtpa will increase Sishen mine’s annual potential revenue, which will translate into additional business sales and additional GGP.	Medium-High	
	Infrastructure	+	3	4	3	4	25 (Medium)	Although no extensive municipal infrastructure upgrades would be required, increased production is set to have downstream infrastructure implications along the value chain which might stimulate further investment.	Low	
	Service Sector (e.g. retail, health care, housing, education)	+	3	4	3	4	55 (Medium)	The increased revenue and the increased employment as a result of the higher production will sustain increased demand for economic goods and services, e.g. retail, health care, housing, education, etc.	Medium-High	

Source: Demacon, 2017