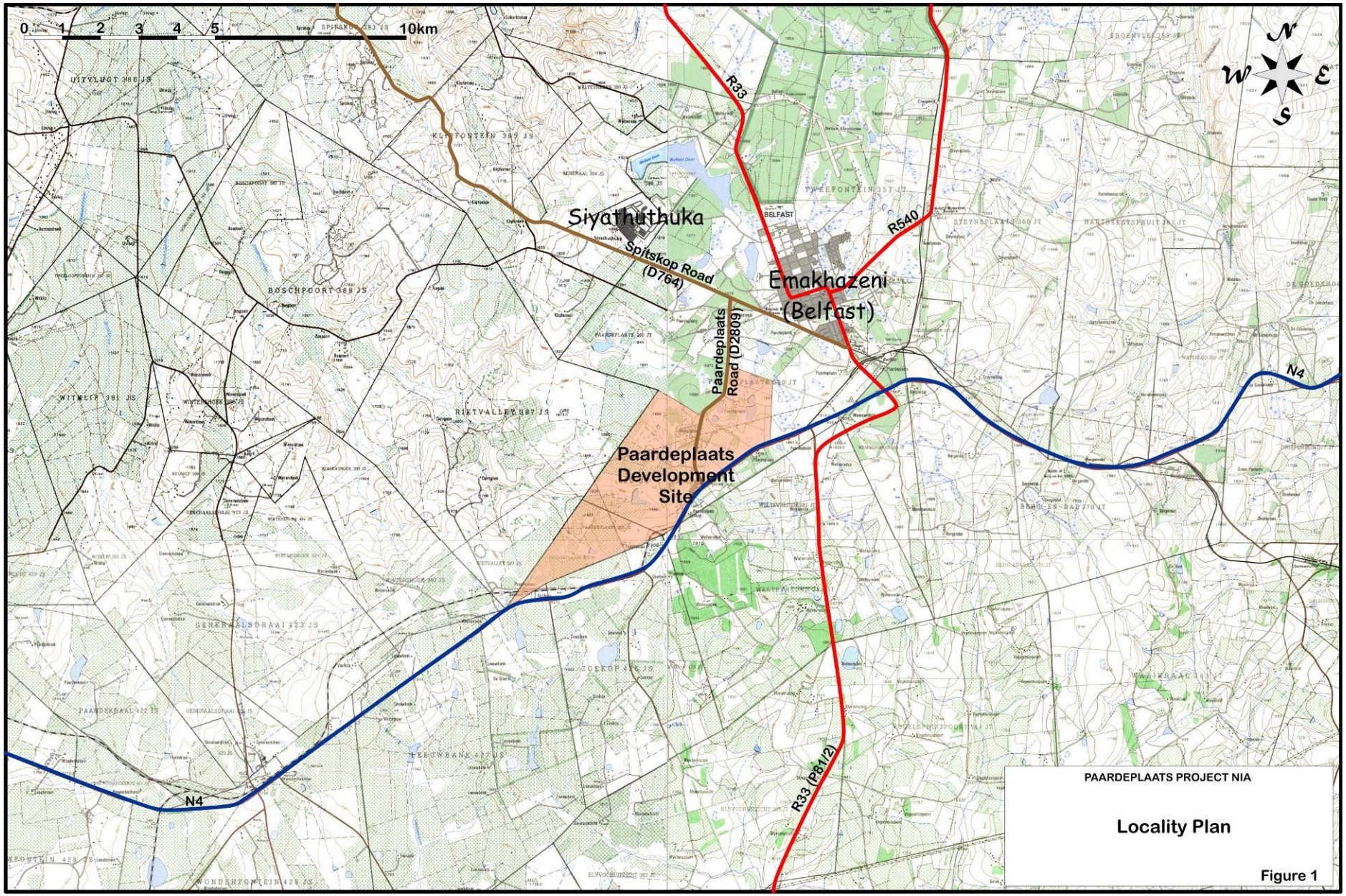

0 1 2 3 4 5 10km
N
W
E
S
R33
BELFAST
R540
Siyathuthuka
Spitskop Road (D764)
Emakhazeni (Belfast)
Paardeplaats Road (D2809)
Paardeplaats Development Site
N4
N4
R33 (P81/2)
PAARDEPLAATS PROJECT NIA
Locality Plan
Figure 1

1.4 The Paardeplaats Project

The proposed Paardeplaats Coal Mine is essentially an extension of the existing Glisa NBC Coal Mine. As an extension of Glisa Coal Mine, all mineral processing and waste disposal will be undertaken at Glisa Coal Mine. Paardeplaats will be an opencast mining operation with a life of mine estimated at 20 years.

The proposed Paardeplaats Coal Mine's surface infrastructure is limited as all mineral processing will be undertaken on the adjacent Exxaro owned and operated Glisa Coal Mine. As such the mining and surface infrastructure on approval of the Paardeplaats Project will consist of the following:

- Mining activities (opencast pit);
- Pollution control and return water dams;
- Topsoil, subsoil, and wetland soil stockpiles;
- Overburden stockpiles;
- Storm water management including clean and dirty water separation systems;
- Access and haul roads;
- Pipelines;
- RoM Stockpiles;
- Diesel storage;
- Mobile office and ablution block; and
- Temporary general waste storage area.
- Mobile lighting

The mining method will be a hybrid between roll-over mining as well as bench/box cut mining. The roll-over mining will be used where only one seam is present, as well as where the overburden has a thickness less than 20m. The bench mining will be used where two or more seams are present and where the overburden has a thickness of more than 20m. This hybrid mining method will allow for the extraction of coal from both shallow and deeper seams.

The following generic actions are involved in the operation and are classified sequentially as follows:

a) Strip topsoil, subsoil, and wetland soils;
b) Separate stockpiling of topsoil, subsoil, and wetland soils;
c) Drill and blast overburden;
d) Load and haul the top off;
e) Dozing the roll over;

f) Clean the top of the coal;
g) Dig trench to prevent contamination;
h) Drill and blast coal;
i) Load and haul coal; and
j) Start with next cut.

Three mining alternatives have been analysed, namely

- The mining of only Portion 30 of the coal body in the north-western portion of the site. EIMS named this the Sensitivity Planning Approach Alternative.
- The mining of the entire coal body, named the Maximum Mine Production Alternative.
- The No Go Alternative.

2 BACKGROUND INFORMATION USED AND DETAILS OF THE SITE VISITS UNDERTAKEN

Only the aspects which have an influence on the potential noise impact of the colliery are dealt with in this section.

2.1 Topography

The terrain may be described as mildly undulating.

2.2 Roads

There are four roads that influence the noise climate in the core study area, namely (Figure 1):

- National Road N4. This is a national freeway aligned in an east-east direction through the central sector of the core study area and forms the southern boundary of the proposed development site.
- Road P81/2 (Route R33). This is a provincial road linking Belfast to Carolina and is aligned in an east-west direction for a short distance and then turns southward.
- Spitskop Road (Road D764). This is the main road on the western side of Belfast (eMakhazeni) that links Belfast to the Glisa Mine and Siyathuthuka.
- Road D2809 (Paardeplaats Road) is a gravel road that links Spitskop Road to the N4 Freeway and is aligned through the centre of the development site. This road carries very low volumes of traffic and has not been considered in the modelling of the traffic noise impact. Sections of this road will have to be re-aligned during mining.

The haul roads internal to the pit (both alternatives) have their exits to the pit on the northern corner of Portion 30. The haul road external to the pit to the Glisa Mine beneficiation plant is

likely to be aligned from this point in a north-easterly direction directly to the beneficiation plant. Refer to Figure 2.

2.3 Railway Lines

There is one railway line in the area, namely the Middelburg - Nelspruit line. This railway line is aligned in an east-west direction along the southern boundary of the proposed development site. There are at present 16 freight trains per day on the line. There is no commuter service. This data were obtained from Transnet.

2.4 Land Use

The main land uses in the study area are:

i) Residential
   a) The town of eMakhazeni (Belfast), including the township of Siyathuthuka.
   b) Various farmhouses and farm labourer residences, including Hadeco Village.

ii) Educational: Schools and crèches, both in the rural areas and in eMakhazeni (Belfast).

iii) Institutional: Hospital and clinics in eMakhazeni (Belfast) and Siyathuthuka.

iv) Industrial:
   a) Light industrial in eMakhazeni (Belfast).
   b) Glisa Mine.

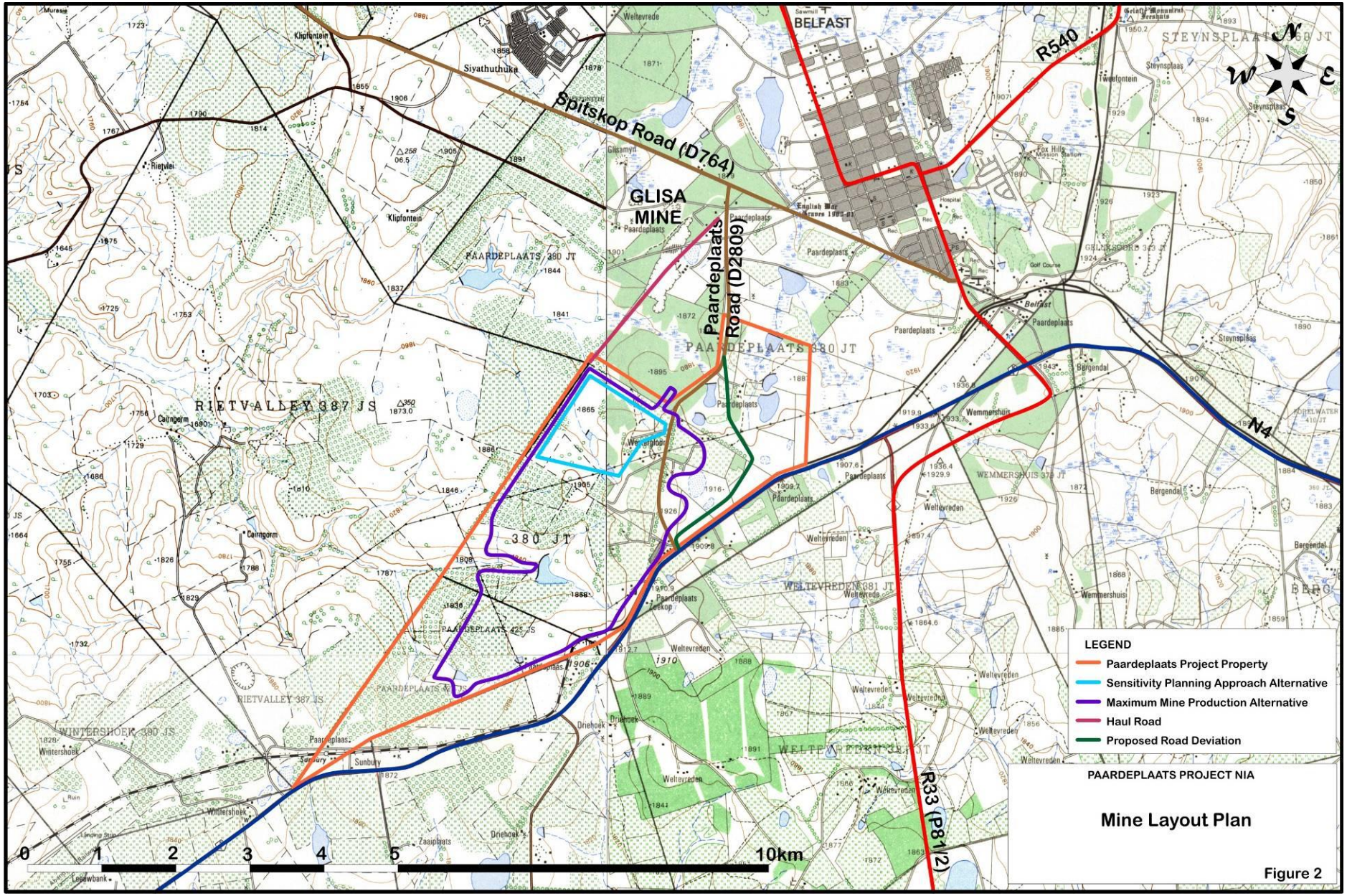
v) Agricultural: Various.

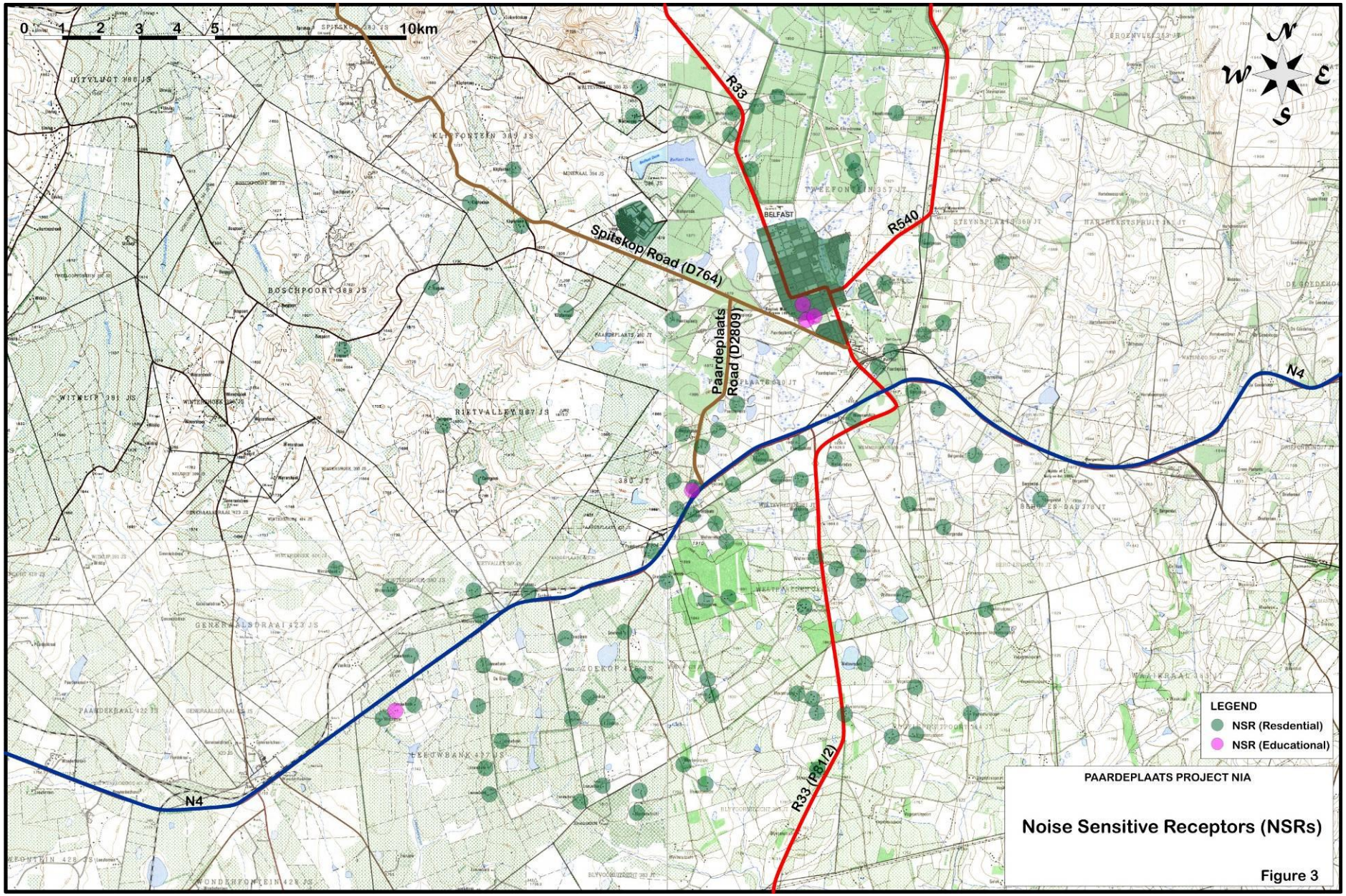
2.5 Noise Sensitive Receptors

The noise sensitive sites/areas in the study area that are potentially affected by the development of the mine on this site are the residential areas of eMakhazeni (Belfast), Siyathuthuka township, Hadeco Village, farm houses, farm labourer residences, schools, crèches, clinics, and hospitals listed in Section 2.4 and as shown in Figure 3.

For this study, the position of houses/dwellings on the farms was taken off 1:50 000 topographical cadastral maps and verified as far as possible using Google Earth. Even though the latest edition was used, the relevant maps are 26 years out of date and there may be new dwellings and/or some of the existing shown buildings may be derelict. During the field survey for the noise measurement survey, such aspects were noted where possible. The following 1:50 000 topographical cadastral maps were used:

- SOUTH AFRICA 1:50 000 Sheet 2529DB, LANGUITSIG Second Edition 1986.
- SOUTH AFRICA 1:50 000 Sheet 2529DD, ARNOT Second Edition 1986.
- SOUTH AFRICA 1:50 000 Sheet 2530CA, BELFAST Second Edition 1988.
- SOUTH AFRICA 1:50 000 Sheet 2530CC, MOEDIG Second Edition 1988.


Spitskop Road (D764)
GLISA MINE
Paardeplaats Road (D2809)
BELFAST
R540
N4
R33 (P81/2)
PAARDEPLAATS 380 JT
RIETVALLEY 387 JS
380 JT
WELTEVREDEN 381 JT
WINTERSHOEK 390 JS
LEGEND
Paardeplaats Project Property
Sensitivity Planning Approach Alternative
Maximum Mine Production Alternative
Haul Road
Proposed Road Deviation
PAARDEPLAATS PROJECT NIA
Mine Layout Plan
Figure 2
0 1 2 3 4 5 10km


0 1 2 3 4 5 10km
N
W
E
S
R33
R540
BELFAST
Spitskop Road (D764)
Paardeplaats Road (D2809)
N4
N4
R33 (P61/2)
LEGEND
NSR (Resdential)
NSR (Educational)
PAARDEPLAATS PROJECT NIA
Noise Sensitive Receptors (NSRs)
Figure 3

2.6 Aspects of Acoustical Significance

2.6.1. **Terrain**

There are no prominent topographical features in the area that will significantly influence the transmission of the noise from the Paardeplaats Project.

2.6.2. **Meteorological Aspects**

For this project Airshed Planning Professionals (Pty) Ltd used Lakes Environmental MM5 data, for the period 2009 – 20011. The centre point of the meteorological domain was at: 25.729289°S; 30.004964°E. For more detail on the meteorological data, refer to Appendix C.

The flow field is dominated by winds from the east and north-west. During day-time conditions, frequency of wind from the north-western sector increases while winds from the north-eastern sector are more common at night. Seasonal variation in wind direction is also evident where winds from the north-western sector dominating during spring and summer. Easterly winds are more frequent in autumn and winter.

Atmospheric temperature inversions also have a significant effect on the noise propagation character of the area. Temperature inversions tend to increase noise levels at some distance from a source. A temperature inversion is formed when air near the ground is cooler than the air above. This occurs mainly at night or to a lesser extent during cloudy days away from large bodies of water. Stable conditions with high humidity and very low velocity wind conditions are necessary. As cool air is denser than warm air, sound waves are refracted towards the cooler air, that is, towards the ground.

2.7 Site Visit

A site inspection was carried out and noise measurements of the residual noise climate were taken on Tuesday 19 May 2012. For details refer to Appendix B.

In general the residual noise levels in the undeveloped areas to the north-west of the proposed development site are low (that is, the areas are very quiet). The noise levels are typically representative of a rural farming area, namely where the average daytime noise levels do not exceed 45dBA and the night-time levels do not exceed 35dBA. Refer to Table 1.

TABLE 1: MEASURED CURRENT NOISE LEVELS IN THE PAARDEPLAATS COLLIERY STUDY AREA (YEAR 2012)

Site No	Location Description	Measured Sound Pressure Level (dBA)					
		Daytime Period			Evening Period		
		L_{Aeq}	L_{max}	L_{min}	L_{Aeq}	L_{max}	L_{min}
1	On Paardeplaats Road (Road D2809), at entrance to Hadeco Farm	42.3	62.1	30.8	41.6	-	<35
2	On Paardeplaats Road (Road D2809), at entrance to Westergloor Farm	43.0	63.9	28.0	36.7	-	<35
3	In cul de sac of Fitzgerald Street, Belfast (eMakhazeni), outside No. 65	46.1	58.6	32.6	40.7	-	<35
4	At entrance to farmhouse, approximately 350m from centreline of National Road N4 and approximately 50m from centreline of R33 (to Carolina)	52.9	68.8	36.7	45.1	-	<35

3 METHODOLOGY

3.1 General

The general procedure used to determine the noise impact was guided by the requirements of the Code of Practice SANS 10328:2008: *Methods for Environmental Noise Impact Assessments.* The level of investigation was the equivalent of an EIA. A comprehensive assessment of all noise impact descriptors (standards) has been undertaken. The noise impact criteria used specifically take into account those as specified in the South African National Standard SANS 10103:2008, *The Measurement and Rating of Environmental Noise with Respect to Annoyance and Speech Communication* as well as those in the National Noise Control Regulations. The investigation comprised the following:

i) Determination of the existing situation (prior to the development of the colliery).

ii) Determination of the situation during the construction phase and the operational phase.

iii) Assessment of the change in noise climate and impact.

iv) Identification of mitigation measures.

3.2 Determination of the Existing Conditions

This phase comprised the following:

i) Review of the Noise Impact Assessment report for the Glisa Mine by dBAcoustics (2010).

ii) The relevant technical details of the planned mine (as known at this stage), the existing traffic patterns and the existing and planned land use in the study area were reviewed in order to establish a comprehensive understanding of all aspects of the project that will influence the future noise climate in the study area.

iii) Using these data, the limits of the study area were determined and the potential noise sensitive areas, other major noise sources and potential problems in these areas were identified.

iv) Applicable noise standards were identified. The National Noise Control Regulations and the SANS 10103:2008 standards were applied.

v) The existing *noise climate* of the study area was determined by means of a field inspection and a noise measurement survey. The measurement survey appropriately covered the whole extent of the study area, focussing specifically on the identified noise sensitive/problem areas. Measurements were taken at four monitoring sites. The sound pressure level (SPL) (noise) measurements were taken in accordance with the requirements of the Code of Practice SANS 10103. A Type 1 Integrating Sound Level meter was used for the noise measurements. All measurements were taken under dry weather and normal traffic (that is mid-week/school term) conditions. Refer to Appendix B for details of the measurement survey.

vi) On the general field inspection and at the same time as each individual measurement was being taken, the qualitative nature of the *noise climate* in the area of the measurement site was assessed and recorded. This comprised an appraisal of the general prevailing acoustic conditions based on the subjective response to the sounds as perceived by the listener (i.e. *auditory observation* by the surveyor), as well as identifying those noise incidents, which influenced the noise meter readings during that measurement period. This procedure is essential in order to ensure that that there is a *human* correlation between the noise as perceived by the human ear and that, which is measured by the meter, as well as to establish any anomalies in the general ambient noise conditions.

vii) The existing noise climates along the main roads as related to the current traffic volumes and patterns were established. These traffic noise levels were calculated using the South African National Standard SANS 10210 *Calculating and Predicting Road Traffic Noise* for Route. The latest traffic was used as the baseline reference. The calculated 24-hour period noise indicators, as well as those for the daytime period and night-time period provided the main data for the impact assessment. The measured data provided a field check of the acoustic conditions. See Section B7 in Appendix B for details of the road traffic noise impact.

viii) A general analysis of the rail traffic impact in the study area was undertaken. Refer to Section B8 in Appendix B for the likely rail traffic noise impact on the study area.

3.3 Assessment of Planning/Design Phase and Construction Phase Impacts

Aspects of the pre-design field surveys and construction activities that potentially will have a noise impact were identified. Refer to Section 6.4 and Section 6.5.

3.4 Assessment of Operational Phase Impacts

The main focus of the operational phase assessment was to establish the nature, magnitude and extent of the potential change in *noise climate* in the study area directly related to and within the area of influence of the development site. The modelling of the noise propagation from a multi-noise source site such as the proposed Paardeplaats Project is extremely complex and requires the careful consideration and input of many diverse parameters. The likely noise that will be generated by the mining operations was established and this was used to determine a footprint of impact.

As the detailed sound power levels of the plant and equipment were not available, the anticipated noise profile was calculated from data at similar type equipment. Firstly, the sound power levels of the various elements of the mining operation were obtained from similar facilities JKA has worked on, international standards and available databases of source noise levels. For the mining of the open cast pits (roll-over method, including drill and blast), the noise from the drill rigs, excavators, FELs, dozers, ore trucks, diesel bowsers, water carts and dewatering pumps was input into the calculation model. Variation of activities and/or variation of intensity of activities over a period of time have been taken into account. Equipment will not always be operating 100% of the time over a 24-hour period and adjustments need to be made.

Secondly, the combined level of the noise from all these elements was calculated at various distances from the noise sources by means of a propagation model in order to establish the noise contours. The model used was based on SANS 10357:2004, *The Calculation of Sound Propagation by the Concawe Method.* Note that the noise descriptor being calculated is the equivalent continuous A-weighted sound pressure level (ambient noise level) determined for the average condition. The following was taken into account:

i) The determination of the correction for atmospheric absorption which is representative of an average condition is complex as the interaction of the variables of atmospheric pressure, temperature, and humidity especially when related to the changes over a 24-hour cycle and a yearly cycle need to be considered. The correction also has to be related to various frequencies of the sound spectrum.

ii) Correction for the effect of ground surface, that is, the attenuating effect of vegetation.

iii) The determination of the correction for meteorological effects which is representative of an average condition is complex as the interaction of the variables of wind speed,

incident solar radiation, time of day and cloud cover, especially when related to the changes over a 24-hour cycle and a yearly cycle, need to be considered. Conditions for both high wind and temperature inversion were checked.

iv) The effect of the topography of the core study area was reviewed.

v) With regard to the open pit analysis, the ambient noise climates (noise profiles) that will be generated by virtually continuous mining operations at the open pit have been predicted. These are for the unmitigated conditions. The mining operation will not extend over the whole area of the planned pit at any one time, but the area will be mined incrementally. This will mean that there will not be a static noise footprint from the mining operations, as with a fixed feature such as a crusher. As well as moving in plan, the noise levels from the respective sections being mined will also vary (decrease) as the depth of the pit increases due to the shielding from the sidewalls of the excavation and the building of a berm with waste rock. The position of the access roads down into the pit (haul truck routes) will also alter with time. The given noise footprint thus calculated for the pit mining operations is rather the total “noise envelope” covering all situations over the full mining period. It indicates the worst situation that could occur at any specific receiver point from the open pit mining operations over the lifetime of the mine.

3.5 Method of Assessing the Significance of Impact

The impact significance rating methodology, as provided by EIMS, is guided by the requirements of the NEMA EIA Regulations (2010). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition other factors, including cumulative impacts, public concern, and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S).

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER).

The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$C = \frac{(E+D+M+R)}{4} \times N$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in Table 2:

TABLE 2: CRITERIA FOR DETERMINATION OF IMPACT CONSEQUENCE

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),
	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Once the C has been determined the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P (refer to Figure 1). Probability is rated/scored as per Table 3.

TABLE 3: PROBABILITY SCORING

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$ER = C \times P$$

TABLE 4: DETERMINATION OF ENVIRONMENTAL RISK

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability					

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in Table 5.

TABLE 5: SIGNIFICANCE CLASSES

Environmental Risk Score	
Value	Description
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk),
≥ 9; < 17	Medium (i.e. where the impact could have a significant environmental risk),
≥ 17	High (i.e. where the impact will have a significant environmental risk).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/ mitigated.

In accordance with the requirements of Regulation 31 (2)(l) of the EIA Regulations (GNR 543), and further to the assessment criteria presented in Section 1.1.1.1 it is necessary to assess each potentially significant impact in terms of:

- Cumulative impacts; and
- The degree to which the impact may cause irreplaceable loss of resources.

In addition it is important that the public opinion and sentiment regarding a prospective development and consequent potential impacts is considered in the decision making process.

In an effort to ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority / significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/ mitigation impacts are implemented.

TABLE 6: CRITERIA FOR THE DETERMINATION OF PRIORITISATION.

Public response (PR)	Low (1)	Issue/ impact raised in < 30% of responses.
	Medium (2)	Issue/ impact raised in >30% and < 60% of responses.
	High (3)	Issue/ impact raised in >60% of responses.
Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable loss of resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 6. The impact priority is therefore determined as follows:

$$\text{Priority} = PR + CI + LR$$

The result is a priority score which ranges from 3 to 9 and a consequent PF ranging from 1 to 2 (refer to Table 7).

TABLE 7: DETERMINATION OF PRIORITISATION FACTOR.

Priority	Ranking	Prioritisation Factor
= 3	Low	1
3 – 9	Medium	1.5
= 9	High	2

In order to determine the final impact significance the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is to be able to increase the post mitigation environmental risk rating by a full ranking class, if all the priority attributes are high (i.e. if an impact comes out with a medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential, significant public response, and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

TABLE 8: ENVIRONMENTAL SIGNIFICANCE RATING

Value	Description
< 9	Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
≥ 9; < 17	Medium (i.e. where the impact could influence the decision to develop in the area),
≥ 17	High (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

4 SITE SENSITIVITIES

The noise sensitive sites/areas in the study area that are potentially affected by the development of the mine on this site are the residential areas of eMakhazeni (Belfast), Siyathuthuka township, farm houses, farm labourer residences, schools, crèches, clinics, and hospitals listed in Section 2.4 and as shown in Figure 3.

5 SITE CONSTRAINTS

There are no physical site constraints to the propagation of the mine-generated noise.

6 IMPACT ASSESSMENT

The following conditions were observed in the study area and the following aspects were determined from the surveys, calculations of noise indicators and the predictive modelling undertaken for the assessment of the noise impact of the planned Paardeplaats Project.

6.1 General Details

General aspects of note were as follow:

i) The main sources of noise in the area are from:
   a) Road traffic.
   b) Glisa Coal Mine.
   c) Middelburg - Nelspruit railway line.
   d) General farming activities (not a major source of noise).
   e) Air traffic noise at Belfast Aerodrome.

ii) The main noise sensitive receptors in the area are as follows (refer also to Figure 3 and Section 2.6) are the residential areas of eMakhazeni (Belfast), Siyathuthuka township, farm houses, farm labourer residences, Hudaco Village, schools, crèches, clinics, and hospitals listed in Section 2.4 and as shown in Figure 3.

6.2 The Residual (Existing Ambient) Noise Climate

Measurements and *auditory observations* were taken in May 2012 at four main sites in order to establish the ambient noise conditions of the study area. For a detailed description of the main measurement sites and for more technical details of the measurement survey refer to Appendix B. Refer also to Figure B1.

Conditions for the daytime and evening periods were ascertained. The summary of all the noise measurements taken at the main sites is given in Table 1 and in Appendix B. The definitions/details of the noise descriptors for the measurements are given in Appendix A and Appendix B.

In order to complement the short-term noise measurements in the study area, the existing 24-hour residual noise levels related to the average daily traffic (ADT) flows on the main roads were also calculated. The noise levels at various offsets from the centreline of these roads are summarised in Table 9. See also Appendix B for more detail.

TABLE 9: EXISTING NOISE CLIMATE ADJACENT TO MAIN ROADS IN THE PAARDEPLAATS COLLIERY STUDY AREA (YEAR 2012 TRAFFIC)

Road	Noise Climate Alongside the Main Roads at Given Offset from Centreline (SANS 10103 Indicator) (dBA) Year 2012																				
	25m Offset			100m Offset			250m Offset			500m Offset			1000m Offset			2000m Offset			2500m Offset		
	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}	L_d	L_n	L_{dn}
N4	68.5	62.6	70.3	62.3	56.4	64.1	57.9	52.0	59.7	54.1	48.2	55.9	49.6	43.7	51.4	44.3	38.4	46.1	42.4	36.5	44.2
R33	60.5	54.6	62.3	54.3	48.4	56.1	49.9	44.0	51.7	46.1	40.2	47.9	41.6	35.7	43.4	36.3	30.4	38.1	34.4	28.5	36.2
Spitskop	56.6	50.8	58.5	50.4	44.6	52.3	46.0	40.2	47.9	42.2	36.4	44.1	37.7	31.9	39.6	32.4	26.6	34.3	30.5	24.7	32.4

A noise measurement survey was undertaken by the Glisa Colliery in 2010: *Environmental Noise Impact Assessment for the Exxaro Glisa Colliery on the Farm Paardeplaats 380 JT, Belfast*, by dBAcoustics. The prevailing ambient noise levels along the boundaries of the Glisa Colliery at the time of the survey were found by dBAcoustics to be as follows:

- Western Boundary: 33.9dBA for the daytime and 31.9dBA for the night-time.
- Southern boundary: 39.1dBA for the daytime and 42.3dBA for the night-time.
- Eastern Boundary: 47.9dBA for the daytime and 52.6dBA for the night-time.
- Northern boundary: 54.1dBA for the daytime and 47.6dBA for the night-time.

Detailed data from this survey have also been included in Appendix B for the sake of convenience.

In overview, the situation with respect to the existing *noise climate* in the study area was found to be as follows:

vii) Residual noise levels at the various farmhouses and farm labourers' dwellings are relatively low (quiet). Daytime ambient conditions across the area range from about 42dBA to 53dBA near the main road. In areas remote from the influence of road traffic noise, the evening conditions range from about 30dBA to 39dBA, while the night-time ambient levels fall even lower to about 25dBA in places. These are acceptable rural residential conditions (SANS 10103).

viii) Residual noise levels at the schools generally meet the noise standards required for educational purposes, namely 50dBA not exceed during school hours.

ix) The existing *noise climate* alongside the main roads is degraded with regard to rural residential living conditions. Residences in some areas are negatively impacted from traffic noise (particularly at night) for up to the following distances from these roads:

a) National Road N4 - 2300 metres.

b) Road R33 - 800 metres.

c) Spitskop Road - 500 metres.

x) The Middelburg - Nelspruit railway line is on the southern boundary of the development site, running parallel to and just to the north of the N4 and has very little influence on the ambient noise climate of the study area.

xi) The residual (existing background) noise levels are relatively low (quiet) in the residential areas of eMakhazeni (Belfast) and in Siyathuthuka.

xii) In general the residual noise levels in the undeveloped areas to the north-west of the proposed development site are low (that is, the areas are very quiet). The noise levels are typically representative of a rural farming area, namely where the average daytime noise levels do not exceed 45dBA and the night-time levels do not exceed 35dBA.

6.3 Noise Standards/Impact Criteria

From these findings and observations on site it was considered appropriate to apply the following noise standards and impact criteria to the study area:

i) Rural residential: the noise impact on the farmhouse sites and residences and guesthouses on farms in the area has been determined on the basis of rural residential district standards (SANS 10103), namely the daytime period ambient noise level should not exceed 45dBA and that for the night-time period should not exceed 35dBA. Measured levels indicate that parts of the (rural) study area are already severely degraded close to the main sources of noise.

ii) Suburban residential: the noise impact on eMakhazeni (Belfast), Siyathuthuka and Hudaco Village has been determined on the basis of suburban residential district standards (SANS 10103), namely the daytime period ambient noise level should not exceed 50dBA and that for the night-time period should not exceed 40dBA.

iii) Educational: the noise impact on the schools in the area have been determined on the basis that the daytime period ambient noise level should not exceed 50dBA and that for the night-time period should not exceed 40dBA.

The above indicates the ideal situation, where noise sensitive receptors are not already degraded by the existing (residual) noise climate. However, it is likely that the residual noise level at some of the noise sensitive receptors already exceeds the recommended maximum (e.g. next to major roads and the railway line). In order to assess the actual noise impact at any particular site, therefore, the residual noise climate has to be taken into account when determining impact. Where the noise level for a particular site is presently lower than the maximum ambient allowed (as indicated in SANS 10103) the recommended maximum shall not be exceeded by the introduction of the intruding noise. Where the noise level for the site is presently at or exceeds the maximum level allowed, the existing level shall not be increased by more than that indicated as acceptable in SANS 10103 (refer to Table A3 in Appendix A).

6.4 Assessment of the Pre-Construction Phase

Activities during the planning and design phase that normally have possible noise impact implications are those related to field surveys (such as seismic testing and geological test borehole drilling for prospecting purposes and/or investigation of founding conditions for large buildings/plant/equipment). As these activities are usually of short duration and take place during the day, they are unlikely to cause any major noise disturbance or nuisance in most adjacent areas.

6.5 Assessment of the Construction Phase

The potential noise climate was established in general for the construction of the works related to the Paardeplaats project and on Paardeplaats property, inclusive of appurtenant works. Construction camps and housing for construction workers will be established on site.

Although not all of the details of the planned surface workings and related infrastructure layouts have been finalised, where this is the case, general concepts have been used in the noise impact evaluation and these are adequate to provide a sound basis for the analysis of typical noise conditions and impacts that are likely to prevail on the project. Data related to construction have been sourced from various consultants and contractors, British Standard BS 5228 and the experience that JKA has had working on similar sites.

The daily construction related traffic will vary over the period of the construction. It has been estimated that the construction activities at the project site will on average generate no more than about 150 vehicle trips (two way trips) daily. The main percentage of the trips will be concentrated in the morning and evening peak periods.

Construction will likely be carried out during the daytime only (07h00 to 18h00 or 20h00). It should however be noted that certain activities may occasionally extend into the late evening period, while others such as de-watering operations may need to take place over a 24-hour period. It is estimated that the development of the project will take place over a period of about 12 months to 18 months.

6.5.1. ***Sources of Noise***

The following, where relevant, are likely to be the main construction related sources of noise for the planned surface workings and related infrastructure:

i) Construction camp establishment.

ii) Removal and demolition of existing infrastructure that is no longer needed or needs to be replaced.
iii) Earthworks to remove topsoil and overburden at opencast pit.
iv) Activities related to the relocation of services.
v) Excavation for storm water culverts and service trenches. Blasting may be required in places, but in general pneumatic breakers will be used where rock is encountered.
vi) Erection of shuttering for concrete works.
vii) Fixing of steel reinforcing.
viii) Placing and vibration of concrete. Poker vibrators will be used.
ix) Stripping of shuttering after concrete pour.
x) Erection of structural steelwork.
xi) General movement of heavy vehicles such as concrete delivery vehicles, mobile cranes, mechanical dumpers and water trucks (dust suppression) around the site.
xii) De-watering pumps. A 24-hour operation may sometimes be necessary.
xiii) Road construction equipment. Scrapers, dozers, compactors, etc. (Construction of the internal road system, access roads and the deviation of Road D2809).
xiv) Construction site fabrication workshops and plant maintenance workshops (if required).
xv) Concrete batching plant (this may not be necessary if ready-mix concrete is locally available).
xvi) Construction material and equipment delivery vehicles.

The level and character of the construction noise will be highly variable as different activities with different plant/equipment will take place at different times, over different periods, in different combinations, in different sequences and on different parts of the construction site. Typical noise levels generated by various types of construction equipment are given in Table 10. These noise levels assume that the equipment is maintained in good order. Conservative attenuation conditions (related to intervening ground conditions and screening) have been applied.

TABLE 10: TYPICAL NOISE LEVELS GENERATED BY CONSTRUCTION EQUIPMENT

Plant/Equipment	Typical Operational Noise Level at Given Offset (dBA)							
	5m	10m	25m	50m	100m	250m	500m	1000m
Air compressor	91	85	77	71	65	57	51	46
Compactor	92	86	78	72	66	58	52	46
Concrete batching plant	84	78	70	64	58	49	42	35
Concrete mixer	95	89	81	75	69	61	55	49
Concrete vibrator	86	80	72	66	60	52	46	40
Mobile Conveyor belt	77	71	63	57	51	43	37	32
Crusher (aggregate)	90	84	76	70	64	56	50	44
Crane (mobile)	93	87	79	73	67	59	53	47
Dozer	95	89	81	75	69	61	55	49
Loader	95	89	81	75	69	61	55	49
Mechanical shovel	98	92	84	78	72	64	58	52
Pile driver	110	104	97	91	85	77	71	65
Pump	86	80	72	66	60	52	46	40
Pneumatic breaker	98	92	84	78	72	64	58	52
Rock drill	108	102	94	88	82	74	68	62
Roller	84	78	70	64	58	50	44	38
Trucks	87	81	73	67	64	60	57	54

It is not possible to calculate exact daytime period and night-time period continuous equivalent sound pressure levels are with certainty at this stage as the final construction site layout, work programme for the various components, work *modus operandi* and type of equipment have not been finalised. Using baseline data from typical construction sites, the ambient noise conditions at various offsets from the following main construction activities are predicted:

- Noise from concrete batching plant (if required).
- General concrete construction in the various proposed infrastructure areas, for example storm water culverts.

Refer to Table 11.

TABLE 11: PREDICTED AMBIENT NOISE LEVELS AT GIVEN OFFSETS FROM SOME SPECIFIC CONSTRUCTION ACTIVITIES

Equipment	Sound pressure level at given offset(dBA)					
	500m	1000m	1500m	2000m	2500m	3000m
Concrete Batching Plant	53.6	46.0	41.1	37.5	34.7	32.3
Concreting Operations	57.2	49.1	43.9	40.1	37.1	34.6

6.5.2. ***Noise Impact***

The general nature of the noise impacts from the colliery construction sites is predicted to be as follows:

i) Source noise levels from many of the construction activities will be high. Noise levels from all work areas will vary constantly and in many instances significantly over short periods during any daytime working period.

ii) It is not possible to calculate exact daytime period and night-time period continuous equivalent sound pressure levels with certainty at this stage as the final construction site layout, work programme for the various components, work *modus operandi* and type of equipment have not been finalised. Working on a worst case scenario basis, it is estimated that the ambient noise level from general construction activities could negatively affect noise sensitive sites within a distance of 1300 metres of the construction site. Refer to Table 10. Night-time construction could have a significant impact on noise sensitive sites within a radius of 3000 metres of the construction site.

iii) There are likely to be significant noise nuisance effects during the day from intermittent loud noises on people living in the area. If there is any night-time construction, fairly significant impacts will be experienced.

iv) It has been estimated that the construction activities at the colliery site will on average generate no more than about 150 vehicle trips (two way trips) daily. The main percentage of the trips will be concentrated in the morning and evening peak periods. In general, the construction traffic will have a relatively minor effect on the noise climate alongside the main external roads in the area. Because of the character of the traffic (namely heavy vehicles), there is likely to be some noise nuisance factor with the passing of each vehicle at noise sensitive receptors along the access routes. This is particularly so at night with heavy delivery trucks.

Sections of the Paardeplaats Road (Road D2809) may have to be re-aligned at places where these servitudes will be affected by the new mine. No details of the proposed re-alignments are available at this stage. However, when greater clarity of the sequence of mining has been ascertained these re-alignments will need to be considered within the EIA.

The general nature of the noise impacts from road construction (internal haul roads, access roads and re-alignment of Paardeplaats Road) activities is predicted to be as follows:

i) The level and character of the construction noise will be highly variable as different activities with different plant/equipment take place at different times, over different periods, in different combinations, in different sequences and on different parts of the construction site.

ii) As no specific construction details or possible locations of major ancillary activity sites are available at this stage, the anticipated noise from various types of construction activities cannot be calculated accurately. In general at this stage, the typical noise levels of construction equipment at a distance of 15 metres will lie in the range of 75 decibels (dBA) to 100dBA. Refer also to Table 10. Based on data from similar "linear" construction sites, a one-hour equivalent noise level of between 75dBA and 78dBA at a point 50 metres from the construction would be typical for the earthmoving phase.

It should be noted that higher ambient noise levels than recommended in SANS 10103 are normally accepted as being reasonable during the construction period, provided that the very noisy construction activities (refer to Table 11) are limited to the daytime and that the contractor takes reasonable measures to limit noise from the work site. Note that it has been assumed that construction will generally take place from 06h00 to 18h00 with no activities (or at least no noisy construction activities) at night. From the details presently available, it appears that the construction noise impact is not likely to be severe. There is potential for impact at several sites in the immediate vicinity of the construction site, namely the school at the intersection of Paardeplaats Road (Road D2809) and Road N4, farmhouses and farm workers' dwellings.

In summary, the impact of the construction phase for the three alternatives will be as follows:
Sensitivity Planning Approach Alternative: There is a potential for several noise sensitive receptors to be impacted by construction noise from this open cast pit configuration (albeit at different periods of mining), and specifically during the night-time period. The noise impact of this alternative is relatively smaller than that of the Maximum Mine Production Alternative, and there are fewer NSRs that could potentially be affected in the southern sector of the study area.

- Maximum Mine Production Alternative: There is a potential for several noise sensitive receptors to be impacted by the construction noise from this pit configuration (albeit at different periods of mining), and specifically during the night-time period. The noise impact of this configuration is relatively larger than that of the Sensitivity Planning Approach Alternative, and there are more NSRs that could potentially affected in the southern sector of the study area.
- No Go Alternative: There will be no change in the existing ambient noise climate of the study area.

6.6 Assessment of the Operational Phase

6.6.1. *Sources of Noise*

The main sources of background noise in the area are as indicated in Section 4.1(i). In general, it is not anticipated that the noise levels from these existing sources will increase significantly in the future, with the exception of road traffic noise. The noise generated by the new Paardeplaats Project, the surface workings and mine generated traffic will be added to the noise climate prevailing in the area.

6.6.2. *Noise Sensitive Areas*

The main noise sensitive receptors in the area are as indicated in Section 2.5.

6.6.3. *Noise Climate generated by the Paardeplaats Project*

6.6.3.1. Open Cast Pits Mining Operation

The ROM will be transported to the existing beneficiation plant at the Glisa Mine. The noise from the process plant has therefore not been taken into consideration as part of the new Paardeplaats Project.

Three alternatives have been analysed, namely

- The mining of only Portion 30 of the coal body in the north-western portion of the site. EIMS named this the Sensitivity Planning Approach Alternative.
- The mining of the entire coal body, named the Maximum Mine Production Alternative.
- The No Go Alternative.

The analysis of the noise impact of the operational phase of the project has focused on the critical noise footprint (i.e. the area contained within the 35dBA noise contour) of the opencast pit. The noise contours in the figures reflect the worst meteorological conditions, namely when temperature inversion occurs. The same analysis parameters were used for the Sensitivity Planning Approach Alternative and the Maximum Mine Production Alternative.

The 35dBA ambient noise contour (envelope) demarcates the outer limit of impact for rural residential living according to SANS 10103. The instantaneous noise footprint of the opencast pit will move within this envelope as mining progresses. There are some short-term noises that may, at times, be heard beyond the indicated positions of the respective 35dBA contours, for example blasting and workshop noise.

All the calculated noise profiles as shown in Figures 4 and 5 and in Table 12 reflect a worst condition scenario (conservative) approach. The noise levels given are for unmitigated

conditions. In reality there will be greater attenuation with distance than shown where there are houses, other buildings, vegetation and terrain restraints in the intervening ground between the source and the receiver point.

The mining method will be a hybrid between roll-over mining as well as bench/box cut mining (refer to Section 1.4). The coal is to be taken directly by truck to the primary crusher located at the beneficiation plant at the Glisa Mine. Here the coal will be crushed, sorted and washed before being exported.

Certain of the sounds generated from the open pit operations will be continuous (over 24-hours) while others will be intermittent. The loudest of the continuous noise sources will be from:

i) Pneumatic drills (for blast holes).
ii) Excavators, loaders and bull-dozers.
iii) Dewatering pumps.
iv) Coal haul trucks.

The intermittent noises will be from:

i) Blasting.
ii) Ancillary transport in pit (blasting truck, service truck, water truck, supervisory vehicles).
iii) Coal haul trucks between mine and surface workings.

The ambient noise climate (noise profile) that will be generated by virtually continuous mining operations at each of the alternatives is predicted to be as indicated in Table 12. The offsets from the edges of the pits are shown in the table. These conditions could occur in the daytime or night-time under specific meteorological conditions. These are the unmitigated conditions.

It should also be noted that the mining operation will not extend over the whole area of the planned pit at any one time, but the area will be mined incrementally. This will mean that there will not be a static noise footprint from the mining operations. As well as moving in plan, the noise levels from the respective sections being mined will also vary (noise will decrease) as the depth of the pit increases due to the shielding from the sidewalls of the excavation and if berms are built.

The noise footprint shown for each respective scenario, namely in Figure 4 (Sensitivity Planning Approach) and Figure 5 (Maximum Mine Production), is for the mining operations over the full mining period for that specific pit. It is the ***total*** noise envelope covering the noise generated by

each of these pit scenarios for ***all situations over the full LOM of that pit***. It indicates the worst situation that could occur at any specific receiver point (but only for a specific period of the mining operation).

As the mining operation is virtually continuous over 24 hours, the activities will remain similar over this period, and therefore contours of the noise generated for the daytime and night-time periods (as defined by SANS 10103) will be the same.

TABLE 12: PREDICTED AMBIENT NOISE CONDITIONS FROM OPERATIONS AT THE PAARDEPLAATS PROJECT: OPENCAST PIT AREAS (UNMITIGATED)

Time Period	Sound pressure level at given offset (dBA)							
	100m	**500m**	**1000m**	**2000m**	**3000m**	**4000m**	**5000m**	**6100m**
Daytime (06h00 – 22h00) $L_{Req,d}$	78.9	64.0	57.1	49.6	44.7	41.0	37.9	35.1
Night (22h00 – 06h00) $L_{Req,n}$	78.9	64.0	57.1	49.6	44.7	41.0	37.9	35.1

The noise levels from blasting are likely to be very loud at noise sensitive receptors that are relatively close to the opencast pits. For details of the noise impact from blasting activities, refer to specialist report on blasting impact.

6.6.3.2. Dumps and Stockpiles

No details have been provided on the position of dumps and stockpiles on the Paardeplaats Project property. Typically noise at dumps and stockpiles is generated when trucks dump the load and the material is worked into an orderly dump by means of bulldozers and front-end loaders.

Certain of the sounds generated by dump operations will be virtually continuous (over 24-hours) while others will be intermittent. The loudest of the continuous noise sources will be from bulldozers and front-end loaders. The intermittent noises will be from haul trucks up to the dump.

The ambient noise climate (noise profile) that will be generated by typical operations at the dump (as described above) are predicted to be as indicated in Table 13. The daytime and night-time conditions at various offsets from the centre of operations are shown. These are the unmitigated conditions.

As the dumping operations will be virtually continuous over 24 hours, the activities will remain similar over this period, and therefore contours of the noise generated for the daytime and night-time periods (as defined by SANS 10103) will be the same.

TABLE 13: PREDICTED AMBIENT NOISE CONDITIONS FROM OPERATIONS AT DUMPS AND STOCKPILES (UNMITIGATED)

Time Period	Sound pressure level at given offset (dBA)							
	500m	1000m	1500m	2000m	2500m	3000m	3500m	4000m
Daytime (06h00-22h00) $L_{Req,d}$	57.2	50.2	45.9	42.7	40.0	37.8	35.8	34.1
Night (22h00-06h00) $L_{Req,n}$	57.2	50.2	45.9	42.7	40.0	37.8	35.8	34.1

Dependent on their location, there is a potential for several noise sensitive receptors to be impacted by the operations at dumps and stockpiles (albeit at different periods of the life of the mine).

6.6.3.3. Internal Haul Roads

Coal will be hauled by truck from the pit to the beneficiation plant at the Glisa Mine. The haul roads internal to the pit (both alternatives) have their exits from the pit on the northern corner of Portion 30. The haul road external to the pit to the Glisa Mine beneficiation plant is likely to be aligned from this point in a north-easterly direction directly to the beneficiation plant. Refer to Figure 2.

There are no details at this stage of the rate of haulage, that is, there are no details on the number of trucks per hour on the haul route. The maximum noise from a truck (loaded en route to the beneficiation plant and unloaded on the return trip) at various distances from the source are given in Table 14.

TABLE 14: NOISE LEVELS FROM HAUL TRUCKS (UNMITIGATED)

Condition	Sound pressure level at given offset (dBA)						
	100m	500m	1000m	1500m	2000m	2500m	3000m
Loaded	67.7	52.8	45.9	41.5	38.5	35.6	33.4
Unloaded	43.9	28.7					

6.6.4. ***Mine Generated Traffic***

It has been estimated by the traffic engineers that the new mining operations will generate approximately 326 external vehicle trips per day, 77 of which are light vehicles and 249 of which are heavy vehicles. These heavy vehicles are primarily those transporting the final product (ex the Paardeplaats Project) from the Glisa beneficiation plant to external destinations. The analysis of the traffic breakdown on Spitskop Road is given in Table 15. The mine-generated

traffic will increase the noise climate along Spitskop Road by 1.3dBA, from 61.2dBA to 62.5dBA (at an offset of 25 metres).

TABLE 15: ANALYSIS OF MINE GENERATED TRAFFIC ON SPITSKOP ROAD

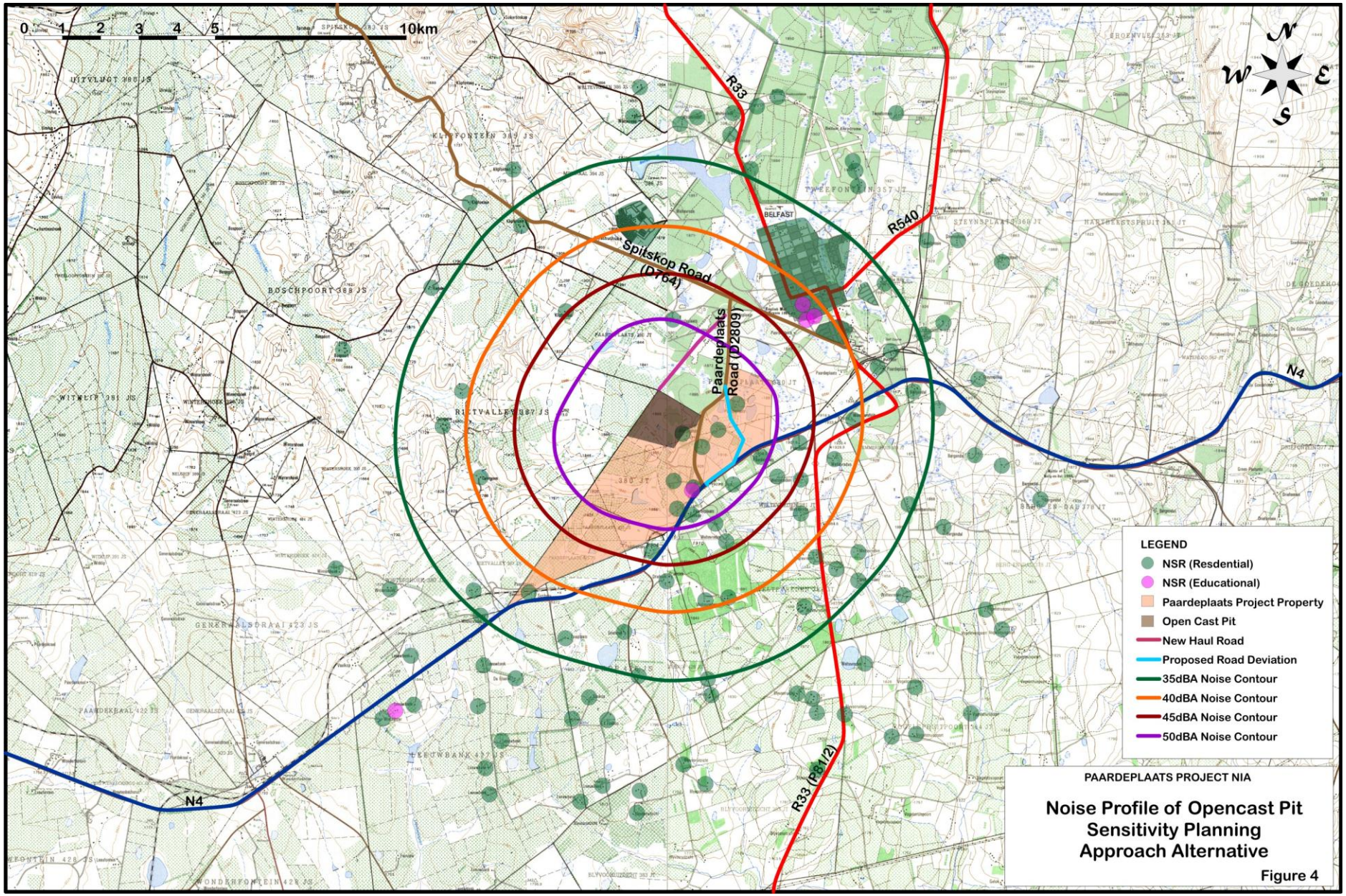
Description	Year	Traffic Composition (Vehicles per day)			
		Total	Light Vehicles	Heavy Vehicles	% Heavy
Average Daily Traffic (ADT)	2012	920	644	276	30
ADT Background Traffic	2022	1103	772	330	30
ADT Paardeplaats Project	2022	326	77	249	76
ADT Glisa expansion mine heavy vehicles	2022	272	0	271	100
ADT Total mine traffic (Glisa + Paardeplaats)	2022	597	78	520	87
ADT Background 2022 + Glisa	2022	1375	774	601	43.7
ADT Total 2022 (Background+Glisa+Paardeplaats)	2022	1701	851	850	50

The main impact of the heavy vehicles will occur during a single bypass of a truck, during which time annoyance may be experienced.

6.6.5. ***Noise Impact***

- Sensitivity Planning Approach Alternative: There is a potential for several noise sensitive receptors to be impacted by the mining operation noise from this pit configuration (albeit at different periods of mining), and specifically during the night-time period. Refer to Figure 4. The noise footprint of this configuration is relatively smaller than that of the Maximum Mine Production Alternative, and there are less NSRs affected in the southern sector of the study area.
- Maximum Mine Production Alternative: There is a potential for several noise sensitive receptors to be impacted by the mining operation noise from this pit configuration (albeit at different periods of mining), and specifically during the night-time period. Refer to Figure 5. The noise footprint of this configuration is relatively larger than that of the Sensitivity Planning Approach Alternative, and there are more NSRs affected in the southern sector of the study area.
- No Go Alternative: There will be no change in the existing ambient noise climate of the study area.

The noise contours for both operational alternatives represent the total noise envelope covering all situations over the full mining period (life of mine) in each case. The noise levels from blasting are likely to be very loud at noise sensitive receptors relatively close to the opencast pit and can create a major noise nuisance. This will be dependent on the times and frequency of blasting.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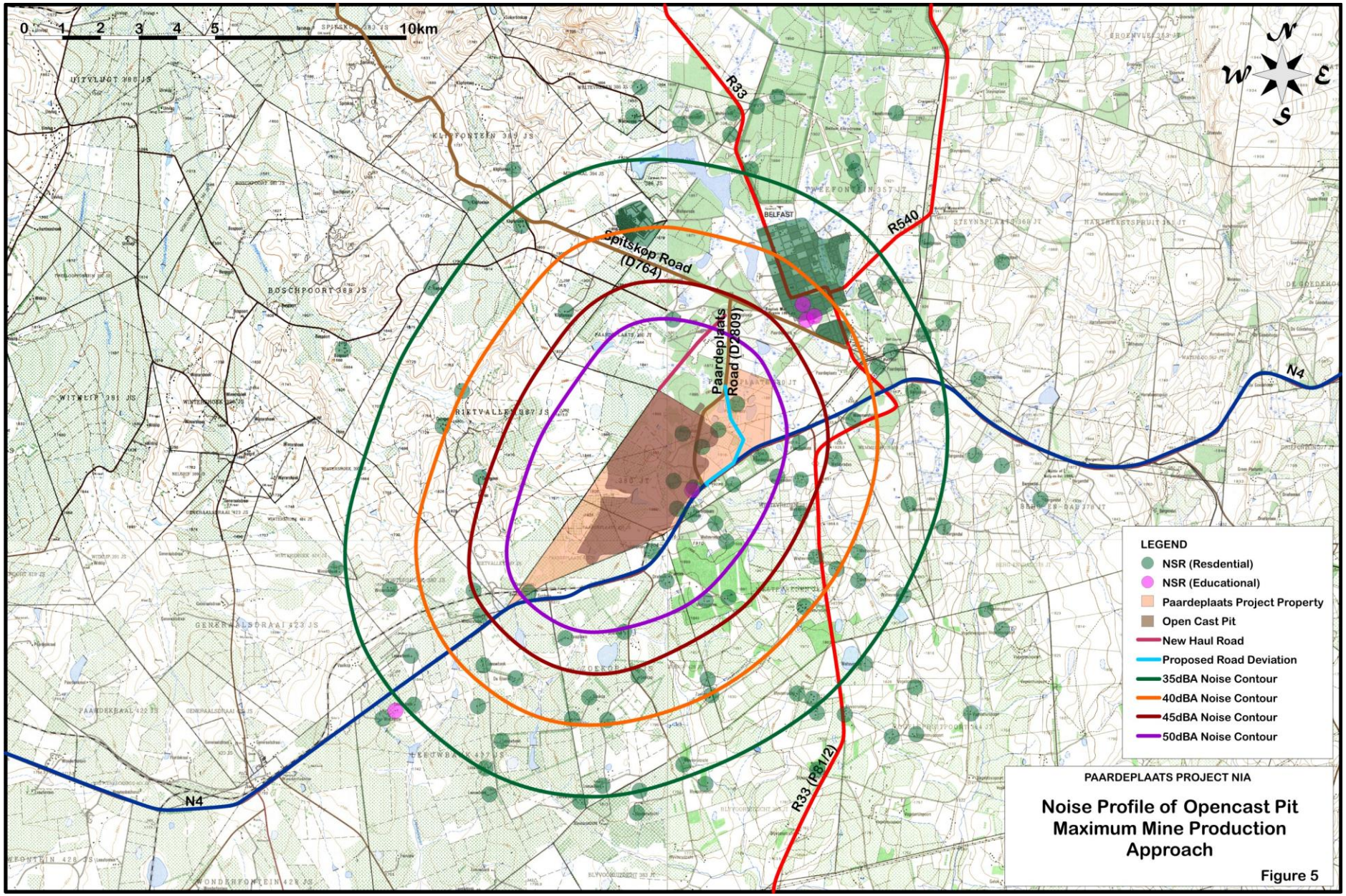
R33 (P81/2)
LEGEND
NSR (Resdential)
NSR (Educational)
Paardeplaats Project Property
Open Cast Pit
New Haul Road
Proposed Road Deviation
35dBA Noise Contour
40dBA Noise Contour
45dBA Noise Contour
50dBA Noise Contour
PAARDEPLAATS PROJECT NIA
Noise Profile of Opencast Pit
Sensitivity Planning
Approach Alternative
Figure 4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Paardeplaats Project Property
Open Cast Pit
New Haul Road
Proposed Road Deviation
35dBA Noise Contour
40dBA Noise Contour
45dBA Noise Contour
50dBA Noise Contour
PAARDEPLAATS PROJECT NIA
Noise Profile of Opencast Pit
Maximum Mine Production
Approach
Figure 5

6.7 Noise Impact of Decommissioning, Closure and Rehabilitation Phase

Activities that will take place during this phase are the demolition and removal of infrastructure used during the operational phase, the infilling of the open cast pit (areas not handled by the roll-over procedure during operations) from discard dumps and the rehabilitation of the surface area of the pit (relay of the topsoil from the storage areas and revegetation of the area).

Typical equipment that will be used during this phase and the noise levels generated by same are given in Table 16:

TABLE 16: TYPICAL NOISE LEVELS GENERATED BY EQUIPMENT REQUIRED DURING CLOSURE AND REHABILITATION

Plant/Equipment	Typical Operational Noise Level at Given Offset (dBA)							
	5m	10m	25m	50m	100m	250m	500m	1000m
Air compressor	91	85	77	71	65	57	51	46
Compactor	92	86	78	72	66	58	52	46
Mobile Conveyor belt	77	71	63	57	51	43	37	32
Dozer	95	89	81	75	69	61	55	49
Loader	95	89	81	75	69	61	55	49
Mechanical shovel	98	92	84	78	72	64	58	52
Water pump	86	80	72	66	60	52	46	40
Pneumatic breaker	98	92	84	78	72	64	58	52
Roller	84	78	70	64	58	50	44	38
Trucks	87	81	73	67	64	60	57	54

Source noise levels will be high. The level and character of the noise during this phase will be highly variable as different activities with different equipment will take place at different times, over different periods, in different combinations, in different sequences and on different parts of the site. These noise levels assume that the equipment is maintained in good order. Conservative attenuation conditions (related to intervening ground conditions and screening) have been applied.

In summary, the impact of the closure and rehabilitation phase for the three alternatives will be as follows:

- Sensitivity Planning Approach Alternative: There is a potential for several noise sensitive receptors to be impacted by noise generated by activities during the closure and rehabilitation phase from this pit alternative, and specifically during the night-time period.

The noise impact of this alternative is relatively smaller than that of the Maximum Mine Production Alternative, and there are fewer NSRs that could potentially be affected in the southern sector of the study area.

- Maximum Mine Production Alternative: There is a potential for several noise sensitive receptors to be impacted by noise generated by activities during the closure and rehabilitation phase from this pit alternative, and specifically during the night-time period. The noise impact of this configuration is relatively larger than that of the Sensitivity Planning Approach Alternative, and there are more NSRs that could potentially be affected in the southern sector of the study area.
- No Go Alternative: There will be no change in the existing ambient noise climate of the study area.

7 RISK RATING

Based on the procedure described in Section 3.5, the risk rating regarding environmental noise is as shown in Tables 17-20 (Sensitivity Planning Approach 1), Tables 21-24 (Maximum Mine Production Approach). The No Go Alternative will have no noise impacts on the study area.

TABLE 17: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: SENSITIVITY PLANNING APPROACH – PRE-CONSTRUCTION PHASE

Impact name:	*Noise*				
Phase:	*Preconstruction*				
Alternative:	*Sensitivity Planning Approach*				
Description of impact:	*Noise disturbance and noise nuisance from seismic testing and geological test borehole drilling for prospecting purposes*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	1	1
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	2	2
Environmental Risk (Pre-mitigation)					**-3.5**
Environmental Risk (Post-mitigation)					**-3.5**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
Insignificant cumulative effects					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-3.5**
Recommended Mitigation Measures					
Provide portable acoustic screens to enclose the drill rigs and compressors where necessary					

TABLE 18: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: SENSITIVITY PLANNING APPROACH – CONSTRUCTION PHASE

Impact name:	*Noise*				
Phase:	*Construction*				
Alternative:	*Sensitivity Planning Approach*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	2	2
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	3	3
Environmental Risk (Pre-mitigation)					**-6**
Environmental Risk (Post-mitigation)					**-6**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be minor cumulative effects with noise from the Glisa Colliery, the N4, Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-6**
Recommended Mitigation Measures					
• Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. *• All construction vehicles and equipment are to be kept in good repair.* *• Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers, poker vibrators).* *• Construction activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.* *• With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.* *• Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.* *• In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).* *• Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.*					

TABLE 19: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: SENSITIVITY PLANNING APPROACH – OPERATIONAL PHASE

Impact name:	*Noise*				
Phase:	*Operation*				
Alternative:	*Sensitivity Planning Approach*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	3	3
Extent of Impact	3	3	Reversibility of Impact	3	3
Duration of Impact	4	4	Probability	4	4
Environmental Risk (Pre-mitigation)					**-13**
Environmental Risk (Post-mitigation)					**-13**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be cumulative effects with noise from the Glisa Mine, the N4, Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-13**
Recommended Mitigation Measures					
• With drilling operations in preparation for blasting in the pit, portable acoustic shields should be considered to enclose the drills. *• The insulation of particularly noisy equipment.* *• The stockpiles of spoil rock and overburden (berms) from the opencast pit excavations should, where possible, be used as interim or long-term noise attenuation barriers. Berms should particularly be considered around the whole periphery of the pit.* *• Where possible, very noisy activities should not take place at night (between the hours of 20h00 to 06h00). Specifically, blasting should take place to a regular programme and should be restricted to the period between 08h00 and 16h00.* *• All equipment and vehicles are to be kept in good repair.*					

TABLE 20: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: SENSITIVITY PLANNING APPROACH – DECOMMISSIONING PHASE

Impact name:	*Noise Impact*				
Phase:	*Closure*				
Alternative:	*Sensitivity Planning Approach*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	3	3
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	3	3
Environmental Risk (Pre-mitigation)					**-6.75**
Environmental Risk (Post-mitigation)					**-6.75**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be minor cumulative effects with the noise from the Glisa mine, the N4, Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-6.75**
Recommended Mitigation Measures					
• Maintenance facilities and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. *• All construction vehicles and equipment are to be kept in good repair.* *• Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers).* *• Demolition activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.* *• With regard to unavoidable very noisy demolition activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.* *• Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.* *• In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).* *• Staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.*					

TABLE 21: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: MAXIMUM MINE PRODUCTION APPROACH – PRE-CONSTRUCTION PHASE

Impact name:	*Noise*				
Phase:	*Preconstruction*				
Alternative:	*Maximum Mine Production*				
Description of impact:	*Noise disturbance and noise nuisance from seismic testing and geological test borehole drilling for prospecting purposes*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	1	1
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	2	2
Environmental Risk (Pre-mitigation)					**-3.5**
Environmental Risk (Post-mitigation)					**-3.5**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
Insignificant cumulative effects					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-3.5**
Recommended Mitigation Measures					
Provide portable acoustic screens to enclose the drill rigs and compressors where necessary					

TABLE 22: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: MAXIMUM MINE PRODUCTION APPROACH – CONSTRUCTION PHASE

Impact name:	*Noise*				
Phase:	*Construction*				
Alternative:	*Maximum Mine Production Approach*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	2	2
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	3	3
Environmental Risk (Pre-mitigation)					**-6**
Environmental Risk (Post-mitigation)					**-6**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be minor cumulative effects with noise from the Glisa Colliery, the N4 Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-6**
Recommended Mitigation Measures					
• Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. *• All construction vehicles and equipment are to be kept in good repair.* *• Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers, poker vibrators).* *• Construction activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.* *• With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.* *• Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.* *• In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).* *• Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.*					

TABLE 23: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: MAXIMUM MINE PRODUCTION APPROACH – OPERATIONAL PHASE

Impact name:	*Noise*				
Phase:	*Operation*				
Alternative:	*Maximum Mine Production*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	3	3
Extent of Impact	3	3	Reversibility of Impact	3	3
Duration of Impact	4	4	Probability	4	4
Environmental Risk (Pre-mitigation)					**-13**
Environmental Risk (Post-mitigation)					**-13**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be cumulative effects with noise from the Glisa Mine, the N4, Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-13**
Recommended Mitigation Measures					
• With drilling operations in preparation for blasting in the pit, portable acoustic shields should be considered to enclose the drills. *• The insulation of particularly noisy equipment.* *• The stockpiles of spoil rock and overburden (berms) from the opencast pit excavations should, where possible, be used as interim or long-term noise attenuation barriers. Berms should particularly be considered around the whole periphery of the pit.* *• Where possible, very noisy activities should not take place at night (between the hours of 20h00 to 06h00). Specifically, blasting should take place to a regular programme and should be restricted to the period between 08h00 and 16h00.* *• All equipment and vehicles are to be kept in good repair.*					

TABLE 24: NOISE IMPACT RISK ASSESSMENT FOR PAARDEPLAATS: MAXIMUM MINE PRODUCTION APPROACH – DECOMMISSIONING PHASE

Impact name:	*Noise Impact*				
Phase:	*Closure*				
Alternative:	*Maximum Mine Production*				
Description of impact:	*Noise disturbance and noise nuisance at urban and rural noise sensitive receptors*				
Environmental Risk					
Attribute	**Pre-mitigation**	**Post-mitigation**	**Attribute**	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1	Magnitude of Impact	3	3
Extent of Impact	3	3	Reversibility of Impact	2	2
Duration of Impact	1	1	Probability	3	3
Environmental Risk (Pre-mitigation)					**-6.75**
Environmental Risk (Post-mitigation)					**-6.75**
Degree of confidence in impact prediction:					Medium
Impact Prioritisation					
Public Response					1
EIMS WILL COMPLETE					
Cumulative Impacts					1
There will be minor cumulative effects with the noise from the Glisa mine, the N4, Route R33 and Spitskop Road					
Degree of potential irreplaceable loss of resources					1
Not applicable					
Prioritisation Factor					1
Final Significance					**-6.75**
Recommended Mitigation Measures					
• Maintenance facilities and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites. *• All construction vehicles and equipment are to be kept in good repair.* *• Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers).* *• Demolition activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.* *• With regard to unavoidable very noisy demolition activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.* *• Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.* *• In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).* *• Staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.*					

8 MITIGATION MEASURES SUGGESTED AND REQUIRED ACTION PLANS

Potential noise mitigation measures for the project were identified. These are presented in concept only.

8.1 Pre-construction Phase

Local residents should be notified of any potentially noisy field survey works or other works during the planning and design phase and these activities should be undertaken at reasonable times of the day. These works should not take place at night or on weekends. Provide portable acoustic screens to enclose the drill rigs and compressors where necessary. Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.

During this phase, consideration must be given to the noise mitigation measures required during the construction phase and which should be included in the tender document specifications and the design.

8.2 Construction Phase

The noise mitigation measures to be considered during the construction phase are as follows:

i) Construction site yards and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites.

ii) All construction vehicles and equipment are to be kept in good repair.

iii) Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers, poker vibrators).

iv) Construction activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.

v) With regard to unavoidable very noisy construction activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.

vi) Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.

vii) In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).

viii) Construction staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.

8.3 Operational Phase

The following noise mitigation measures, which will need to be considered where appropriate, are indicators of what needs to be done to reduce or control the noise generated by the operations at the mine:

i) The design of all major equipment for the colliery is to incorporate all the necessary acoustic design aspects required in order that the overall generated noise level from the new installation does not exceed a maximum equivalent continuous day/night rating level (L_{Rdn}), namely a noise level of 70dBA (just inside the *property projection plane*, namely the property boundary of the colliery) as specified for industrial districts in SANS 10103. Refer to Appendix A. Notwithstanding this provision, the design is also to take into account the maximum allowable equivalent continuous day and night rating levels of the land use type of potentially impacted sites outside the Paardeplaats Project property. Where the noise level at such an external site is presently lower than the maximum allowed, the maximum shall not be exceeded. Where the noise level at the external site is presently at or exceeds the maximum, the existing level shall not be increased by more than indicated as acceptable in SANS 10103.

ii) The latest technology incorporating maximum noise mitigation measures for components of the complex should be designed into the system. Ideally, equipment should meet the following specification: the sound power level (LW) should be such that the sound pressure level (SPL – i.e. the noise level) measured at 1 metre from the surface of the given equipment should not exceed 85dBA. When ordering equipment, manufacturers should be requested to provide details of the sound power level. Where possible, those with the lowest sound power level (most quiet) should be selected.

iii) The design process is to consider, *inter alia*, the following aspects:
   a) The position and orientation of buildings on the site, if relevant.
   b) The design of the buildings to minimise the transmission of noise from the inside to the outdoors.
   c) The insulation of particularly noisy equipment.

iv) The stockpiles of spoil rock and overburden (berms) from the opencast pit excavations should, where possible, be used as interim or long-term noise attenuation barriers. Berms should particularly be considered around the whole periphery of the pit.

v) All equipment and vehicles are to be kept in good repair.

vi) Where possible, very noisy activities should not take place at night (between the hours of 20h00 to 06h00). Specifically, blasting should take place to a regular programme and should be restricted to the period between 08h00 and 16h00.

vii) With drilling operations in preparation for blasting in the pit, portable acoustic shields should be considered to enclose the drills.

8.4 Decommissioning, Closure and Rehabilitation Phase

The noise mitigation measures to be considered during the decommissioning, closure and rehabilitation phase are as follows:

i) Maintenance facilities and other noisy fixed facilities should be located well away from noise sensitive areas adjacent to the development sites.

ii) All construction vehicles and equipment are to be kept in good repair.

iii) Where possible, stationary noisy equipment (for example compressors, pumps, pneumatic breakers,) should be encapsulated in acoustic covers, screens or sheds. Proper sound insulation can reduce noise by up to 20dBA. Portable acoustic shields should be used in the case where noisy equipment is not stationary (for example drills, angle grinders, chipping hammers).

iv) Demolition activities, and particularly the noisy ones, are to be confined to reasonable hours during the day and early evening.

v) With regard to unavoidable very noisy demolition activities in the vicinity of noise sensitive areas, the mine should liaise with local residents on how best to minimise the impact.

vi) Machines in intermittent use should be shut down in the intervening periods between work or throttled down to a minimum.

vii) In general, operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No 85 of 1993).

viii) Staff working in areas where the 8-hour ambient noise levels exceed 75dBA should wear ear protection equipment.

It should be noted that any mitigation measures taken at the development sites at the mine and transport route will limit the impacts in the specific areas designed for, but will not necessarily contribute to improving the degraded noise climates in adjacent areas where there is already a problem.

9 RECOMMENDATIONS

The following are recommended:

i) The National Noise Control Regulations and SANS 10103:2008 should be used as the main guidelines for addressing any further noise issues on this project.

ii) Various measures to reduce the potential noise impact from the surface workings at the Paardeplaats Project are possible, and the mitigation measures indicated in Section 7 need to be considered.

iii) The noise mitigation measures will need to be designed and/or checked by an acoustical engineer in order to optimise the design parameters and ensure that the cost/benefit of the measure is optimised.

iv) Once the layout and infrastructure at the proposed pit is finalised and the actual noise profile of plant and equipment is known, the position of the noise contours should be checked.

v) At commissioning of the project, the noise footprint of the selected opencast pit option should be established by measurement in accordance with the relevant standards, namely SANS ISO 8297:1994 and SANS 10103. The character of the noise (qualitative aspect) should also be checked to ascertain whether there is any nuisance factor associated with the operations.

vi) Noise Monitoring Guidelines should be developed for the construction and operational phases of the project. The following details and issues should be addressed:

- General Details of the Colliery
- Noise Area of Influence
- Residual (Baseline) Noise Climate of the Study Area
- Noise Standards/Impact Criteria
- Noise Measurement Procedures
- Selection of Noise Monitoring/Measurement Sites
- Length of Measurement Period
- Frequency of Monitoring Measurement
- Measurement Data Requirements.

10 CONCLUSIONS

The following conclusions may be drawn from the foregoing analysis:

i) The study area is one of changing character. Previously, and still in some areas, the main land use is agricultural and a rural noise climate prevails. However, west of eMakhazeni (Belfast) there has been a significant development of coal mines along the N4 Freeway.

ii) Residual noise levels at the various farmhouses and farm labourers' dwellings which are remote from the main roads and the mines are relatively low (quiet). Daytime ambient conditions across the area range from about 42dBA to 53dBA near the main road. Evening conditions range from about 30dBA to 39dBA, while the night-time ambient levels fall even lower to about 25dBA in places. These are acceptable rural residential conditions (SANS 10103).

iii) Residual noise levels at some of the schools do not meet the noise standards required for educational purposes, namely they exceed 50dBA during school hours.

iv) There are numerous noise sensitive receptors in the area that potentially will be impacted by the mining of the new pit, namely schools, farmhouses, farm workers' dwellings, eMakhazeni (Belfast) and Siyathuthuka.

v) The existing *noise climate* alongside many of the roads through the area is degraded with regard to residential living.

vi) The operations at the Glisa Mine to the north of the planned Paardeplaats Project have raised ambient noise levels in this sector of the study area significantly.

vii) There will be very loud and short term noises (for example blasting) from sections of the colliery that will at times be heard well beyond the indicated positions of the respective 35dBA contours and the total 35dBA contour envelope of the operation.

viii) There are measures that can be introduced to mitigate some of the impact of the operational noise, but in general the development of the Paardeplaats Project will alter the noise profile and character of the area significantly. Adverse noise conditions can be expected, especially at night.

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Proposed Paardeplaats Coal Mine

Social Impact Assessment

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Executive Summary

The purpose of this document is to provide a baseline description of the receiving socio-economic environment, to identify social impacts and to suggest mitigation and management measures for the proposed Paardeplaats Coal Mine project.

The proposed Paardeplaats coal mine is located on Portions 28, 29, 30 and 40 of the farm Paardeplaats 380 JT; Remaining Extent of Portion 2 of the farm Paardeplaats 425 JS; and Portion 13 of the farm Paardeplaats 380 JT. The proposed site covers an area of approximately 1 415 ha and falls within the jurisdiction of the Emakhazeni Local Municipality in the Nkangala District Municipality.

Three alternatives are being investigated for the proposed project, namely:

- The No Go option;
- Mining only Portion 30; and
- Mining as per the mining schedule.

A number of stakeholder groups have been identified and the following groups are seen as sensitive receptors:

- Hadeco and Hadeco Village;
- Siyathuthuka;
- The town of Belfast; and
- Neighbouring farmers and farm workers.

The dominant economic activity in the Emakhazeni Local Municipality is farming and there are a number of small towns in the area that serve as service centres for the agricultural sector, namely:

- Emakhazeni (Belfast) and Siyathuthuka;
- Dullstroom and Sakhelwe;

- Entokozweni (Machadodorp) and Emthonjeni;
- Waterval-Boven and Emgwenya.

The area has a high environmental and aesthetical value with numerous wetlands and sensitive environmental areas, particularly around Dullstroom and is popular for fly-fishing.

Most people in the area are fairly poor with a relatively low standard of living and high levels of unemployment. Educational and skills levels are not very high. Infrastructure is generally not in a good condition and often not well maintained. There is shortage of proper health and educational facilities, as well as of other types of facilities such as sports and recreational.

A number of potential social impacts have been identified for the different alternatives for the project. The three alternatives as well as recommendations relating to each alternative is summarised below:

The No Go option

The No Go option means that no mining will take place on the proposed Paardeplaats site and current activities on the site can continue as per usual. As the proposed mining activities is intended as an expansion of the Glisa mine, it also means that the Glisa mine will have to close down in a few years and this would result in job losses. The impact of No Go option, and the resultant closure of the Glisa mine, is mainly economic and will be de discussed in more detail in the economic impact assessment. From a social perspective, the measures stipulated in the Social and Labour Plan relating to closure should be adhered to, to support employees of the Glisa mine.

As there currently seems to be trust issues with Exxaro that can affect their social license to operate, it is recommended that Exxaro implements a community relations programme and investigate the implementation of some of the other measures recommended for the other alternatives. It would be very important for

Exxaro to communicate in an open and transparent way that does not create the impression that they are only going through the motions.

Mining only Portion 30

Mining only on Portion 30 means that people currently residing on the remainder of the proposed site can continue to do so. For Portion 13 it means that they can in all likelihood continue with their activities as usual. Impacts experienced by residents of Portion 13 will be cumulative or similar to existing impacts such as cracks, vibrations, noise, dust, etc. The extent of impacts will be addressed in the relevant specialist studies and is mentioned in the SIA from a nuisance perspective.

Residents of the Hadeco Village as well as the clay village will not have to be relocated. Whether their livelihoods will be impacted on, will be determined by whether it will be possible for Hadeco to continue with their business in a viable way if mining takes place on Portion 30. Whether Hadeco will be able to continue with their business depends on the impact of the mining activities on bio-physical aspects such as the soil quality, air quality, water, etc. which falls outside the scope of the SIA. It is recommended that Exxaro enters in discussion with Hadeco on the impact of mining of Portion 30 on Hadeco's business activities as soon as possible.

The following potential impacts can be expected for this alternative:

- Increase in HIV/AIDS and other infectious diseases;
- Health impacts;
- Conflict between local residents and newcomers;
- Expectations regarding the benefits of the project;
- Skills development;
- Impact on infrastructure such as roads and housing;
- Blasting;

- Dust;
- Water pollution; and
- Co-operative governance.

The following recommendations are made for this alternative:

- Start a communication process with Hadeco as soon as possible to discuss and mitigate potential impacts.
- Form a partnership with a Non Profit organisation (NPO) to provide the necessary social services to people whose lives are affected by infectious diseases.
- Develop an in-house infectious diseases strategy to address health issues with the workforce.
- Align infectious diseases strategy with community HIV strategy followed by NPO.
- Follow mitigation measures suggested in bio-physical studies relating to dust to address potential health impacts.
- Implement community relations programme.
- Develop a business forum and ensure local SMME's are utilised for projects.
- Implement local procurement policy.
- Encourage and enable staff to live locally.
- Communicated frequently with affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.
- Ensure that local Emakhazeni communities are the beneficiaries of skills development initiatives.

- Implement the skills development initiatives that have been identified in the SLP.
- Establish a skills training centre as per the SLP.
- Engage with municipalities to discuss strategic long-term planning with regard to services such as road maintenance and housing.
- Coordinate the outcomes of the SLP with the IDPs of the municipalities.
- Become a member of the IDP Forum.
- Conduct a crack survey at properties within a certain radius from the mine.
- Explore alternative blasting methods that may have a lower physical impact.
- Engage with experts and affected parties to find suitable solutions for dust impact.
- Address community's fear regarding water pollution by being open about monitoring data;
- Utilise experts to educate the community about the scientific facts regarding water impacts;
- Install and communicate water pollution prevention measures.
- Establish good working relationships with local and district government by attending their forums and individual interaction.

Mining as per the mining schedule

Mining as per the mining schedule means that Hadeco, Hadeco village, the clay village as well as the residents of Portion 13 will have to be relocated. In addition, there will be a number of job losses. Job losses will be discussed in more detail in the economic impact assessment. This will have severe impacts from a social perspective

and will be a very costly exercise for Exxaro, especially in terms of the special needs of the Hadeco operations.

The following potential impacts can be expected for this alternative:

- Increase in HIV/AIDS and other infectious diseases;
- Health impacts;
- Conflict between local residents and newcomers;
- Resettlement of Hadeco Village;
- Expectations regarding the benefits of the project;
- Skills development;
- Impact on infrastructure such as roads and housing;
- Blasting;
- Dust;
- Water pollution; and
- Co-operative governance.

The following recommendations are made for this alternative:

- Form a partnership with a Non Profit organisation (NPO) to provide the necessary social services to people whose lives are affected by infectious diseases.
- Develop an in-house infectious diseases strategy to address health issues with the workforce.
- Align infectious diseases strategy with community HIV strategy followed by NPO.

- Follow mitigation measures suggested in bio-physical studies relating to dust to address potential health impacts.
- Implement community relations programme.
- Develop a business forum and ensure local SMME's are utilised for projects.
- Implement local procurement policy.
- Encourage and enable staff to live locally.
- Appoint a relocation specialist to compile a relocation action plan in line with international best practice standards.
- Communicated frequently with affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.
- Ensure that local Emakhazeni communities are the beneficiaries of skills development initiatives.
- Implement the skills development initiatives that have been identified in the SLP.
- Establish a skills training centre as per the SLP.
- Engage with municipalities to discuss strategic long-term planning with regard to services such as road maintenance and housing.
- Coordinate the outcomes of the SLP with the IDPs of the municipalities.
- Become a member of the IDP Forum.
- Conduct a crack survey at properties within a certain radius from the mine.
- Explore alternative blasting methods that may have a lower physical impact.
- Engage with experts and affected parties to find suitable solutions for dust impact.

- Address community's fear regarding water pollution by being open about monitoring data;
- Utilise experts to educate the community about the scientific facts regarding water impacts;
- Install and communicate water pollution prevention measures.
- Establish good working relationships with local and district government by attending their forums and individual interaction.

From a social perspective, Mining on Portion 30 will be the preferred alternative as it also has some positive impacts associated with it, no relocation of residents will be required, and it would enable the Glisa mine to remain operational, avoiding the negative economic impacts associated with its closure.

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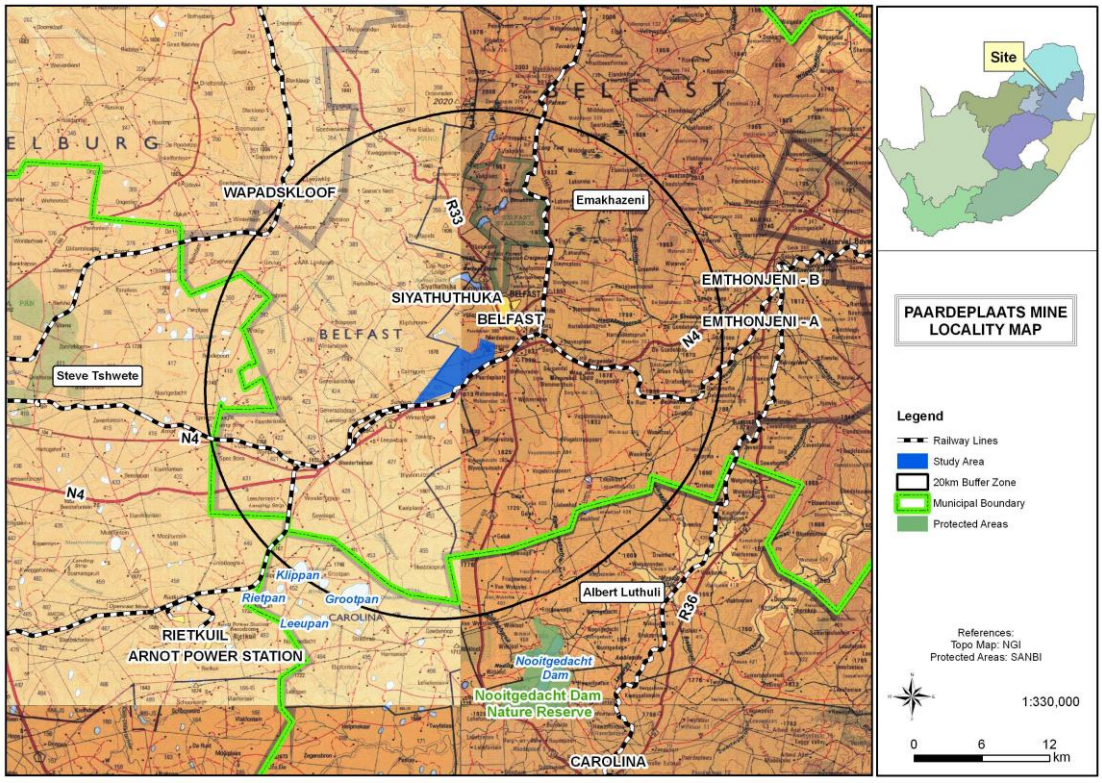
1 Introduction

The proposed Paardeplaats coal mine is located on Portions 28, 29, 30 and 40 of the farm Paardeplaats 380 JT; Remaining Extent of Portion 2 of the farm Paardeplaats 425 JS; and Portion 13 of the farm Paardeplaats 380 JT. The proposed site covers an area of approximately 1 415 ha and falls within the jurisdiction of the Emakhazeni Local Municipality in the Nkangala District Municipality. Figure 1 shows the proposed location for the mine within municipal context.

Figure 1: Locality of proposed Paardeplaats Coal Mine



The proposed Paardeplaats coal mine will supply coal to the Glisa mine beneficiation plant at a rate of 4.2 – 4.4 mtpa and will supply to Eskom at a rate of 2.4 mtpa. The mining method will be a hybrid between roll-over mining as well as bench mining. The supporting infrastructure for the proposed Paardeplaats coal mine will be situated at Glisa. Infrastructure on the site is likely to include pipelines, haul roads and two Pollution Control Dams.

Three alternatives are being investigated for the proposed project, namely:

- The No Go option;
- Mining only Portion 30; and
- Mining as per the mining schedule.

The purpose of this report is to provide baseline information regarding the socio-economic environment, to identify possible social and economic risks/fatal flaws and to suggest ways in which these impacts can be mitigated. This will assist decision-makers on the project in making informed decisions by providing information on the potential or actual consequences of their proposed activities. The process entailed the following:

- A baseline socio-economic description of the affected environment;
- Identification of potential social and economic change processes that may occur as a result of the project; and
- Identification of potential social and economic impacts.

One of the ways in which social and economic risk can be managed is by conducting a social and economic impact assessment (SEIA). Such an assessment can assist with identifying possible social and economic impacts and risks. Disregarding social and economic impacts can alter the cost-benefit equation of development and in some cases even undermine the overall viability of a project. A proper social and economic impact assessment can have many benefits for a proposed development (UNEP, 2002) such as:

- Reduced impacts on communities of individuals,
- Enhanced benefits to those affected,
- Avoiding delays and obstruction – helps to gain development approval (social license),

- Lowered costs,
- Better community and stakeholder relations,
- Improved proposals.

EIMS was appointed to manage the Environmental Impact Assessment for the project and they appointed Ptersa Environmental Management Consultants to perform a social impact assessment for the proposed project. This report represents the findings and recommendations of a social impact assessment for the proposed project as part of the EIA phase.

2 Background information used and details of site visits undertaken

2.1 Receiving environment

According to the National Environmental Management Act (NEMA, 1998) environment refers to the surroundings in which humans exist. When viewing the environment from a social perspective the question can be asked what exactly the social environment is. Different definitions for social environment exist, but a clear and comprehensive definition that is widely accepted remains elusive. Barnett & Casper (2001) offers the following definition of human social environment:

> *"Human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community. The social environment subsumes many aspects of the physical environment, given that contemporary landscapes, water resources, and other natural resources have been at least partially configured by human social*

> *processes. Embedded within contemporary social environments are historical social and power relations that have become institutionalized over time. Social environments can be experienced at multiple scales, often simultaneously, including households, kin networks, neighbourhoods, towns and cities, and regions. Social environments are dynamic and change over time as the result of both internal and external forces. There are relationships of dependency among the social environments of different local areas, because these areas are connected through larger regional, national, and international social and economic processes and power relations."*

Environment-behaviour relationships are interrelationships (Bell, Fisher, Baum & Greene, 1996). The environment influences and constrains behaviour, but behaviour also leads to changes in the environment. Only by understanding people in the context of their environment can the impacts of a project on them truly be comprehended. The baseline description of the social environment will include the identification of relevant stakeholders; a description of the area within a provincial, district and local context that will focus on the identity and history of the area as well as a description of the population of the area based on a number of demographic, social and economic variables.

The baseline description of the population will take place on three levels, namely provincial, district and local. Only by understanding the differences and similarities between the different levels can impacts truly be comprehended. The baseline description will focus on the communities of the Emakhazeni Local Municipality within the context of the Nkangala District Municipality in the Mpumalanga Province (referred to in the text as the study area).

The data used for the socio-economic description was sourced from the Community Survey (CS) conducted by Statistics South Africa in 2007. The Community Survey is a large-scale household survey conducted by Statistics South Africa to bridge the gap between censuses. It served as a mini census and its purpose (www.statssa.gov.za) is to collect information on the trends and level of demographic and socio-economic

data; the extent of poor households; access to facilities and services; levels of employment/unemployment; in order to assist government and private sector in planning, evaluation and monitoring of programmes and policies.

Community Survey 2007 yields more up-to-date information than Census 2001 that used to be the most recent source of demographic and socio-economic data on national, district and municipal level. It should however be noted that Community Survey 2007 is not a replacement of the Census (Statistics South Africa, 2007a) and that there are certain limitations inherent to the study that should be taken into consideration when interpreting the results (Statistics South Africa, 2007b):

- The scope of the study only included household and individuals. Institutions such as military bases, national parks, prisons, hotels, hospitals, military barracks, etc were excluded from the fieldwork. The institutional population is an approximation based on 2001 figures and not new data.

- The measurement of unemployment is higher and less reliable due to the differences in questions asked relative to the normal Labour Force Surveys.

- The income includes unreasonably high income for children probably due to misinterpretation of the question, e.g. listing parent's income for the child.

- The distribution of households by province has very little congruence with the General Household Survey or Census 2001. It is not yet clear whether these changes are real or whether they are due to variables that could be ascribed to the study.

- Since the Community Survey is based on a random sample and not a Census, any interpretation should be understood to have some random fluctuation in data, particularly concerning the small population for some cells. It should be understood that the figures are within a certain interval of confidence. This applies in particular to cross-tabulations on municipal level where small numbers are likely to give an under or overestimation of the true population (due to group not present in sample or number realised for sample very

small). The aggregated total number per municipality however provides more reliable estimates (Statistics South Africa, 2007a).

- Further it should be noted that the estimates were done with the use of the de-facto population (the group of population who were enumerated according to where they stayed on a specific night) and not the de-jure population (the group of population who were enumerated according to where they usually live). These results are presented as the de-jure population.

Based on this the results should be viewed as indicative of the population characteristics in the area and should not be interpreted as absolute.

2.1.1 History

The proposed mine will be located in the Emakhazeni Local Municipality that forms part of the Nkangala District Municipality in Mpumalanga. The baseline description of the environment will include these areas.

The Mpumalanga Province is located in the north eastern part of South Africa and covers an area of approximately 82 333 km2 (www.mputopbusiness.co.za). It borders the Limpopo Province, Gauteng, the Free State, KwaZulu Natal and internationally Swaziland and Mozambique. The word Mpumalanga means “place where the sun rises”.

The province consists of three district municipalities, namely Gert Sibande, Nkangala and Ehlanzeni. Nelspruit is the provincial capital and other major towns include Barberton, Delmas, Ermelo, Hazyview, Komatipoort, Malelane, Mashishing (Lydenburg), Middelburg, Piet Retief, Sabie, Secunda, Standerton, Volksrust, White River as well as Emalahleni (Witbank) (www.mpumalanga.com).

Mpumalanga is South Africa’s major forestry production area and is also the world’s largest producer of electrolytic manganese metal. Six major industrial clusters have been identified in Mpumalanga (Mpumalanga PGDS) in which numerous investment

opportunities exists, namely stainless steel; agri-processing; wood products; chemical industry and chemical products; agri-products and tourism.

Extensive mining is done in the province. Minerals found include: gold, platinum group metals, silica, chromite, vanadiferous magnetite, argentiferous zinc, antimony, cobalt, copper, iron, manganese, tin, coal, andalusite, chrysotile asbestos, kieselguhr, limestone, magnesite, talc and shale.

Mpumalanga also accounts for 83% of South Africa's coal production. Ninety percent of South Africa's coal consumption is used for electricity generation and the synthetic fuel industry. Coal power stations are situated close to the coal deposits.

The province mainly exports primary products from its mining and agricultural activities with little value addition. Mpumalanga will be able to increase its share of export contribution towards the provincial GDP by adding value to its export products through beneficiation (Mpumalanga Economic Profile).

The Nkangala District Municipality (NDM) is one of the three district municipalities in Mpumalanga. Local municipalities forming part of the Nkangala DM are Delmas, Dr JS Moroka, Emalahleni, Emakhazeni, Steve Tshwete, and Thembisile, as well as the Mdala District Management Area.

The district is approximately 17 000 km2 and consists of about 165 towns and villages, with Emalahleni and Middelburg being the primary towns. The Nkangala DM has a population of approximately 1.1 million people, which constitutes almost a third of Mpumalanga’s population.

According to the municipality’s website, the Nkangala DM is at the economic hub of Mpumalanga and is rich in minerals and natural resources. The district’s economy is dominated by electricity, manufacturing and mining. Community services, trade, finance, transport, agriculture and construction (www.nkangaladm.org.za) are also important sectors. Nkangala’s Integrated Development Plan (IDP) states that the district has extensive mineral deposits, including chrome and coal.

Another important economic activity in Nkangala is agriculture. The southern regions of the municipality are suitable for crop farming, specifically for fresh produce such as maize and vegetables, while cattle and game farming occur in the northern regions.

In terms of the population profile of the Nkangala DM, the majority of its inhabitants are extremely poor and do not have access to mainstream economic activities. The main poverty concentration is amongst the communities residing in Dr JS Moroka and Thembisile Local Municipalities. The most important employment centre for these communities is the City of Tshwane, reducing their reliance on NDM. Daily commuting by means of public transport is a necessity (Nkangala IDP 2008/2009).

The **Emakhazeni Local Municipality** is at the heart of the Mpumalanga province and is bordered by the Greater Groblersdal, Thaba-Chweu, Steve Tshwete, Albert Luthuli and Mbombela Local Municipalities. The municipality is strategically located between the Pretoria / Johannesburg complex in Gauteng and Nelspruit in Mpumalanga and is situated on the N4 Maputo corridor.

The dominant economic activity in the area is farming (Emakhazeni Local Municipality IDP 2012-2013). Farming occupies the largest part of the physical area. There are a number of small towns in the area that serve as service centres for the agricultural sector, namely:

- Emakhazeni (Belfast) and Siyathuthuka;
- Dullstroom and Sakhelwe;
- Entokozweni (Machadodorp) and Emthonjeni;
- Waterval-Boven and Emgwenya.

The area has a high environmental and aesthetical value with numerous wetlands and sensitive environmental areas, particularly around Dullstroom. The area is popular for fly-fishing that attracts a large number of tourists to the area. There are four nature reserves in the area, namely the Tullach-Mohr Reserve, the Dullstroom

Nature Reserve, the Verloren Valley Nature Reserve and the Ntsinini Nature Reserve. The Emakhazeni LM sees the town of Emakhazeni as the tourism gateway for attractions in the Emakhazeni area as well as the Lowveld areas (Emakhazeni Local Municipality IDP, 2011-2016) and is of the opinion that it should be promoted as such. The area between Emakhazeni, Dullstroom, Lydenburg, Entokozweni and Waterval-Boven was earmarked as the "Trout Triangle." This initiative has been incorporated into the Spatial Development Framework and should be supported through local initiatives.

Several minerals can be found in the region, for example gold and black granite. The viability of the diamond deposits in the area is currently being investigated. There are two coalmines in the vicinity, namely the Emakhazeni and Glisa mines that are operated as open quarry mines. A large coal deposit has been discovered towards the south of Emakhazeni. The presence of lime deposits in the municipal boundaries has also been indicated. Other minerals found in the area include copper, nickel, cobalt, arsenic, platinum, zinc, silver and flint clay.

2.1.2 Demography

2.1.2.1 Population

According to the Community Survey 2007, the population of South Africa is approximately 48.5 million and has shown an increase of about 8.2% since 2001. The household density for the country is estimated at approximately 3.87 people per household, slightly down from the 2001 average household size of 4 people per household.

As shown in Table 1, the growth rate in Mpumalanga was very similar to the national average, with Nkangala DM experiencing growth rates well above the national average and the population in the Emakhazeni LM showing a decrease of more than one fifth since 2001. It must be noted though that according to a survey done by the Emakhazeni LM in 2007, the population has grown to 59,000 (Emakhazeni Local Municipality IDP, 2012-2013). The results of Census 2011 should be able to shed light on which population size is correct. Although the population size in the Emakhazeni

LM has decreased, there was a great increase in the number of households, indicating fewer people per household.

Table 1: Community Survey 2007 Population, growth and household estimates

	Mpumalanga Province	Nkangala DM	Emakhazeni LM
Approximate population size	3,643,435	1,226,500	32,840
Approximate number of households	940,403	305,567	12,127
Average population density (number of people per km^2)	45.84	73.19	6.95
Average household density (number of people per household)	3.87	4.01	2.71
Estimated growth in population size since 2001 (in %)	8.25%	20.38%	-23.64%
Estimated growth in number of households since 2001 (in %)	19.73%	24.48%	24.72%
Estimated change in household sizes since 2001 (in %)	-0.41	-0.14	-1.72
Total dependency ratio (youth (aged 0 – 14 years) and aged (65 years or older) to economically active population (aged 15 - 64 years))	61,41	55,56	53,69
Youth dependency ratio	54,03	48,37	45,62
Aged dependency ratio	7,38	7,19	8,07

While the population density in the Nkangala DM is much higher than on provincial level, the population density in the Emakhazeni LM is relatively low, although it can be expected that it would be much higher in the urban areas of Belfast and Siyathuthuka. The average household size in the Nkangala DM is larger than on provincial level, but on local level the average household size is much smaller and has shown a significant decrease in size since 2001. This can indicate that a number of people of economically active age (aged 15 – 65 years) have moved out of the area in search of job opportunities, leaving old people and children behind, and also that a number of people of economically active age moved to the area in search of jobs due to the increasing mining activities in the area, leaving their families behind elsewhere.

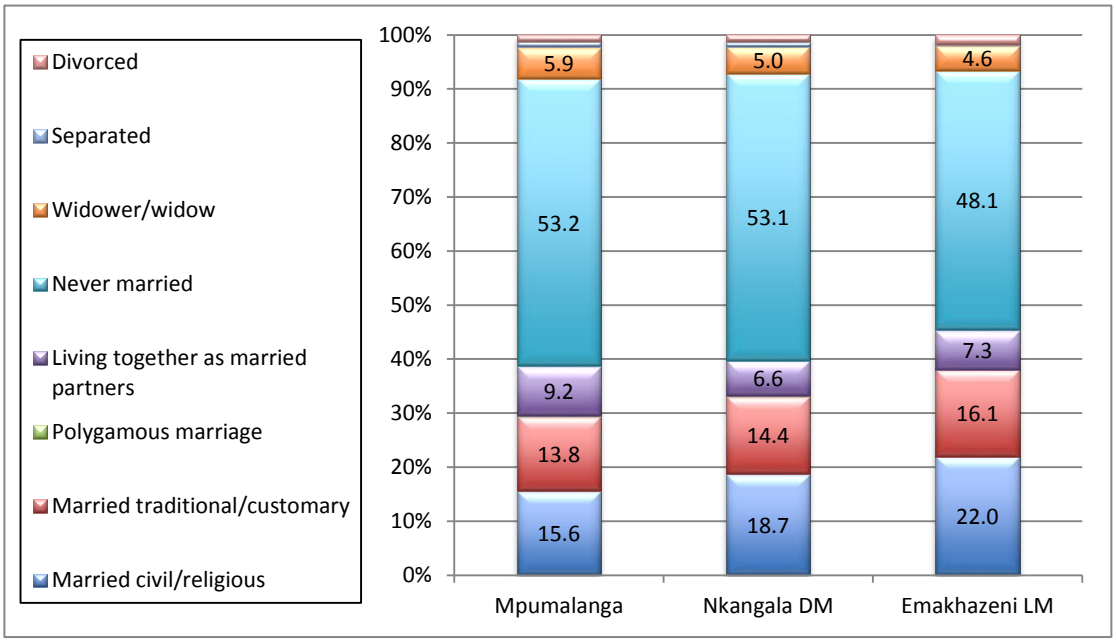
The total dependency ratio is used to measure the pressure on the productive population. As the ratio increases, there may be an increased burden on the

productive part of the population to maintain the upbringing and pensions of the economically dependent. A high dependency ratio can cause serious problems for a country as the largest proportion of a government's expenditure is on health, social grants and education that are most used by the old and young population. The total dependency ratio as well as the youth dependency ratio for the Emakhazeni LM is lower than on district or provincial level, indicating a smaller proportion of youth in this area, while the aged dependency ratio is higher than on provincial and district level, indicating an aging population in the area. Although this ratio is calculated on the number of people of economically active age, it must be kept in mind that many people in this age group are not employed, thus placing even an even heavier burden on those that are employed.

2.1.2.2 Marital status

Almost half of the people living in Emakhazeni LM have indicated that they have never been married (Figure 2), while just over a fifth have indicated that they have been married in a civil or religious ceremony while about 16% have indicated that they are in traditional or customary marriages and about 7% are living together as married partners. Almost no one has indicated that they are in polygamous marriages while a relatively small proportion have indicated that they are divorced or separated. It must be noted these figures would reflect a person's status at the time of the Community Survey 2007.

Figure 2: Marital status - people aged 15 years or older (shown in percentage, source: CS 2007)



No recent data is available for the district on mortality and fertility (Emakhazeni Local Municipality IDP, 2012-2013).

2.1.2.3 Crime

The crime statistics for the SAPS are not grouped according to district municipalities, but according to SAPS regions. For this reason, the statistics will be reviewed on national and provincial level as well as for the local police station, namely the Belfast Police Station.

Figure 3 gives a comparison of the distribution of crime by main category in the area with national and provincial profiles for the April 2009 to March 2010 reporting period. The highest frequency of crimes reported in South Africa and Mpumalanga is contact crimes (crimes against the person). These include crimes such as murder, assault, robbery and sexual crimes. In the Belfast police precinct the highest frequency of crimes is property-related crime, which includes burglary at residential and non-residential premises, theft of motor vehicle and motorcycle, theft out of or from motor vehicle and stock theft.

Figure 3: Crime for the April 2011 – March 2012 reporting period by main crime categories (source: www.saps.gov.za)

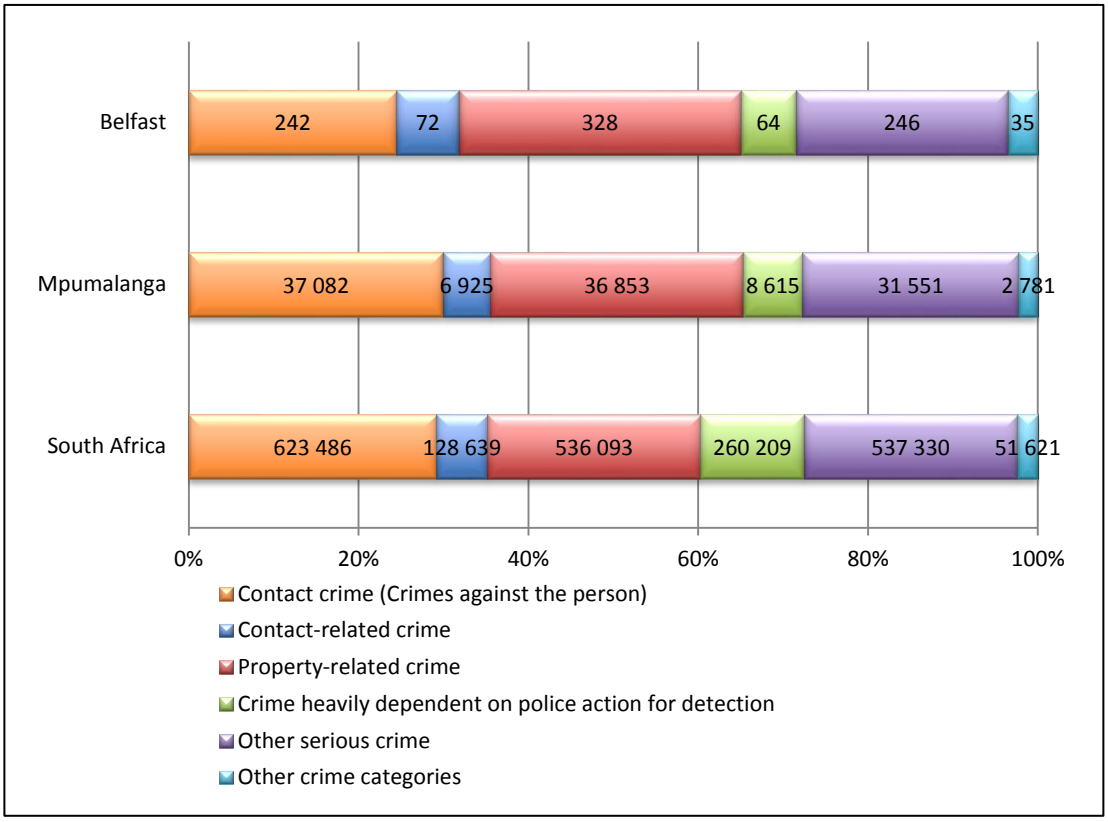
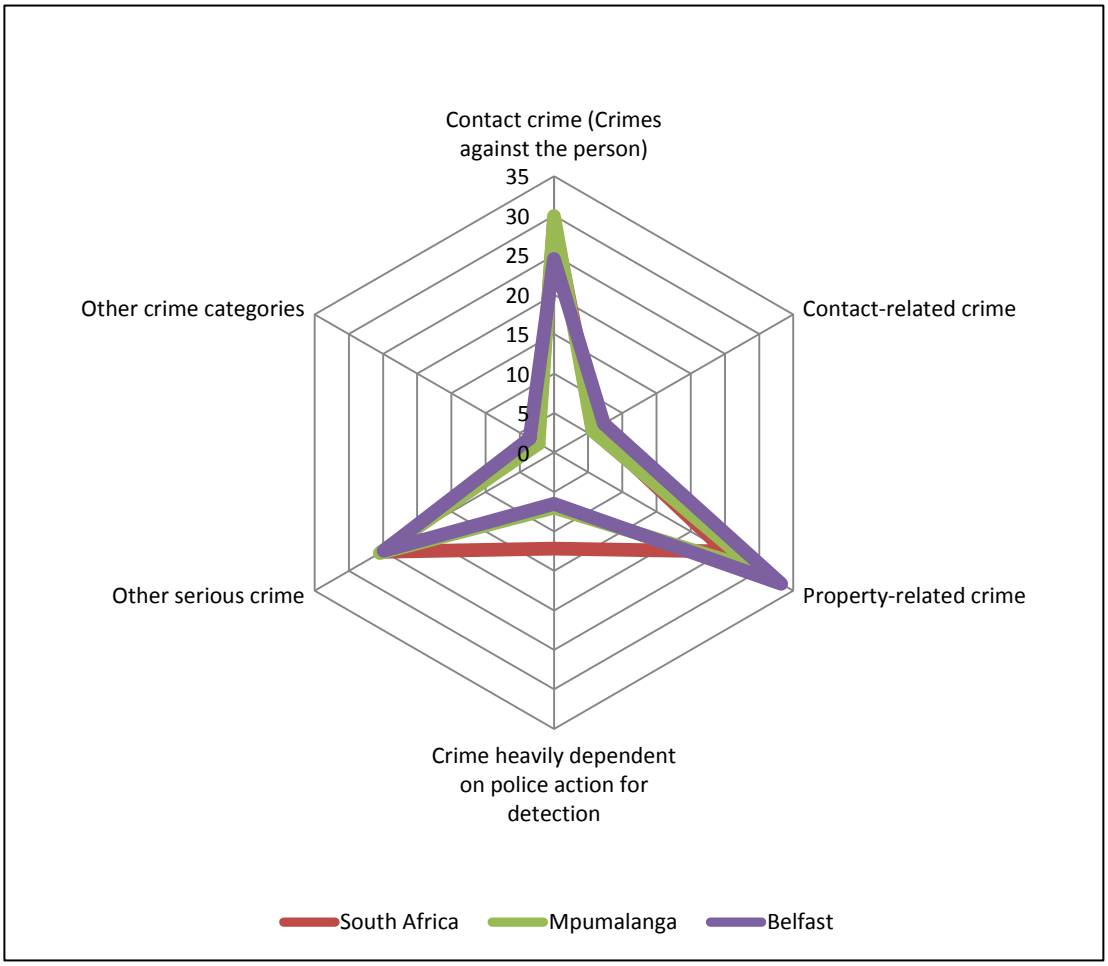


Figure 4 shows the crimes in the areas under discussion in percentage. The crime patterns for Mpumalanga look very similar to that of South Africa with contact crimes being the crime category with the highest proportions. In the Belfast Police Precinct there are proportionately more property-related crimes and proportionately less crime heavily dependent on police action for detection, which can indicate that there is less detection actions implemented at the Belfast police precinct.

Figure 4: Crime for the April 2011 – March 2012 reporting period by main crime category (shown in percentage, source: www.saps.gov.za)



Contact crimes involve physical contact between the victims and perpetrators and as such are almost always violent in nature. For the victim, contact crime can lead to death, serious injury, psychological trauma and / or the loss of property which can especially for poorer victims have detrimental consequences. A number of contact crimes are crimes that are social or domestic in nature and usually take place between people who know each other such as friends, family and acquaintances. An analysis of dockets (SAPS, 2007) showed that in almost 90% of assault cases the people involved knew one another. In most instances the motivation for social crimes relate to a misunderstanding (SAPS, 2009), indicating that people in these communities do not have the necessary social skills to deal with these issues in another, less violent way. It also seems as if there is a close relationship between some contact crimes, particularly all categories of assault and factors and conditions

like urbanisation, poverty and unemployment, vigilantism, previous offenders as well as alcohol and drugs. Urbanisation causes urban unemployment, a massive growth of informal settlements (especially in or adjacent to existing poor areas) and the disappearance of the rural subsistence economy and social support network. It also creates rising expectations and new needs (SAPS, 2007).

Contact-related crimes cover the crimes of arson and malicious damage to property. Such crimes can flow from either individual behaviour (someone in bad faith causing damage to another person's property for whatever reason) or from collective behaviour (a group of people going on the rampage as a result of industrial action; out of frustration with, for example trains running late or a lack of service delivery; or from being swept along by a frenzy, for example xenophobic fury). In this regard it has to be kept in mind that if a train is set alight a charge of malicious damage to property will be registered, as arson usually only occurs when immovable property is set alight. On a national level, incidences for both arson and malicious damage to property have decreased. The seriousness of this type of crime is often overlooked (SAPS, 2011). Deliberate destruction of or damage to equipment can cause disruption and losses running to millions of Rands to both the private and public sector in material terms alone and can result in loss of employment opportunities when concerns are ruined. In a similar vein, deliberate or even negligently started veld or forest fires (whether resulting from pure maliciousness, intended as an act of intimidation, meant as revenge or originating from whatever purpose) can have unseen consequences such as loss of life, destroying heritage sites, productive farmland, invaluable natural resources or irreplaceable assets.

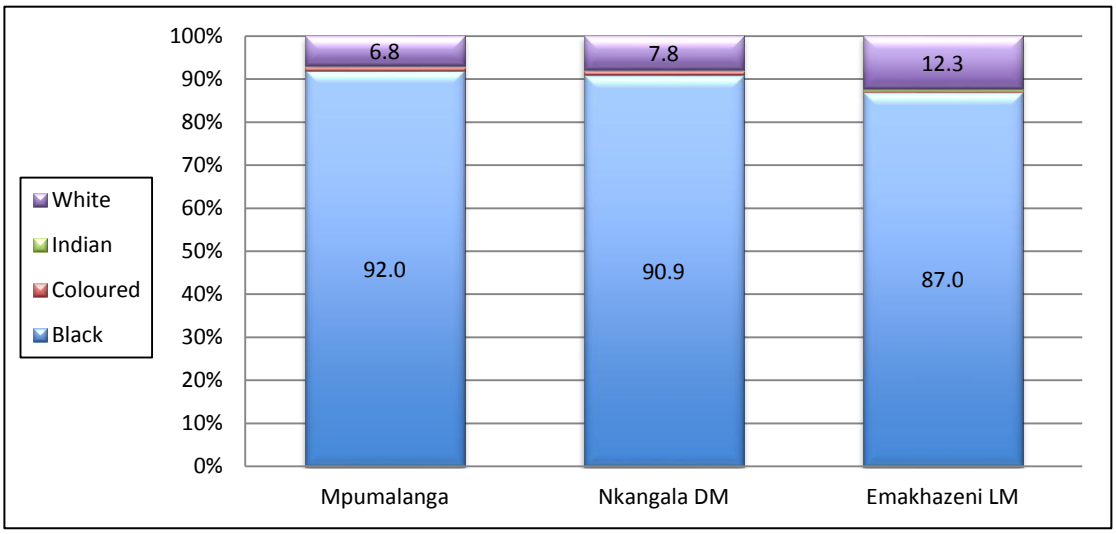
2.1.3 Social structure

2.1.3.1 Population

The majority of residents on the provincial, district and local level belong to the Black population (Figure 5). The proportion of people belonging to the Black population group in the Emakhazeni LM is lower than on district and provincial level, with a higher proportion of people belonging to the White population group. As such the

local municipality can be expected to be culturally different from the district in certain areas.

Figure 5: Population distribution (shown in percentage, source: CS 2007)



2.1.3.2 Age

Table 2 shows that the Emakhazeni LM has the highest average age (28.88 years) of the areas under investigation.

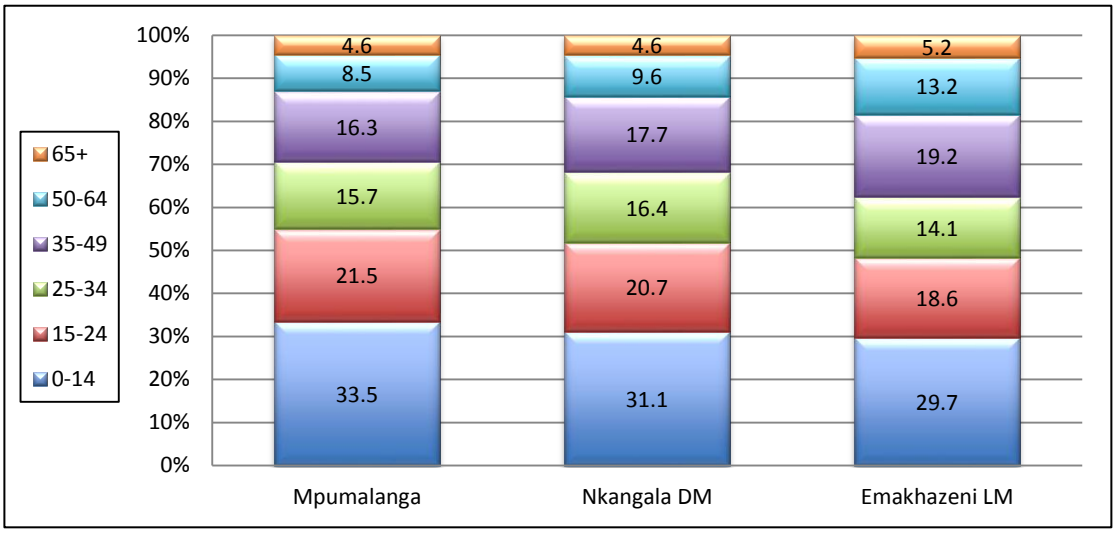
Table 2: Average age (source: CS 2007 data)

	Approximate average age (in years)
Mpumalanga	**25.98**
Nkangala DM	27.05
Emakhazeni LM	28.88

A closer look at the age distribution (Figure 6) shows that the Emakhazeni LM has a smaller proportion of children, youth and young adults (aged 24 years or younger) than the district or the province and proportionately more people aged between 25 – 64 years, which are of economically active age. On provincial and district level 50% or more of the population are younger than 25 years. The higher proportion of children younger than 15 years on provincial and district level places a heavier burden on those who are economically active to take care of their needs. It also

indicates high potential for future population growth as Census 2001 (Stages in the life cycle of South Africans, 2005) indicates that at the age of nineteen; about 30.5% of women have given birth to at least one child. The high proportion of children and youth further indicates that there will be a higher future demand for employment and potentially a much bigger need for infrastructure, should all these people choose to remain in the area and not to migrate to urban areas. It also suggests that people may migrate to areas where new job opportunities are created.

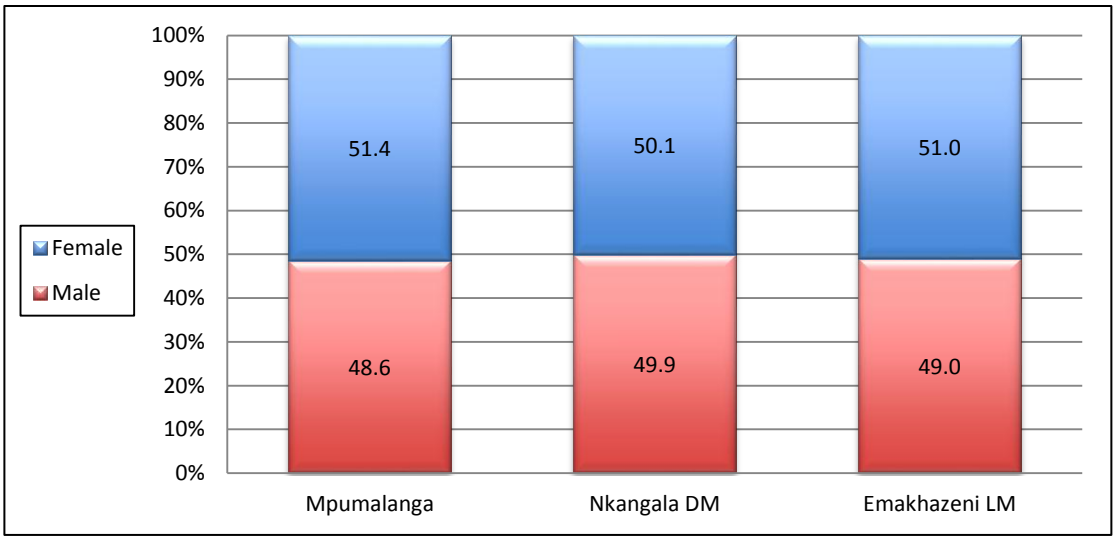
Figure 6: Age distribution (shown in percentage, source: CS 2007)



2.1.3.3 Gender

The gender distribution is fairly equal (Figure 7), with a slight biased towards females on provincial, district as well as local level.

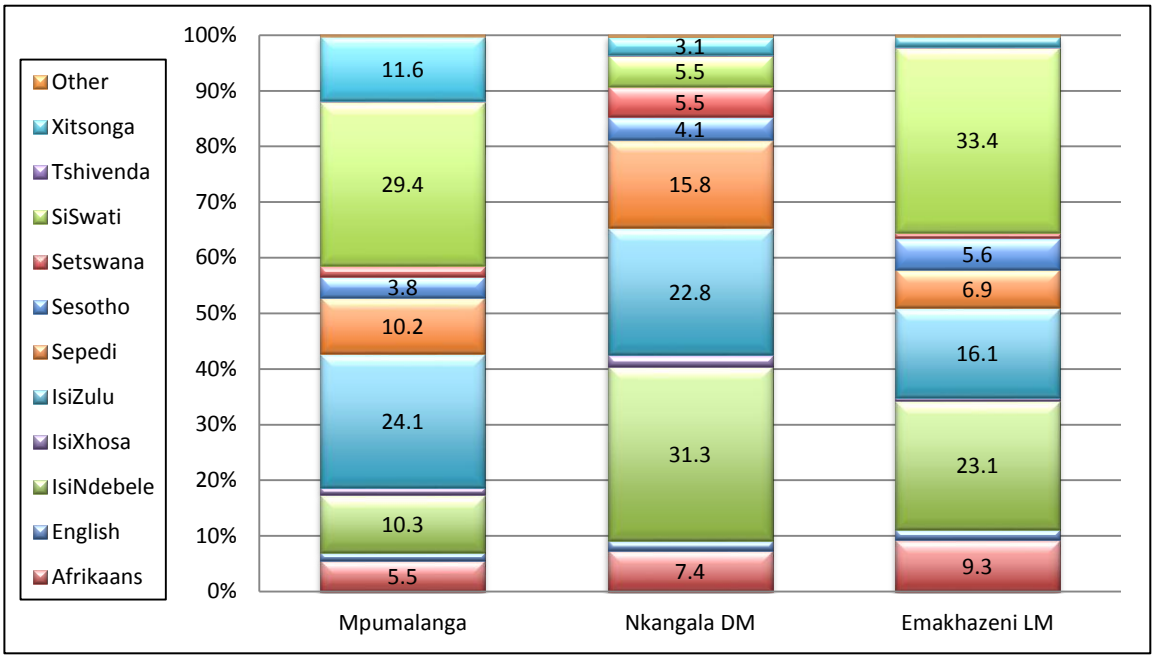
Figure 7: Gender distribution (shown in percentage, source: CS 2007)



2.1.3.4 Language

The language profiles for the areas are very different from one another (Figure 8). In 2001, the dominant home language in the Emakhazeni LM was SiSwati (33.4%), followed by isiNdebele (23.1%), IsiZulu (16.1%) and Afrikaans (9.3%). On a district level, isiNdebele (31.3%) was the most dominant home language, followed by isiZulu (22.8%) and Sepedi (15.8%). Home language gives an indication of the cultural makeup of the area. Knowing the culture of the area would help the outsider to connect more easily with the local communities. Therefore it is suggested that communication with communities in the study area should mainly take place in SiSwati, isiNdebele, Sepedi, Afrikaans and English to ensure the largest reach. Not doing so could create barriers for accessing these communities.

Figure 8: Language distribution (shown in percentage, source: Census 2001)



2.1.4 Economic structure

The three largest contributors (Nkangala District Municipality IDP, 2012-2013) in terms of gross value added (GVA) to the district economy were mining (29.7%), community services (14.0%) and finance (13.5%). The three largest contributors in the Emakhazeni LM were Transport (26.8%), Mining (23.3%) and Community Services (16%). The primary sector in the Nkangala DM contributed 31.6% to the

GVA, the secondary sector 23.2% and tertiary sector 45.2%, while in Emakhazeni LM the primary sector contributed 27.2%, the secondary sector 11.8% and the tertiary sector 60.9%.

The formal sector (non-agricultural) in Nkangala was responsible for 66.3% of total employment in the district in 2009, the informal sector (non-agricultural) 21.0%, agriculture 5.0% and private households 7.7%. Towns in the Emakhazeni Local Municipality are primarily associated with agriculture, tourism and forestry activities (Nkangala District Municipality IDP, 2012-2013). Dullstroom provides some avenues for tourism and is in essence a service centre for the surrounding agricultural communities.

2.1.5 Social services

2.1.5.1 Health

There is a general lack of health facilities in the Emakhazeni LM, especially clinics, hospitals and ambulances, particularly in the rural areas (Emakhazeni Local Municipality IDP, 2012-2013). There is also a shortage of medical staff, especially doctors and specialists, paramedics and nurses, as well as of relevant medicine. Other issues include a lack of support from the sector departments and the hospice; poor co-ordination of HIV and AIDS related activities in the Municipality; and the fact that primary health services remain limited to some communities within the municipal jurisdiction. The rural areas are service by mobile clinics, but which have been reported to be unreliable at times.

2.1.5.2 Education

Education is a major challenge in the area as about 30% of children in the area of school-going age do not have access to quality education (Emakhazeni Local Municipality IDP, 2012-2013). This is due to the rural nature of the area. The majority of schools are farm schools which are multi-graded, and that lack quality infrastructure and adequate human resources. The majority of primary schools are on the NSNP (National Schools Nutrition Programme) and the municipality welcomes the proposal of the Department of Education to extend the programme to high schools. There is only one tertiary education facility in the area, namely a FET College

at Emgwenya. Table 3 gives a summary of the number and type of schools in the Emakhazeni Local Municipality (IDP, 2012-2013).

Table 3: Summary of schools in the Emakhazeni Local Municipality

Type of School	Number
Primary Schools	7
Primary Schools (Farms)	13
Secondary Schools	5
Secondary Schools (Farms)	4
Private Schools	4
Schools for learners with special education needs	1
FET	1
Total	**35**

2.1.5.3 Other social facilities

Especially the farming community is in dire need of social facilities (Emakhazeni Local Municipality IDP, 2012-2013), and to this extent a **multi-purpose community centre** was constructed at Wonderfontein. The municipality is currently trying to solicit funds to establish multi-purpose community centres at other locations as well.

There is a need to upgrade **cemeteries** in the ELM, seeing as graveyards were not properly fenced and the access roads were not well planned making it difficult to access graves, especially during rainy seasons. The lack of security around some municipal cemeteries has led to vandalism and some have become grazing land for livestock. In response to this challenge, the Municipality fenced existing graveyards, and established and fenced new gravesites.

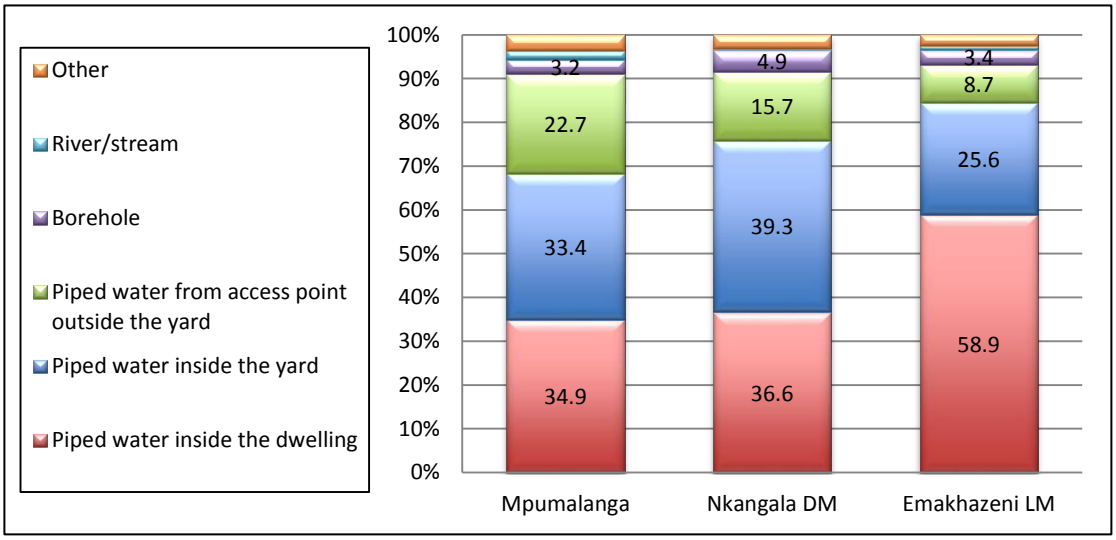
The Municipality has addressed the issue of underdevelopment in existing **sports infrastructure** by means of upgrading sports facilities in Siyathuthuka, Sakhelwe, Emgwenya and Emthonyeni. However, vandalism of sports facilities, particularly in Emgwenya, remains a challenge.

Municipal **libraries** contribute to the promotion of a culture of learning amongst community members. However, the reading material in existing libraries is relevant to adults, since these are public libraries and not necessarily school libraries. Improving the library readership remains a challenge particularly amongst young children, seeing as resources in African languages (the majority population home languages) are limited.

2.1.5.4 Services: Water, Sanitation, Electricity and Refuse Removal

Access to piped water, electricity and sanitation services relate to the domain of Living Environment Deprivation as identified by Noble et al (2006). On a provincial level, almost 70% of the households in Mpumalanga had access to piped water inside the dwelling or yard (Figure 9) in 2007, compared to more than 75% on district level and just over 84% on local level.

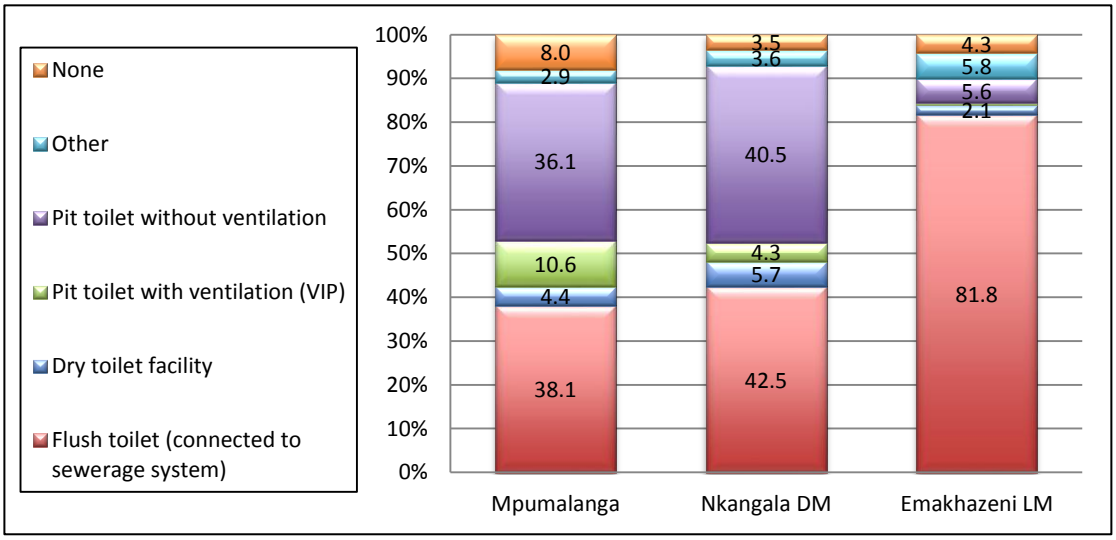
Figure 9: Distribution of water supply (households, shown in percentage, source: CS 2007)



The absence of a flush toilet or a pit toilet with ventilation is one of the indicators of Living Environment deprivation (Noble et al, 2006). From this perspective, the

Emakhazeni LM is the least deprived area in terms of sanitation services with more than 80% of households having access to flush toilets (Figure 10), which is about double the proportion on district or provincial level.

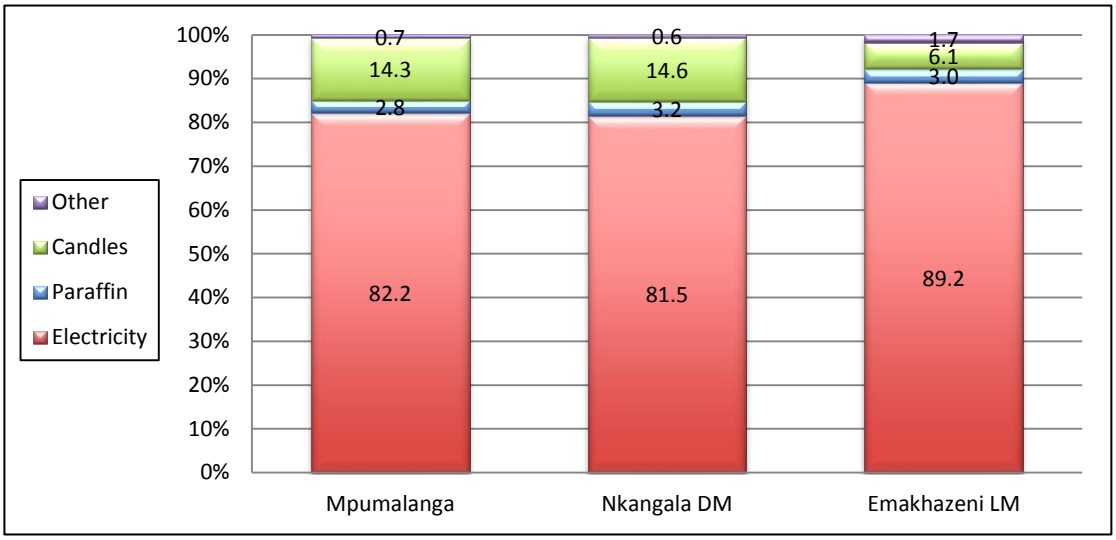
Figure 10: Sanitation distribution (households, shown in percentage, source: CS 2007)



There are four wastewater treatment plants in the Emakhazeni LM. Due to lack of adequate maintenance of the plants the operations are not 100% compliant with legislation, therefore there is a need for the upgrade of facilities (Emakhazeni Local Municipality IDP, 2011-2016).

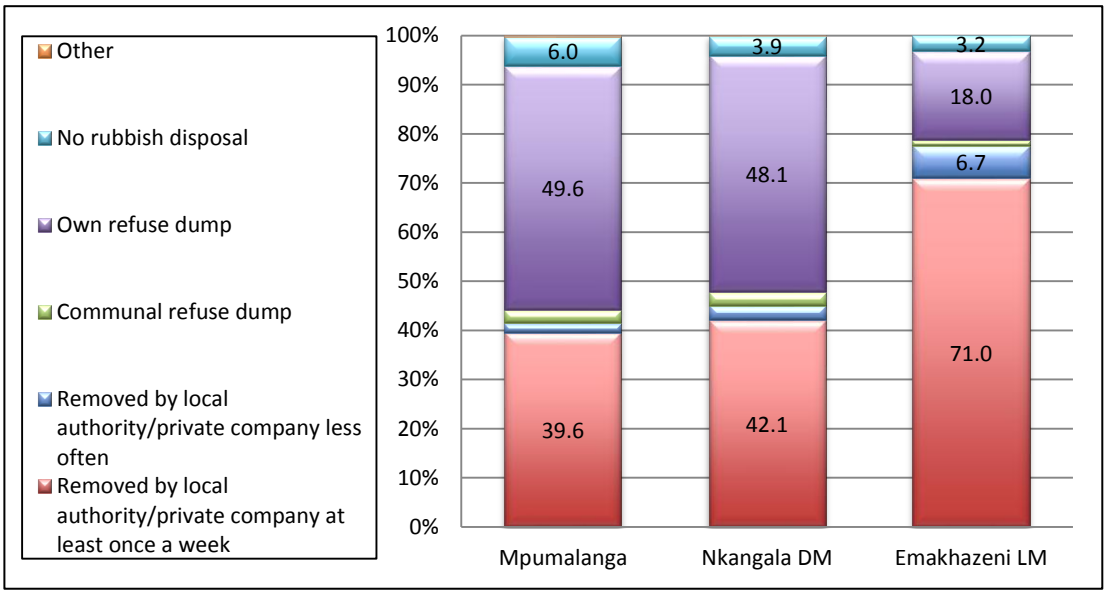
In the Emakhazeni LM almost 90% of the households in the study area use electricity as source for lighting (Figure 11), followed by candles and paraffin. This is higher than on district or provincial level where just over 80% of households use electricity for lighting purposes.

Figure 11: Distribution of energy source for lighting (households, shown in percentage, source: CS 2007)



The profiles for refuse removal on a provincial and district level are very similar (Figure 12). This figure is much higher for the Emakhazeni LM with more than two thirds of the households having their refuse removed once a week.

Figure 12: Refuse removal distribution (households, shown in percentage, source: CS 2007)



Almost half of the households on provincial and district level and about a fifth of households in the Emakhazeni LM have reported that they have their own refuse dumps. Some of these households are likely to be situated on farms and in rural areas that are far away from infrastructure and municipal facilities.

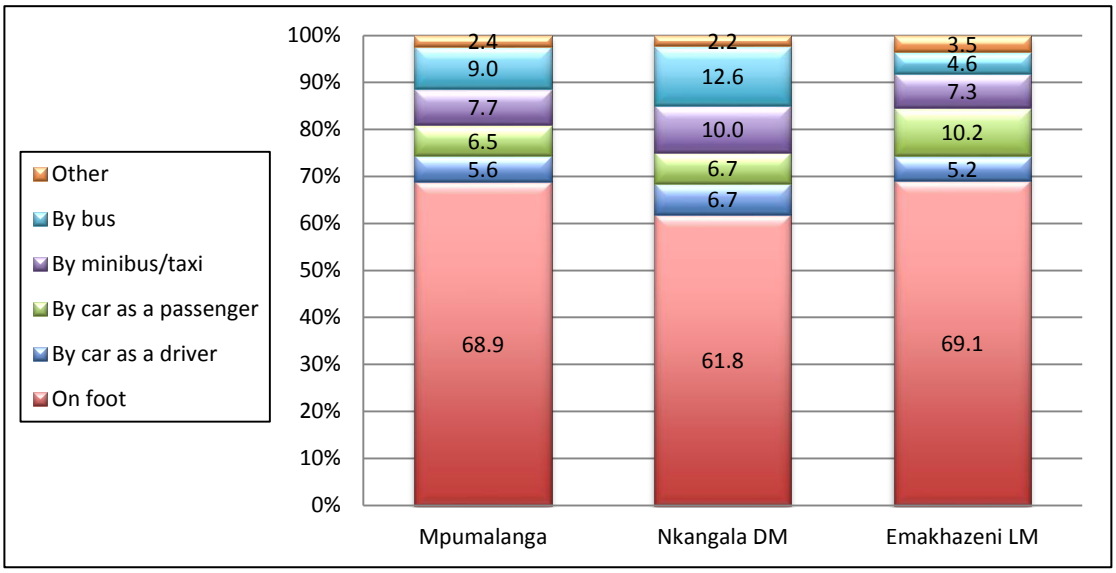
Households with their own refuse dumps rely mostly on backyard dumping, burial and burning. These practices adversely impact on human health and the environment, specifically:

- air pollution from smoke;
- pollution of ground and surface water resources and home grown fruit and vegetables;
- people inhaling smoke from fires at risk of contracting disease (cancer, respiratory related illness); and
- fires can destroy property.

2.1.5.5 Transport

In Mpumalanga almost 70% of people travel by foot as the mode of travel that they use when travelling to their place of work or school (Figure 13). The category "on foot" also includes people who work from home and live-in domestics, in other words people who do not use any transport to get to their place of work or school. This proportion is the lowest for the Nkangala DM where only about 61.8% of people travel by foot to their place of work or school.

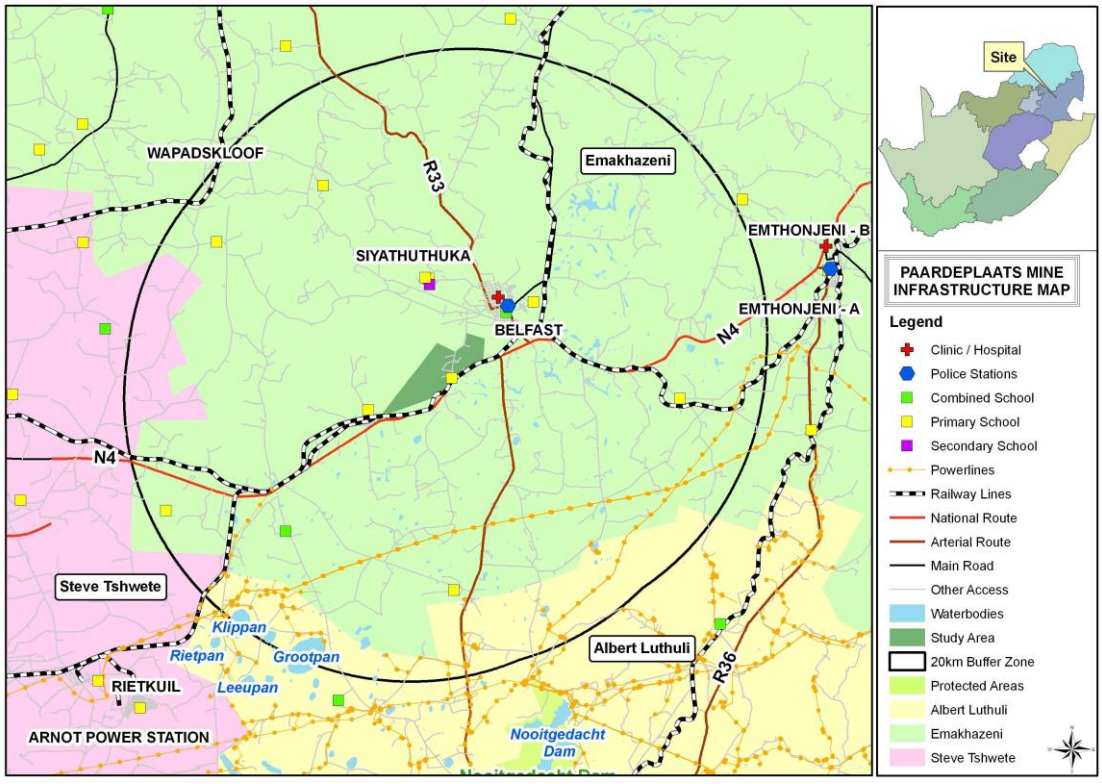
Figure 13: Mode of travel (shown in percentage, source: Census 2001)



The roads in the Emakhazeni LM area were not constructed for the use of the heavy vehicle traffic that passes the towns on a daily basis due to the opening of new mines and transportation of goods from Steelpoort and other area (IDP, 2011-2016). The past five years have seen a great increase in the number of heavy vehicles that pass through the Emakhazeni area. There is also no proper truck stop facility in Emakhazeni therefore trucks are stopping everywhere. Emakhazeni and Dullstroom do not have weighbridges, which means trucks that are overloaded can pass through without monitoring. Emakhazeni LM does not get any assistance to maintain the roads from the truck owners and are experiencing a lot of civil claims from motorists for damage caused by potholes.

Figure 14 shows the location of social infrastructure in relation to the proposed location of the mine.

Figure 14: Infrastructure surrounding the proposed mine



2.1.6 Community power structures

The municipal area is divided in a number of wards, each with a ward councillor representing the ward. Each ward also has a ward committee. There are no areas in

the municipal area that are under the management of traditional authorities. In Siyathuthuka there is a well-organised Community Development Forum with NAFCOC having a strong presence in the area. Most of the farmers in the area belong to the Wonderfontein Farmers Union. Other power structures in the community include other agricultural associations, residents associations like the Wonderfontein Community Association and possibly community property associations.

2.1.7 Health and welfare

2.1.7.1 Health

In 2008, the HIV prevalence for Mpumalanga was 11%, for the Nkangala district, 11.3% and for the Emakhazeni Local Municipality 11.2% (Nkangala District Municipality IDP, 2012-2013). Although the HIV estimates reflect a declining trend, it remains problematic.

The strategy for the Emakhazeni Local Municipality (IDP, 2012-2013) regarding health is as follows:

- The Introduction of PMTCT campaigns to high school learners to promote access to information through lifelong learning;
- The extension of health services especially to the poor through a multi-sectoral approach and collaboration with the Department of Health and Social Services so that adequate safety nets are created and the provision of ARV's and condoms becomes widespread;
- Special attention be given to augmenting Home-based care and encouraging disclosure amongst those infected;
- Encouraging voluntary testing amongst all community members;
- Appointment of an HIV/ AIDS co-ordinator.

2.1.7.2 Welfare

The Emakhazeni Local Municipality (IDP, 2012-2013) has reported a number of issues that relates to the general welfare of the community:

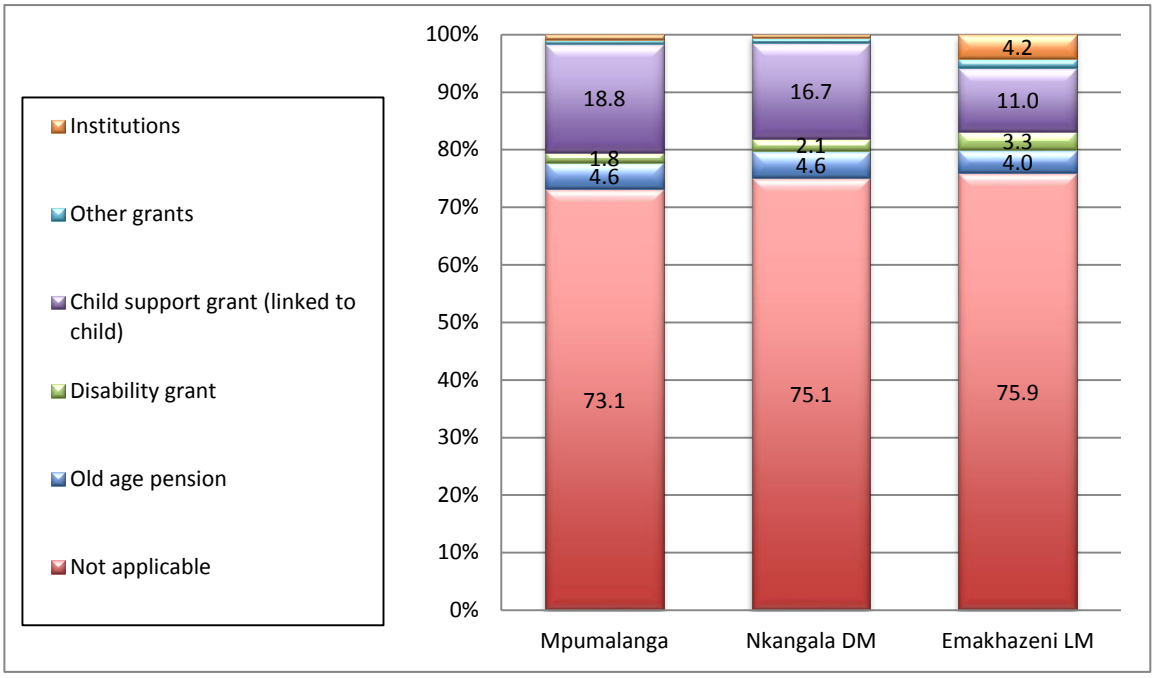
- High rate of unemployment;
- Teenage pregnancy;
- Poverty;
- HIV/AIDS prevalence;
- Substance abuse;
- Inadequacy of recreational and entertainment facilities, especially in entertainment;
- The majority of households in the Emakhazini LM is child-headed;
- Lack of facilitation of early childhood development;
- Lack of career guidance and development of young entrepreneurs;
- Lack of mainstreaming and exit plan for youth development at local government level;
- Lack of Education and Skilling response plan;
- Lack of support from departments and private sector for youth development co-operatives;
- Youth delinquency;
- Lack of interest in issues of local government.

2.1.7.3 Social Grants

For many people receiving a social grant is an important source of income, as it may be the only source of income. About a quarter of the people on provincial, district or

local level is receiving a social grant. On district and local level, slightly less people that on provincial level are receiving social grants. The most frequently received grant is a child support grant that is linked to a child, followed by old age pension and disability grants (Figure 15).

Figure 15: Social grants profile (shown in percentage, base: those of economically active age (15-65 years), source: Community Survey 2007)



2.1.8 Available natural resources and ownership

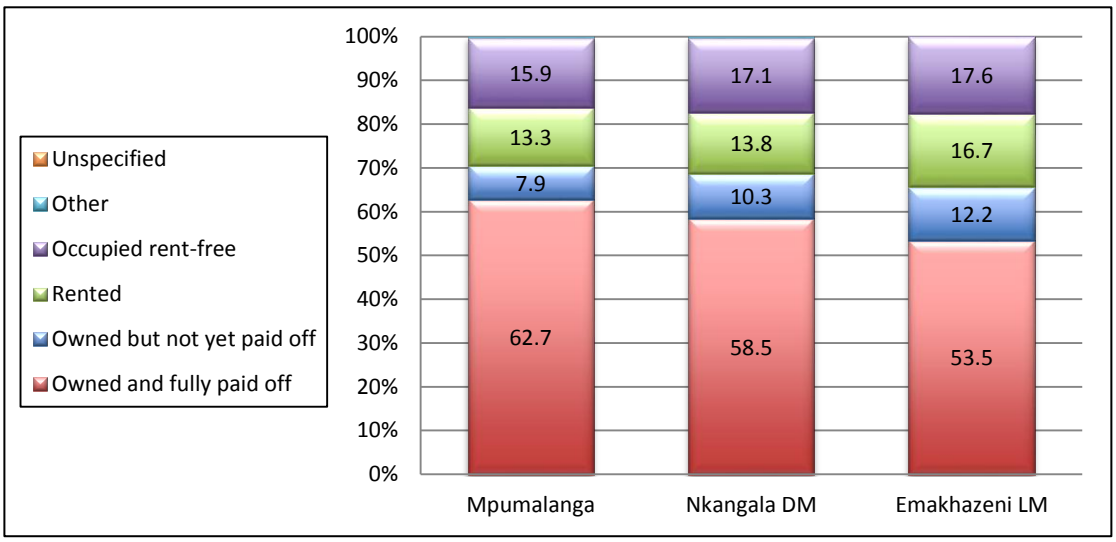
Farming occupies most of the physical land, which means that land ownership in the area rests with a minority of the community. On many farms there are farm workers residing, but they do not own the land that they live on. In the formal township areas, plots tend to be small, while in informal settlements, the land on which the dwellings are situated, usually does not belong to the residents. Tenure status and type of dwelling is discussed below.

2.1.8.1 Tenure

The Emakhazeni LM has the lowest proportion of who own their dwellings and have paid them off in full (Figure 16), compared to 49.2% in the Delmas LM, 58.5% on

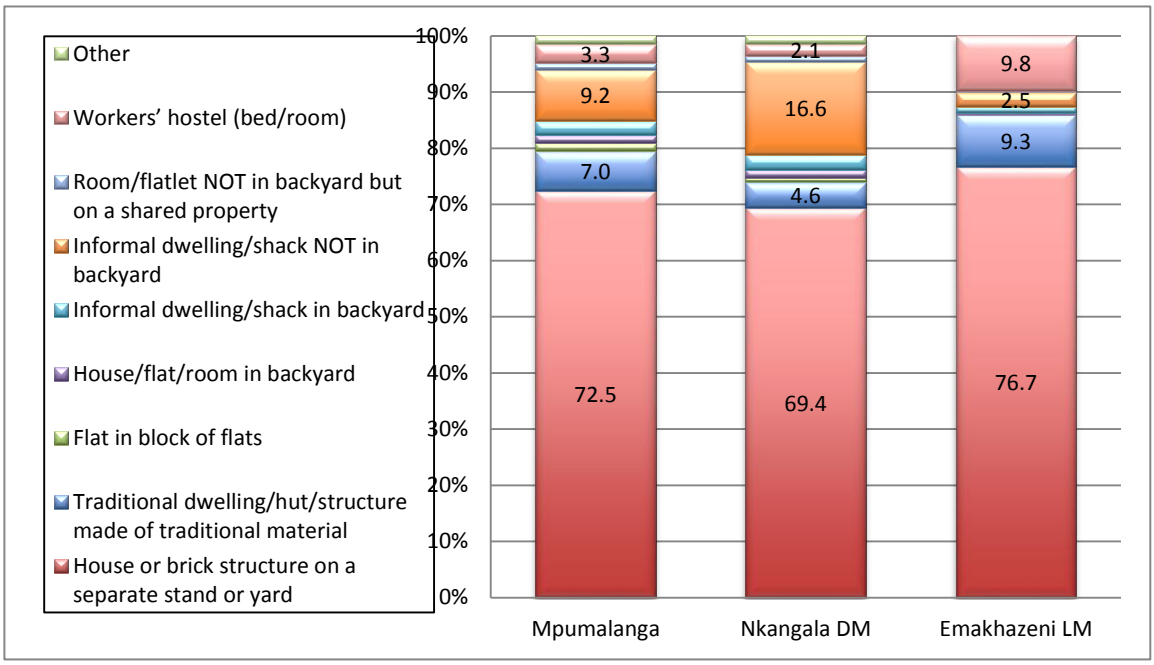
district level and 62.7% on provincial level. Almost a quarter of the households in Emalahleni LM as well as the Delmas LM have indicated that they occupy their dwellings rent-free, which is much higher than on district or provincial level.

Figure 16: Tenure status distribution (shown in percentage, source: CS 2007)



Most dwellings in the Emakhazeni LM are houses or brick structures that are on a separate stand or yard (Figure 17), with a higher incidence than on district or provincial level. The incidence of informal dwellings in the Emakhazeni LM is relatively low compared to the incidence on district and provincial level, which may suggest that there are not that many opportunities in the area that would attract opportunistic job seekers from outside the area. The incidence of traditional dwellings made of traditional material is higher on local level, than on district and provincial level, which is unexpected as there are no areas under traditional authority on local level. The incidence for people staying in workers' hostels is also higher than on district or provincial level.

Figure 17: Type of dwelling (shown in percentage, source: CS 2007)



According to the Emakhazeni Local Municipality IDP (2012-2013) the type of household where a dwelling resides is directly linked to the wellbeing of household members. There is evidence that suggests that children under age 5 who reside in dwellings that have poor floor, wall and roof materials have higher prevalence of negative developmental outcomes (Emakhazeni Local Municipality IDP, 2012-2013). They have higher mortality during childhood, higher morbidity and lower school attendance. This is also because households in dwellings with poor building structures are often poor, have little to no access to other basic services such as safe water and sanitation.

2.1.9 Livelihood

2.1.9.1 Standard of living

In South Africa there is no specific measure for social class or standard of living. The SAARF Universal LSM (Living Standard Measure) is a segmentation tool that is widely used in the marketing industry to segment the South African market into 10 LSM groups with LSM 10 being the highest and LSM 1 the lowest. It groups people according to their living standards using criteria such as degree of urbanisation and ownership of cars and major appliances (www.saarf.co.za). It is does not give an

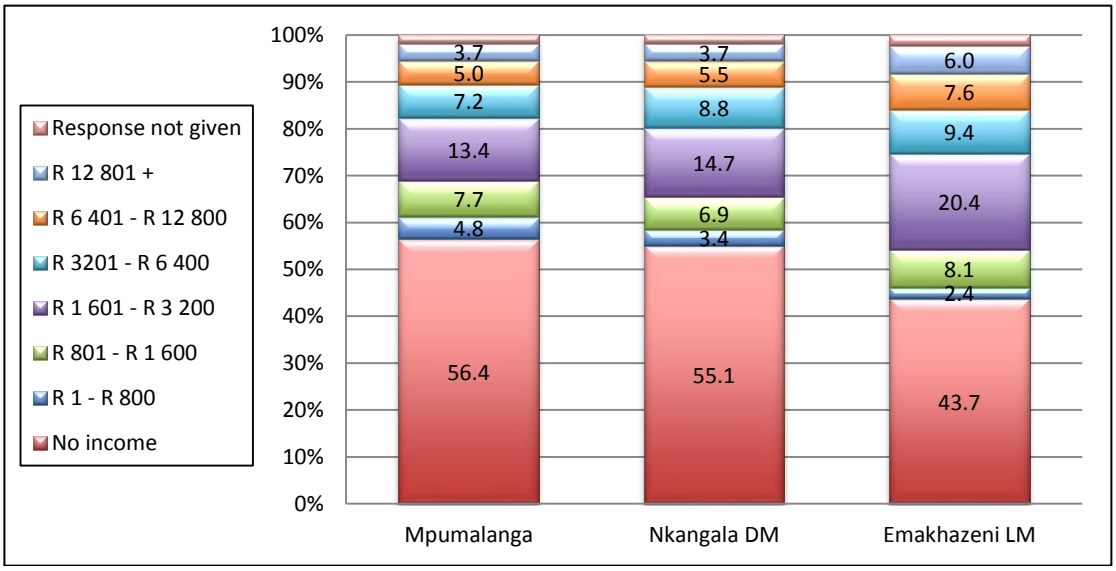
indication of disposable income or the size of a person's income, as a person with a high income who chooses to live a fairly simple life with very few appliances may have a lower LSM than a person with a lower income, a lot of debt, but much more appliances. It must be kept in mind that there are other equally valid ways to segment the population, for example in terms of lifestyle, life stages or attitudes.

Based on the characteristics of the population, it is anticipated that most would fall into the LSM 1-4 groups, maybe some LSM 5. Most would have completed some schooling, but not many would have completed high school. Radio would be the major media communication channel with the incidence of reading newspapers being fairly low. Access to services would range from basic (water, electricity, toilet) to none, with minimal ownership of durables. Participation in activities would include singing, attending gatherings and maybe going to clubs.

2.1.9.2 Income

On district and provincial level, approximately 55% of the population between the ages of 15 and 65 years have indicated that they did not have any income (Figure 18) in 2007, compared to just over 40% on local level. People in the Emakhazeni LM are financially slightly better off than the district and the province, but the levels of poverty are still high.

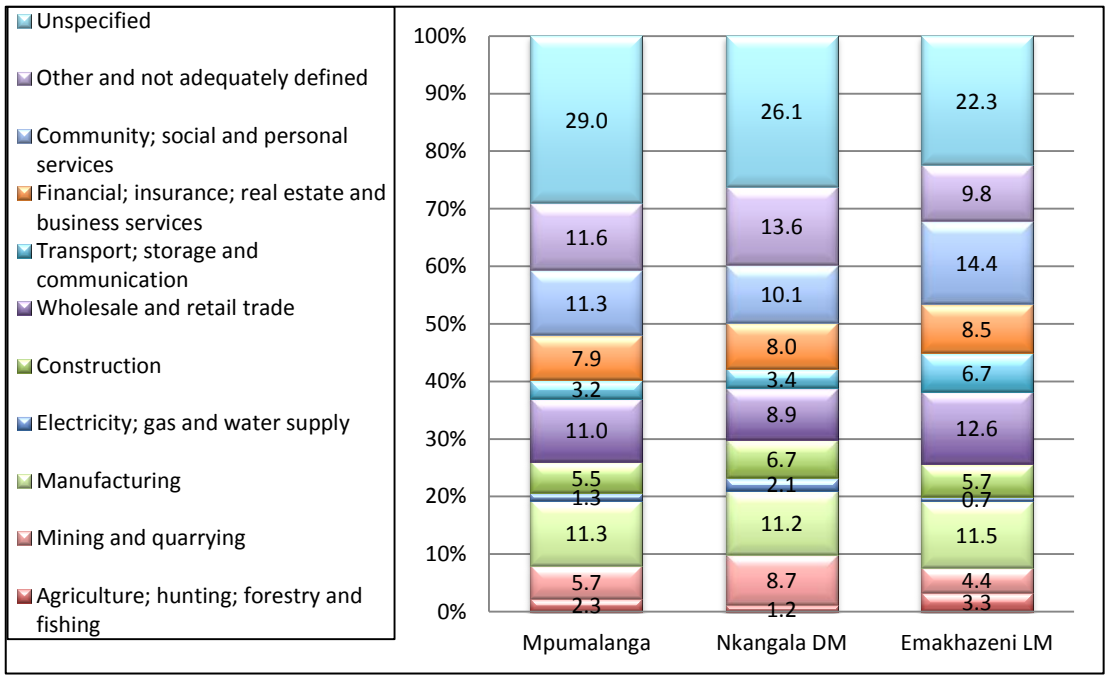
Figure 18: Individual Monthly Income distribution (shown in percentage, source: CS 2007)



2.1.9.3 Industry

The industry profiles for the different areas under investigation look different from one another (Figure 19). It must be noted that a large proportion is indicated as either unspecified or as other and not adequately defined. Sorting this issue out could lead to a change in the profiles. The main industry of employment in Mpumalanga as well as in the Emakhazeni LM is Manufacturing; Community, social and personal services and Wholesale and retail trade. The Community; social and personal services sector includes public administration and defence activities, education and health and social work. Other large employment sectors in the Emakhazeni LM are Wholesale and retail trade and Manufacturing.

Figure 19: Industry distribution of the employed (shown in percentage, source: CS 2007)



2.1.10 Skills

The dilemma in the South African labour market is to find the right balance between high levels of unemployment and the shortage of skills as demanded in the economy (Department of Labour, 2011). Unemployment is high among people with no tertiary education and low among people with a tertiary education. A worrying factor is that

unemployment among the educated is increasingly becoming a phenomenon. Although youth unemployment is very challenging, it is also important to emphasise the importance of promoting effective integral policies. There is a need for a coherent system that might link the educational system to labour market outcomes. As long as large numbers of youth are skilled in fields that are not in demand in the economy, the problem of youth unemployment will persist.

Lack of schooling is not necessarily the reason for unemployment, but employers often use educational level as a selection device. If the average level of education increases, the selection criteria may also be raised. Lack of education and training contributes to low job security and can also increase the number of the long-term unemployed.

The unemployed represent an important target group for the National Skills Development Strategy. It is vital that their skills be upgraded in order to facilitate their transition into active employment and livelong learning and to grow the skills pool from which the employers can recruit (Department Of Labour, 2003).

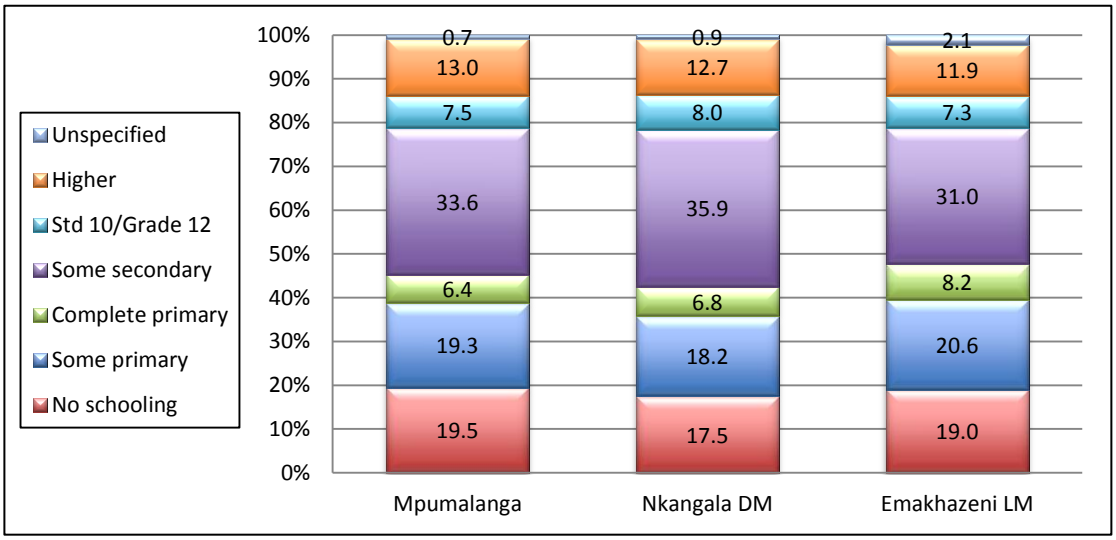
2.1.10.1 Education

Education deprivation is one of the domains of Multiple Deprivation that was used to calculate the Provincial Indices of Multiple Deprivation. There is a close link between educational attainment, the type of work an individual is engaged in and the associated earnings potential. The level of education achieved by an individual, determines current income and savings potential, as well as future opportunities for individuals and their dependants (Noble et al, 2006).

The Emakhazeni LM has the lowest proportion of people indicating that they have obtained Grade 12 or a higher qualification than on district or provincial level (Figure 20), suggesting skills in the area will be limited. According to the Emakhazeni Local Municipality IDP (2012-2013), the proportion of people who have completed Grade 12 has declined since 2001, which could be a comment on the educational system, but does not bode well for skills potential in the area. The high proportion of people who did not attend an educational institution has resulted in a generation of

illiterate young people with a future of unemployment. This also poses a significant problem within communities as dependency as well as criminal activities increases.

Figure 20: Highest education level – people 20 years or older (shown in percentage, source: CS 2007)

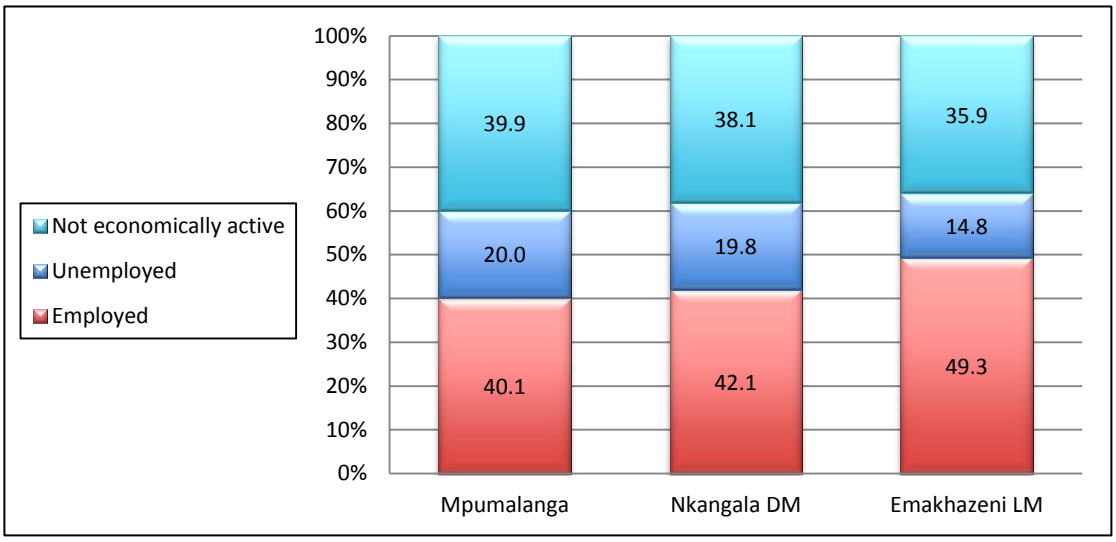


The Nkangala District Municipality's IDP identified some challenges with regard to education in the district as decaying schools, lack of learner transport and lack of facilities, e.g. libraries, sport facilities and basic necessities such as ablution facilities. Other important social issues affecting the school attendance rate include drug abuse, teenage pregnancy and violence at schools (Nkangala IDP 2008/2009).

2.1.10.2 Employment

Approximately half of the people in the Emakhazeni LM who are of economically active age (aged between 15 and 65 years) have indicated that they are employed (Figure 21), compared to 42.1% in Nkangala and 40.1% in Mpumalanga, indicating the greater concentration of economic activities in the area.

Figure 21: Employment status distribution (shown in percentage, source: CS 2007)



Only about 15% of the inhabitants of the Emakhazeni LM have indicated that they wanted to work and had taken active steps around the time of the survey to find employment. The proportions for Emakhazeni LM are different from the proportions on district and provincial level. The Emakhazeni LM has the smallest proportion of people who have described themselves as not economically active. People who are not economically active are people from economically active age who do not form part of the labour force such as housewives/homemakers, students and scholars, pensioners and retired people, and any others who do not seek to work during the period of reference (at the time of data collection). This group also include discouraged work seekers, who have either given up on finding a job, or who live too far or who do not have the means to travel around seeking a job.

Efforts to support employment creation in the following key sectors will be prioritised (Emakhazeni Local Municipality IDP, 2011-2016):

- Infrastructure;
- The agriculture value chain;
- The mining value chain;
- The green economy;

- Manufacturing sectors; and
- Tourism.

To this extent, the objectives of the Emakhazeni LM (IDP, 2011-2016) are:

- To ensure economic growth and that all capital projects contribute towards the alleviation of poverty and job creation;
- To increase the labour intensity of government funded infrastructure projects, environmental programmes and public social grants;
- To achieve the objectives of the National and Mpumalanga Economic Growth and Development Path as linked to the LED strategy.

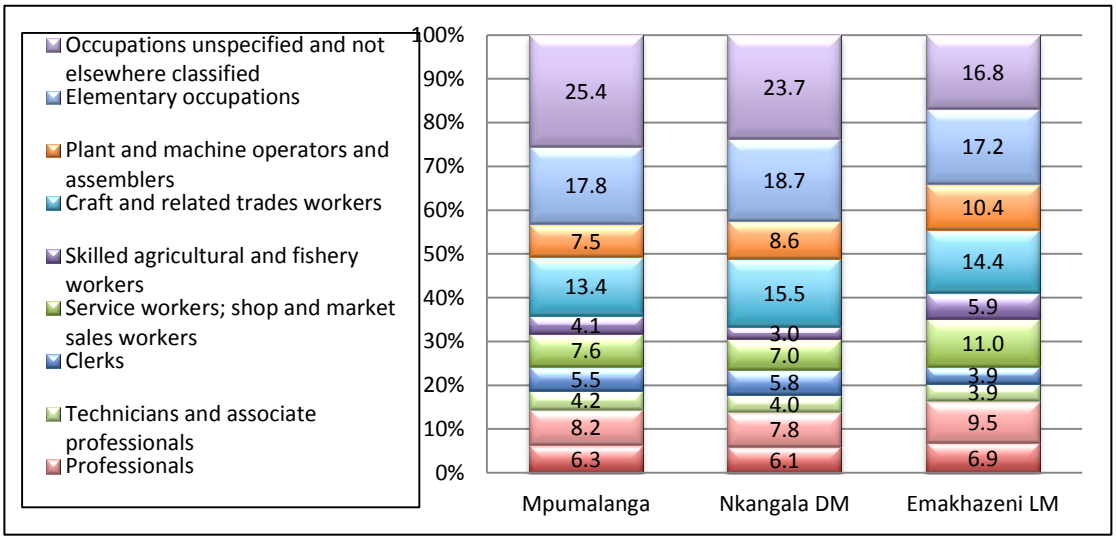
The strategy of the Emakhazeni LM to reach these objectives is:

- To upgrade infrastructure in order to boost tourism in the Emakhazeni LM area;
- To ensure that all the poverty alleviation and job creation projects are implemented and sustained all costs;
- To partner with social partners to create job opportunities in our area.

In general the largest proportion of the employed people in the study area on district and provincial level (Figure 22) are working in elementary occupations such as domestic workers, street vendors, shoe cleaners, building caretakers, messengers, porters, garbage collectors, agricultural workers, mining and construction labourers, manufacturing labourers, transport labourers and freight handlers. In the Emakhazeni LM, Craft and related trades workers is the second biggest occupational category. The category of Craft and related trades workers include extraction and building trades workers, metal, machinery and related trades workers, handicraft, printing and related trades workers and other craft and related trades workers such as food processing. It must be noted that there is a high proportion of occupations

that are indicated as unspecified and not elsewhere classified, which may modify the profiles should they be classified.

Figure 22: Occupation distribution of the employed (shown in percentage, source: CS 2007)



2.1.10.3 GDP Growth

Nkangala's contribution to Mpumalanga's economy showed a marginal increase from 37.0 per cent in 1996, to 39.9 per cent in 2009 (Nkangala District Municipality IDP, 2012-2013). The economic growth of the district, as measured by GDP growth, was lower than the provincial rate in 2009. The average annual growth rate for the district and the province over the period 1996 to 2009 was 3.1% and 2.6%, respectively. Despite the economic recession experienced in 2008 and 2009, the forecasted annual growth rate going forward (2009-2014) is 3.4% for the province and 3.3% for the district. Over the period under review, the economy of the Emakhazeni LM (6%) grew at a faster pace than that of the economy.

2.2 Stakeholder identification and analysis

Every individual potentially affected by this project is a stakeholder in the project. The definition of a stakeholder is:

> *Any individual, group, or institution who has a vested interest in the social, economic or bio-physical resources of the project area and/or who potentially will be affected by project activities and have something to*

gain or lose if conditions change or stay the same (Adapted from WWF, 2005).

Stakeholder analysis identifies all primary and secondary stakeholders who have a vested interest in the issues with which the project is concerned. The goal of stakeholder analysis is to develop a strategic view of the human and institutional landscape, and of the relationships between the different stakeholders and the issues they care about most.

The following key stakeholders have been identified:

- Government
    - Nkangala District Municipality;
    - Emakhazeni Local Municipality.
- Civil society
    - Emakhazeni (Belfast) and Siyathuthuka;
    - Dullstroom and Sakhelwe;
    - Entokozweni (Machadodorp) and Emthonjeni;
    - Waterval-Boven and Emgwenya;
    - Hadeco Village;
    - Farmers;
    - Farm workers;
    - Non-government organisations e.g. Powerbelt Project;
    - Development trusts e.g. Emakhazeni Development Forum.
- Industry

  - Surrounding mines (e.g. Nkomati, Assmang, Mafube, Shanduka);
  - Service providers (Eskom, Transnet etc.).
  - Hadeco;
  - Chamber of Commerce;
  - NAFCOC (National African Federated Chamber of Commerce and Industry);
  - Suppliers.

- Media
  - Local and regional newspapers.

- Internal stakeholders
  - Paardeplaats Shareholders;
  - Paardeplaats Management;
  - Employees;
  - Contractors;
  - Labour Unions.

2.2.1 Sensitive receptors

The following stakeholder groups are seen as sensitive receptors:

- Hadeco and Hadeco Village;
- Siyathuthuka;
- The town of Belfast; and
- Neighbouring farmers and farm workers.

The next paragraphs contain a brief discussion on each of the sensitive receptor groups.

2.2.1.1 Hadeco and Hadeco Village

Hadeco is an agricultural business specializing in flower production and holds a niche market in South Africa. The company employs about 1 400 people in total. There are approximately 60 permanent employees at Paardeplaats and 12 – 150 seasonal workers depending on the time of year. Approximately 85 jobs at Hadeco's Head Office are directly dependent on the activities at Paardeplaats. Hadeco has seven farms across the country that is used for the production of 48 different types of flower bulbs. Different climates are required for optimal production and three of the farms are in a warm climate, three in a temperate climate and only one in a cold climate, namely the farm at Paardeplaats. At each location very specific conditions are required for each type of bulb, for example soil temperature, difference between minimum and maximum temperatures, the direction the land is facing, etc.

The Paardeplaats property is the only place in South Africa where they grow tulips and daffodils due to its unique natural environment with long cold winters and short cool summers. The soil temperatures drop early in the year and do not suffer frosts. There is only 15 degrees difference between the average minimum and maximum temperatures, and this is what the bulbs can tolerate.

The Paardeplaats farm is also a quarantine farm that has been approved by the Department of Agriculture. The soil is being tested regularly and strict quarantine protocols have to be adhered to. Certain changes in soil quality, water or air quality can result in the contravention of the quarantine protocol.

It is a labour intensive business and it employs people with low skills levels, and high numbers of females. The average years of service of the employees on the Paardeplaats property is 21 years, with the average age of the employees around 50 years. Most of the employees live in the Hadeco Village that is situated on the farm. There are currently about 36 families residing in the village with a total of

approximately 195 people. About ten of these families are ex-employees. They have running water and electricity in their houses that is heavily subsidized by Hadeco.

There is also a primary school (Grade R to Grade 7) that is run by the Mpumalanga Education Department on the property – the physical infrastructure belongs to Hadeco. The school has approximately 155 pupils, not all from the village. Children from neighbouring areas ranging from the Sunbury station to the Wimpy are also present at the school.

Also on Hadeco's property is a settlement of about eleven clay houses where approximately 37 people are residing. The residents built these houses themselves.

The employees of Hadeco and residents of Hadeco Village are seen as sensitive receptors, since they all work and reside in the mining rights area. Should Exxaro decide to mine the entire area, the business would need to relocate, which would not be possible without loss of jobs, and all the residents would need to be resettled. Given the age, gender and skills level of the average employee it is highly unlikely that they will find alternative employment should they lose their jobs, and they will get stuck in a downward spiral of poverty.

2.2.1.2 Siyathuthuka

Siyathuthuka is a township just outside the town of Belfast. People in the area tend to know one another and have reported that many people are related to each other. The community is poor and people feel that they do not have skills, they also do not have money to study or attend courses that would expand their skills set. Infrastructure is a huge challenge in the area. There are not enough houses and there is a shortage of municipal land to use for housing. The supply of water and electricity is also problematic according to residents. The people of Siythuthuka are familiar with mining as there are a number of mines in the area, but they are of the opinion that the local economy is not benefitting from the mining as the bulk of the employees are not locals and spend their money in the areas that they come from, like Middelburg or KZN. Residents of Siyathuthuka would like to see more employment and business opportunities for local residents and also that employees

who are not locals reside in houses in the area so that they can spend more of their money locally. They feel that people should live where they work.

Other infrastructure development that residents feel are needed are shops, as most shops are in the town of Belfast, which is not within easy walking distance. They are also of the opinion that the image of the town Belfast, as well as its general appearance, is not helping their case. With the support of the municipality, residents have organised a Community Development Forum and are currently very committed to play an active role in the upliftment of their community.

Residents have indicated that they are already experiencing negative impacts from mining, which are attributed to the Glisa mining activities, that is relatively close to Siyathuthuka and the town of Belfast. The impacts experienced relate to cracks as a result of blasting, noise and dust.

2.2.1.3 The town of Belfast

Belfast is the closest town to the proposed site. Although Belfast is in close proximity to the tourist town of Dullstroom, and offers access to the same types of amenities, Belfast does not have a tourism image and is regarded by many as an industrial town. Some residents even go so far as to describe the town as a "dump". Businesses in the town are battling to survive and the town has a very neglected appearance (especially the parts where tourists and business travellers fare through). Businesses complain that mine employees do not spend their money in town as many reside in other areas. The business community does not have a formal business association, but seems to be loosely organised in interest groups. Some residents describe Belfast as the backbone of infrastructure in the area without which towns like Machadodorp and Waterval Boven, and even Dullstroom, would battle to survive. Belfast, for example, has a hospital as well as doctors.

Residents are complaining that they are already experiencing impacts from the Glisa mine, such as cracks in their houses as a result of blasting, noise as a result of blasting, dust and fears regarding water pollution. The issue with dust does not relate to the average amount of dust experienced, but to the dust load associated

with each blasting incident when a dust cloud travels over the area. They are of the opinion that the impacts of blasting are magnified due to Belfast being located on top of a solid granite bank. Traffic impacts as a result of the Glisa mine as well as other mines in the area is a nuisance due to the impact on the roads. Residents have reported that the heavy vehicles do not always use the roads that were built for them, but often at night take short cuts through the suburbs, which create a lot of noise and cause these roads to deteriorate.

2.2.1.4 Neighbouring farmers and farm workers

The proposed site is located in a rural area and is surrounded by farms. The farmers can be divided in two broad groups, namely the farmers with farms situated in the proposed mining rights area, and then the farmers adjacent to, or in close proximity, to the proposed mining rights area.

Most of the land on the mining rights area belongs to Exxaro, except for portions 13, 29 and 40. Portions 29 and 40 belong to Hadeco, and their activities are discussed under a separate heading. The land belonging to Exxaro is currently being rented out to other farmers in the area. Portion 13 belongs to the Wilkie family. The main source of income from Portion 13 for the Wilkie family is the dams that they rent out to a syndicate of about twelve families. There are cottages at the dam and the syndicate uses the dams for recreational purposes. The syndicate is responsible for stocking the dams with fish as well as the general maintenance of the cottages and the rental agreement is done for a year or two in advance. If the sense of place of the dams is altered, it is likely that the syndicate would no longer be interested in renting the area from the family. The family are currently experiencing impacts from the Glisa mine on the farm like noise from trucks as well as reverse alarms and noise associated with dumping, cracks and damage resulting from vibrations and aftershocks, air quality (not in terms of monthly average, but the instantaneous dust load after blasting) and concerns regarding water levels.

Farmers in the surrounding areas do not only farm with agricultural products, some also practise forestry. In the area surrounding the site, there are pine and eucalyptus plantations. Agricultural products on the surrounding farms mainly consist of maize,

soya and cattle, although it has been reported that there are farmers with cherry orchards in the vicinity. Some farmers have concerns about effect of the coal dust on the trees and agricultural products. Current impacts such as dust and cracks as a result of blasting are the main impacts being experienced by many of the surrounding farmers. Another impact that the farming community is experiencing as a result of mining activities in the area is the loss of farm labour to mines, especially in terms of semi-skilled labourers like tractor drivers. Some of the farmers have empowerment projects for their farm workers. The farm workers are far from town and transport is a challenge for them. Farm workers hope that they will also benefit in some way from the mine's local economic development programmes and that not only the people in the township will be beneficiaries.

2.3 Details of site visits

Fieldwork was conducted during October 2012. Respondents were selected as per the methodology discussed in the next section. Representatives of the following stakeholder groups were interviewed using a qualitative methodology or consulted with:

- Hadeco management;
- Hadeco employees and residents of Hadeco Village;
- Employees of the Emakhazeni Local Municipality;
- Farmers on the proposed mining rights area as well as on adjacent properties;
- Farm workers;
- Representative of Wonderfontein Farmers Union;
- Residents of Siyathuthuka as well as members of the Community Development Forum;
- Small and micro business owners in the area;

- Residents of Belfast;
- Representatives from Exxaro.

In line with international best practice in social research, where possible the identity and confidentiality of private individuals are protected. This is discussed in more detail in the section on ethics under methodology.

3 Methodology

3.1 Information base

The information used in this study was based on the following:

- A literature review (see list provided in the References);
- Professional judgement based on experience gained with similar projects;
- Focus group and individual meetings with affected parties.

3.2 Assumptions and limitations

The following assumptions and limitations were relevant:

- Not every individual in the community could be interviewed, therefore only key people in the community were approached for discussion. Additional information was obtained using existing data, records of public meetings and via telephonic and personal interviews.
- The social environment constantly changes and adapts to change, and external factors outside the scope of the project can offset social changes, for example changes in local political leadership. It is therefore difficult to predict all impacts to a high level of accuracy, although care has been taken to identify and address the most likely impacts in the most appropriate way for the current local context within the limitations.
- Social impacts can be felt on an actual or perceptual level, and therefore it is not always straightforward to measure the impacts in a quantitative manner.

- Social impacts commence when the project enters the public domain. Some of these impacts are thus already taking place, irrespective of whether the project continues or not. These impacts are difficult to mitigate and some would require immediate action to minimise the risk.

- There are different groups with different interests in the community, and what one group may experience as a positive social impact, might be experienced as a negative impact by another group. This duality will be pointed out in the impact assessment phase of the report.

3.3 Methodology

Scientific social research methods were used for this assessment. In order to clarify the process to the reader, this section will start with a brief explanation of the processes that have been used in this study.

3.3.1 Defining of concepts

The theoretical model used for this impact assessment was developed by Slootweg, Vanclay and Van Schooten and presented in the International Handbook of Social Impact Assessment (Vanclay & Becker, 2003). This model identifies pathways by which social impacts may result from proposed projects. The model differentiates between social change processes and social impacts, where the social change process is the pathway leading to the social impact. Detail of how the model works is not relevant to this study, but it is important to understand the key concepts, which will be explained in the following paragraphs.

Social change processes are set in motion by project activities or policies. A social change process is a discreet, observable and describable process that changes the characteristics of a society, taking place regardless of the societal context (that is, independent of specific groups, religions etc.) These processes may, in certain circumstances and depending on the context, lead to the experience of social impacts (Vanclay, 2003). If managed properly, however, these changes may not create impacts. Whether impacts are caused will depend on the characteristics and history of the host community, and the extent of mitigation measures that are put in

place (Vanclay, 2003). Social change processes can be measured objectively, independent of the local context. Examples of social change processes are an increase in the population, relocation, or the presence of temporary workers. Social change processes relevant to the project will be discussed before the possible social impacts will be investigated.

For the purpose of this report, the following social change process categories were investigated:

- demographic processes;
- economic processes;
- geographic processes;
- institutional and legal processes;
- emancipatory and empowerment processes;
- sociocultural processes; and
- other relevant processes.

The International Association for Impact Assessment (2003) states that Social Impact Assessment includes the processes of analysing, monitoring and managing the intended and unintended social consequences, both positive and negative, of planned interventions (policies, programs, plans, projects) and any social change processes invoked by these interventions. Its primary purpose is to bring about a more sustainable and equitable biophysical and human environment. The Inter-organizational Committee on Principles and Guidelines for Social Impact Assessment (2003) defines Social Impact Assessment in terms of “efforts to assess, appraise or estimate, in advance, the social consequences that are likely to follow from proposed actions”.

A **social impact** is something that is experienced or felt by humans. It can be positive or negative. Social impacts can be experienced in a physical or perceptual sense. Therefore, two types of social impacts can be distinguished:

- **Objective** social impacts – i.e. impacts that can be quantified and verified by independent observers in the local context, such as changes in employment patterns, in standard of living or in health and safety.

- **Subjective** social impacts – i.e. impacts that occur "in the heads" or emotions of people, such as negative public attitudes, psychological stress or reduced quality of life.

It is important to include subjective social impacts, as these can have far-reaching consequences in the form of opposition to, and social mobilisation against the project (Du Preez & Perold, 2005).

The following Social Impact Assessment categories were investigated for the purpose of this SIA:

- health and social well-being;
- quality of the living environment;
- economic impacts and material well-being;
- cultural impacts;
- family and community impacts;
- institutional, legal, political and equity impacts; and
- gender impacts.

Relevant criteria for selecting significant social impacts included the following:

- probability of the event occurring;
- number of people that will be affected;
- duration of the impact;
- value of the benefits or costs to the impacted group;
- extent to which identified social impacts are reversible or can be mitigated;

- likelihood that an identified impact will lead to secondary or cumulative impacts;
- relevance for present and future policy decisions;
- uncertainty over possible effects; and
- presence or absence of controversy over the issue.

The model was adapted to suit the South African context, and where processes and impacts were not relevant to the study, it was omitted. Each category has a number of sub-categories, which also have been investigated. In order to make the report easier to read, similar impacts were grouped together, even if they did fall under different categories. Therefore, a number of impacts from different categories will be discussed under one heading. It is important to mention, however, that all categories were investigated and analysed prior to the writing of this report to ensure that the study is as thorough as possible. The Equator Principles, IFC Performance Standards and World Bank Environmental, Health and Safety guidelines were consulted in the writing of this report and the mitigation suggested adheres to these requirements.

3.3.2 Literature study

A detailed literature search was undertaken to obtain secondary data for the baseline description of the socio-economic environment. The information in this report was acquired via statistical data obtained from Statistics South Africa, SIA literature (see References), the public participation process as well as information from reputable sources on the World Wide Web.

3.3.3 Research approach

Traditionally there are two approaches to SIA, a technical approach and a participatory approach. A technical approach entails that a scientist remains a neutral observer of social phenomena. The role of the scientist is to identify indicators, obtain objective measures relevant to the situation and provide an expert assessment on how the system will change (Becker, Harris, Nielsen & McLaughlin, 2004). A participatory approach uses the knowledge and experiences of individuals

most affected by the proposed changes as the basis for projecting impacts. In this case the role of the scientist is facilitator of knowledge sharing, interpretation and reporting of impacts (Becker et al, 2004). For the purpose of this study, a participatory approach was followed. The impact assessment was therefore conducted based on qualitative information and a participatory approach.

The findings presented in this report are based on primary as well as secondary (desk) research. A qualitative approach was followed for the primary research, while qualitative as well as quantitative data were used for the secondary research.

The layperson sometimes criticises qualitative research as “subjective” or “not really that scientific”. For this reason it is vital to understand the distinction between qualitative and quantitative research as well as their respective areas of application.

Qualitative research as a research strategy is usually characterised by the inference of general laws from particular instances, forms theory from various conceptual elements, and explains meaning (David & Sutton, 2004). It usually emphasise words rather than quantification in the collection and analysis of data. Data collection takes place by using methods such as unstructured or semi-structured interviews, focus groups, observations, etc. Data is not recorded in any standardised coding format, but are usually reported according to themes. Qualitative data express information about feelings, values and attitudes. This approach is used where insight and understanding of a situation is required (Malhotra, 1996). Participants are selected based on their exposure to the experience or situation under review. The aim of qualitative research is to understand, not to quantify and as such is extremely suitable for assessing social impacts. A potential impact needs to be understood before it can be assessed appropriately.

Quantitative research as a research strategy usually makes inferences of particular instances by reference to general laws and principles and tends to emphasize what is external to or independent of the mind (objective) and incorporates a natural science model of the research process (David & Sutton, 2004). This usually makes it easier for a person with a natural or physical sciences background to relate to. This

approach usually emphasises quantification in the collection and analysis of data. Data collection take place by using methods such as structured questionnaires and data is recorded in a numeric or some other standardised coding format. Data is expressed in numerical format and statistical techniques are usually used to assist with data interpretation. This approach is used when information needs to be generalised to a specific population and participants are usually selected using probability sampling techniques (although non-probability methods can be used depending on the characteristics of the target population).

Although in theory the qualitative phase of this project could be followed by a quantitative phase, for a number of reasons it was not done. A quantitative phase would be more resource intensive in terms of labour, time and cost and the incremental precision obtained in terms of generalisability would not warrant the additional investment. Due to the strong emotional component relating to the perceived impacts, respondents may intentionally magnify the intensity of the impacts or indicate all impacts are equally severe in an attempt to bias the results in their favour, which will reduce the utility of quantitative results as part of the primary research process.

3.3.4 Primary data collection

Primary data was collected through personal interviews as well as through group interviews. Respondents for the interviews were selected by means of non-probability sampling techniques, more specifically a combination of judgemental and snowball sampling. The interviews took place individually or in a group. The mode of interviewing used depended on the availability and convenience of the particular respondent or group of respondents. An unstructured interviewing technique was used. This allowed for the respondent to communicate freely all information that he / she deemed relevant to the proposed development that may be missed in a more structured interviewing format. It also allowed for the interviewer to probe and to clarify issues.

The data gathered from the interviews were analysed and interpreted using qualitative techniques such as content analysis and triangulated with other data sources for assessment purposes.

3.3.5 Ethical issues

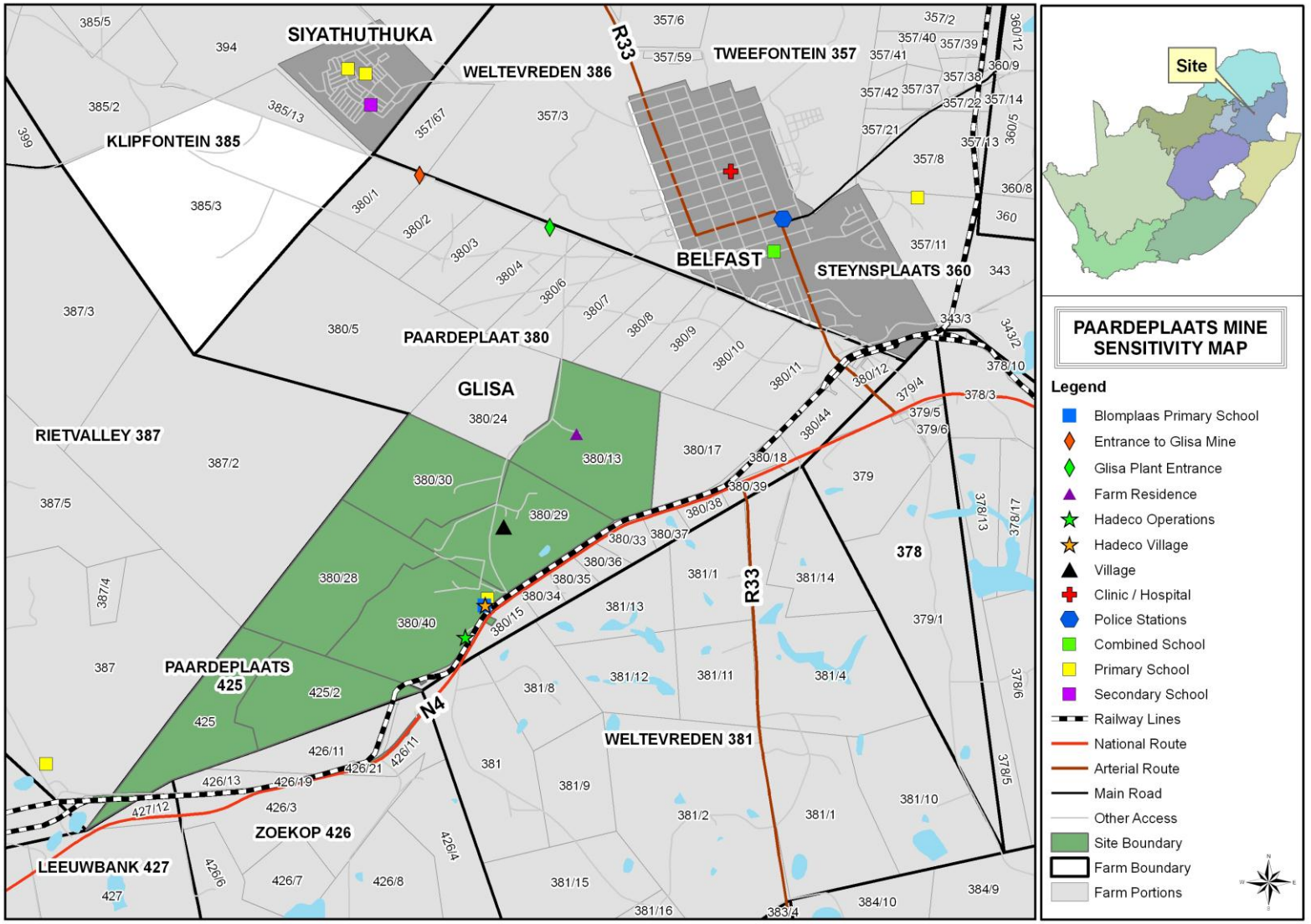
The fact that human beings are the objects of study in the social sciences brings unique ethical problems to the fore. Every individual have a right to privacy which is the individual's right to decide when, where, to whom, and to what extent his or her attitudes, beliefs and behaviour will be revealed (Strydom, 2002). Every person interviewed for the purposes of this report has been ensured that although the information shared will be used, their names will not be disclosed without their permission. Therefore, to protect those consulted and to maintain confidentiality, the people interviewed for this report will not be named in the report. Records of the interviews have been kept. This is in line with international as well as national research practices such as the ESOMAR and SAMRA codes of conduct.

4 Site sensitivities

From a social perspective, the proposed site contains a number of sensitive areas (Figure 23). The farm residence on Portion 13 is sensitive from a nuisance perspective (vibrations, cracks, noise, dust and possibly water pollution) as well as from a livelihoods perspective, should they loose their income as a result of uncertainty about future mining or loss of sense of place.

The other sensitive area on the site from a social perspective is the Hadeco operations, the Hadeco Village, the Blomplaas Primary School as well as the clay village. This sensitivity is mainly as a result of potential loss of livelihoods as well as loss of social networks and quality of life should these residents have to relocate or should Hadeco no longer be able to operate on the farm.

Figure 23: Sensitivity map for the proposed site



5 Site constraints

Site constraints from a social perspective relates closely to the site sensitivities. The business activities on Portion 13 are heavily dependent on sense of place, so even if mining does not take place on Portion 13, but only on Portion 30, it may affect the sense of place from Portion 13's perspective that may lead to a loss of income. It may be possible to overcome this constraint through a process of negotiation.

The main constraint in terms of the site however, is the Hadeco operation. Even in a situation where mining does not take place on the property, adjacent mining activities may have a biophysical impact on the Hadeco operation to an extent that would yield the business no longer viable. Although these impacts should be addressed in bio-physical impact studies such as air, water, soil, etc., it would be imperative for Exxaro to start a consultation process with Hadeco as soon as possible to determine exactly what these constraints and requirements are in order to establish whether mining in the proximity would be feasible or whether it possibly points in the direction of a fatal flaw.

6 Impact assessment

6.1 Social Impact Assessment

> *"Almost all projects almost always cause almost all impacts. Therefore more important than predicting impacts is having on-going monitoring and adaptive management."* Frank Vanclay

Considering the statement above, it must be considered that some social impacts will not be discussed in detail and that the focus will be on the most severe impacts. The social environment is dynamic and adapts to change and it is highly likely that impacts predicted in this report will change throughout the life of the mine. The focus should rather be on the active management of social impacts than on the prediction and once-off mitigation thereof. Successful mitigation and management of social impacts requires long-term commitment and involvement, and should form

part of the strategic planning and management of the mine until closure. Suggestions for the management of social impacts are included in the report. The implementation of the relevant management suggestions should start as soon as possible, since the social impacts of the project started when the project was announced. It must be re-iterated that the management of social impacts is more important than the predicting and listing of impacts. Another important consideration in this project is the social context in which it will be executed. Impacts are assessed from a community perspective, and where it will influence a specific group of stakeholders it will be indicated as such. An attempt was made to simplify the impact assessment and to focus on aspects that can aid the decision-making process.

Social impacts are the result of social change, and to fully understand the potential impacts it is important to know the impact pathways. A social change process is a discreet, observable and describable process that changes the characteristics of a society, taking place regardless of the societal context (that is, independent of specific groups, religions etc.). Social change processes can be measured objectively. The way in which social change processes is perceived, given meaning or valued, depend on the social context in which various societal groups act. Some groups in society are able to adapt quickly and exploit the opportunities of a new situation. Others (e.g. vulnerable groups) are less able to adapt and will bear most of the negative consequences of change. These social change processes may, in certain circumstances and depending on the context, lead to the experience of social impacts. Social impacts are therefore completely context-dependent (Vanclay, 2003). The table below provides the overall framework that was used for this impact assessment, grouping impact areas into six themes. The framework takes social changes and impacts resulting from those changes into consideration.

Table 4: Impact framework

Community Health and Safety	
Local/regional public health issues	Endemic diseases, community health standards, introduction and spread of diseases, disease control and prevention
Health services and facilities	Health services, clinics, government support, health systems, emergency access, hospitals, specialist support and availability
Community safety and environmental health	Traffic safety, access to lease areas, emissions and discharges, heavy metals
Change in the Social Environment	
Demographics	Population, gender, age, mobility, socio-economics, cultural origins
Community identity	Networks, community groups, volunteers, relationships
Education and training	Community education standards and facilities, apprenticeship programmes, adult education and training initiatives
Local political structure	Traditional positions of authority, governance, political parties
Crime and social order	Crime rates, policing arrangements, theft, violence, disturbances
Cultural heritage	Traditional sites, historical buildings, cultural heritage surveys, community organisations
Traditional communities	Traditional culture, land rights, community structures, health standards, history of interactions, community infrastructure
Resettlement	Housing, services, traditional livelihoods, family structures, compensation, government intervention
Local/regional economy	
Labour market	Employment pool, wage relativities, impacts on existing employment patterns
Local economy	Service industries, tourism, agriculture, workforce, regional development,

	business development
Management of taxes and royalties	Taxes, royalties, governments, services
Traditional livelihoods	Food sources, markets, cultural activities, workforce, local economy
Land tenure	Traditional landowners, land rights, agricultural leases, mining and exploration leases/permits, cultural values, community ownership
Local/regional infrastructure	
Local services/utilities	Changes in demand for power, water, sewerage etc, provision and management of facilities
Transport infrastructure	Access for workforce, import/export of materials, roads, rail, port facilities, airstrips, fuel management, river access, national highways
Housing	Availability and cost of housing in community, impacts of construction of new residences
Recreational facilities	Pressure on existing recreational facilities and locations, changes in access
Physical environment	
Water	Demand on local water sources, discharges, competition with other
Other natural resources	Flora and fauna impacts, rehabilitation practices, physical degradation
Environmental amenity	Impacts on other industries, neighbours, noise and vibration etc
Government and other role players	
Local/Regional/National governments	Levels of regional and national government, roles of different government departments, presence of local officials, corruption, regulation, taxes and royalties, planning
NGO's	Campaigns, aid organisations, environmental NGO's, blockades, partnerships, roundtables, Church groups

Impacts will be assessed using the impact framework as guide. Under each impact group opportunities and threats will be listed. Impact tables will be compiled for each impact. The tables will consider project specific impacts, mitigation measures and residual impacts (impact after mitigation). The potential for cumulative impacts will be discussed under the section for potential impacts.

The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility(R)) and to relate this to the probability/ likelihood (P) of the impact occurring. This determines the environmental risk. In addition other factors, including cumulative impacts (CI), public concern (PR), and potential for irreplaceable loss of resources (LR), are used to determine a prioritisation factor (PF) that is applied to the ER to determine the overall significance (S).

The following formulas have been used in determining the significance ratings as well as the priority of the impact:

- C= (E+D+M+R)/4 x N;
- ER= C x P;
- Priority = PR + CI + LR; and
- S = PF x ER (post mitigation).

The rating criteria used in determining the significance ratings are summarised in Table 5 to Table 10 below:

Table 5: Criteria for determination of impact consequence.

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary),
	3	Local (i.e. the area within 5 km of the site),

	4	Regional (i.e. extends between 5 and 50 km from the site
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years),
	3	Medium term (6-15 years),
	4	Long term (the impact will cease after the operational life span of the project),
	5	Permanent (no mitigation measure of natural process will reduce the impact after construction).
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected),
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected),
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way),
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease), or
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease).
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact

Table 6: Probability scoring.

Aspect	Score	Definition
	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

Table 7: Significance classes.

Environmental Risk Score	
Value	**Description**
< 9	Low (i.e. where this impact is unlikely to be a significant environmental risk),
≥9; <17	Medium (i.e. where the impact could have a significant environmental risk),
≥ 17	High (i.e. where the impact will have a significant environmental risk).

Table 8: Criteria for the determination of prioritisation.

Aspect	Score	Definition
	Low (1)	Not raised as a concern by the I&AP's
	Medium (2)	Issue/ impact raised by the I&AP's
	High (3)	Significant and meaningful response from the I&AP's
	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.
	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/definite that the impact will result in spatial and temporal cumulative change.
	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

Table 9: Determination of prioritisation factor.

Priority	Ranking	Prioritisation Factor
= 3	Low	1
3 – 9	Medium	1.5
= 9	High	2

Table 10: Environmental significance rating.

Environmental Significance Rating	
Value	**Description**
< 9	Low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
≥9; <17	Medium (i.e. where the impact could influence the decision to develop in the area),
≥ 17	High (i.e. where the impact must have an influence on the decision process to develop in the area).

It must be stated that the impact tables and ratings have been designed for the natural sciences and that it is not always possible to compartmentalise social impacts. For the sake of consistency this has been attempted, but it is not innate to social science. Allowance for the changing and adaptive nature of social impacts should be made when interpreting the impact tables. Another consideration is that the management and mitigation of some social impacts require input from a number of agencies, as these can only be addressed within the greater societal context. Proper mitigation and management would also take a number of years – this period would go far beyond the construction phase of the project. The focus of this report will therefore be on project-specific mitigation. The social impact will be discussed, but in some instances it is not possible for the proponent to implement the mitigation without support from other role players. The recommendations at the end of the report will focus on the best way to manage social impacts in the context of this project.

Impacts, opportunities and threats identified, mitigation and social management plan

The following section of the report focuses on the identification of social impacts, mitigation and management measures. Each subject will start with a list of factors that should be considered by the mine when contemplating their social impact. It is followed with a table pointing out opportunities and threats – both these sections can be used as checklists by the mine when reviewing their social performance. The first two sections are followed by a discussion of social impacts anticipated at this stage, impact tables and mitigation and management measures. Given the fact that

the social environment is constantly changing, it is important to plan for adaptive management of social impacts, and the intention of presenting the SIA in this format is that it will feed into such a management process.

6.1.1 Community health and safety

6.1.1.1 Factors to consider

- Endemic local or regional health issues e.g. AIDS, tuberculosis and diabetes;
- Extent of workforce migration and commuting;
- Source of workforce;
- Cultural/religious attitudes to specific health issues;
- Workforce living arrangements;
- Existing standard of health services & facilities;
- Social effects of improving health services & facilities;
- Additional facilities required due to population increase;
- Methods of transporting people and materials for mine operations;
- Location of operations with respect to the community;
- Security of mining area and ease of access; and
- Nature, method, volume and concentrations of emissions and discharges.

6.1.1.2 Opportunities and threats

The following tables list opportunities and threats from a health perspective. It is important to consider that opportunities and threats are not impacts, but have the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
The influx of sex workers associated with mining workforce can introduce STD's into the communities.	Yes

Increased movement of people introduces/promotes spread of diseases to other communities.	Yes
High levels of absenteeism and turnover due to endemic diseases e.g. AIDS	Yes
Closure leads to drop in public health levels due to re-emergence of disease, changes in diets and loss of traditional knowledge	Yes
Overreliance on mine to provide health services to the community	Yes
Health infrastructure and services not maintained after mine closure	Yes
Loss of traditional medical knowledge and treatment methods due to introduction of 'Western' medicine	Yes
Migration of people to the mine area for access to improved health facilities leading to overcrowding, social problems and strained resources.	Yes
Different standards of health care for mine workforce and general community causes tension	Yes
Mine-related traffic accidents involving community members	Yes
Safety incidents involving community members accessing mining area	Yes
Theft of hazardous materials from mine operations/contractors e.g. explosives	Yes
Company wrongly blamed for presence of contaminants or public health problems	Yes
Opportunities that will make a positive difference	**Is it possible?**
Treatment and control of diseases that place considerable burden on local communities e.g. HIV/Aids programmes	Yes
Increase community health awareness	Yes
Provide/support community health extension services	Yes
Build local capacity to deliver services and maintain facilities	Yes
Provide access to emergency facilities and services through mine	Yes
Provide health training opportunities to locals e.g. scholarships	Yes
Improve traffic safety infrastructure and standards in community/region	Yes
Develop positive safety culture in the community	Yes

6.1.1.3 Potential impacts

HIV/Aids is a national problem in South Africa and is already present in the community. According to the local community, there are many migrant workers (from other provinces and neighbouring countries) living in the community. In the current economic times, rumours of development will cause an influx of people into the area, even if the mine will not employ any new people. In-migration triggers a dramatic rise in the "four M's": men, money, movement (influx), and mixing (i.e., the interaction between high and low disease prevalence groups). These factors are the conditions necessary to produce a surge in sexually transmitted diseases.

Infectious diseases such as tuberculosis may increase – this is a risk to the communities and the workforce. In traditional communities there are often prejudices about illnesses such as HIV/Aids, and therefore the mitigation and management of this impact should be done in a culturally sensitive manner. There is currently no cure for HIV, and treatment entails chronic drug use, therefore this impact is seen as a permanent, irreversible impact.

There are current traffic impacts in the area, but the mine is not the only source of this impact. The extended operations will not increase the impact, but it will remain a nuisance to the people living in the area. This will not be assessed as a new impact, but some management measures are suggested for the operation phase in the mitigation and management plan.

The mine will be an open cast operation. Dust is an existing problem around the mine, and apart from quality of life impacts, there are health impacts such as respiratory diseases, asthma, allergies and sinusitis that may be attributed to the mine.

There will be some people, especially those with scarce skills, whom may commute from further afield, whether it is on a daily or weekly basis. This will have an impact on their family lives (relationships) and quality of life (fatigue). This is an indirect impact that will be experienced differently by each individual and should be managed on an individual basis.

The next section contains the impact tables, which will be followed by a mitigation and management plan. The mitigation of social impacts often involves a number of role players, and is usually not a once-off occurrence. Since some social change like an influx of people cannot be controlled or managed by the mine, it is difficult to mitigate the impacts resulting from such a change.

6.1.1.4 Impact assessment

Table 11: Increase in HIV/AIDS and other infectious diseases

Impact name:	Increase in HIV/AIDS and other infectious diseases		
Phase:	Construction and Operation		
Alternative:	All alternatives		
Description of impact:	HIV/AIDS is already a problem in the area, as a result of migrant workers employed by the mine and other industries in the area. Rumours of development will result in an influx of people into the area.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	5	5	
Duration of Impact	5	5	
Magnitude of Impact	4	3	
Reversibility of Impact	5	5	
Probability	4	3	
Environmental Risk (Pre-mitigation)			**-19**
Environmental Risk (Post-mitigation)			**-13,5**
Degree of confidence in impact prediction:			High
Recommended Mitigation Measures			
Form a partnership with a Non Profit Organisation (NPO) to provide the necessary social services to people whose lives are affected by infectious diseases. Develop an in-house infectious diseases strategy to address health issues with the workforce. Align strategy with community HIV strategy followed by NPO.			
Impact Prioritisation			
Public Response			2
Impact has been mentioned by a number of stakeholders			
Cumulative Impacts			2
This is an existing impact and the mine is not the only source of the impact. It is not possible to quantify the exact origin of the impact. Due to the presence of migrant labour this impact may spread to the labour-sending areas.			
Degree of potential irreplaceable loss of resources			3
The most important loss will be the loss of human capital and the associated skills since there is currently no cure for HIV/Aids. The treatment of the illness puts pressure on existing medical resources.			

Prioritisation Factor	1,666666667
Final Significance	**-22,5**

Table 12: Health impacts

Impact name:	Health impacts		
Phase:	Operation		
Alternative:	All alternatives		
Description of impact:	Health impacts such as asthma, sinusitis, allergies and other respiratory diseases attributed to dust generated by the operation of the mine.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	3	2	
Duration of Impact	4	4	
Magnitude of Impact	3	2	
Reversibility of Impact	3	3	
Probability	4	3	
Environmental Risk (Pre-mitigation)			**-13**
Environmental Risk (Post-mitigation)			**-8,25**
Degree of confidence in impact prediction:			High
Recommended Mitigation Measures			
Mitigation of the bio-physical dust impact will address this impact.			
Impact Prioritisation			
Public Response			2
Issue has been mentioned by a number of stakeholders			
Cumulative Impacts			2
This is an existing impact, and other industries in the area such as the agricultural, forestry and other mines contribute to the impact.			
Degree of potential irreplaceable loss of resources			1
This is a nuisance impact that affectes people's quality of life, and at most may affect productivity in the working environment.			
Prioritisation Factor			1,333333333
Final Significance			**-11**

6.1.2 Change in Social Environment

6.1.2.1 Factors to consider

- Existing population profile (age, gender etc.);

- Size of possible population changes with respect to existing communities;
- Composition of workforce and in-migrating population;
- Size, composition and diversity of community;
- Presence and strength of community groups and organisations;
- History of community;
- Current levels of education and training;
- Community attitudes towards education and training;
- Existing education and training infrastructure;
- Existing local political structure and culture;
- Capacity of community to engage with mining operations;
- Involvement of workforce in local political life;
- Existing levels of crime and disorder;
- Strength of social controls;
- Effectiveness of policing institutions;
- Extent of likely social disruption resulting from mining development;
- Level of local / regional instability;
- Presence and prominence of traditional community in area;
- Capacity of communities to deal with mining developments (previous exposure and experience);
- Existence of formal traditional groups e.g. Tribal Council; and
- Resettlement

- History of region;
- Presence of cultural/religious sites;
- Nature and size of communities involved; and
- Legal rights to land;

6.1.2.2 Opportunities and threats

The following tables list opportunities and threats from the perspective of changes that may occur in the social environment. It is important to consider that opportunities and threats are not impacts, but has the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
Large scale in-migration to area leading to unplanned population increases	Unlikely
Racial or ethnic tensions created or exacerbated by influx of people from other groups and areas.	Yes
Gender imbalance due to influx of mainly male workforce	Yes
Growth of illegal housing on outskirts of mine (e.g. squatter camps)	Yes
Social changes resulting from the presence of the mine weaken traditional power structures.	Yes
Discrepancy between higher paid mining workers and lower paid workers in the community generates social tensions	Yes
Community's sense of identity and traditional values are undermined by demographic and economic changes resulting from establishment of mining development	Yes
Uneven distribution of costs and benefits between different community groups (e.g. employment opportunities) generates tensions	Yes
Imported workers and other in-migrants introduce different lifestyles and patterns of behaviour, generating tension	Yes
Imported labour force creates resentment in community	Yes
Working time arrangements (e.g. 12 hour shifts and continuous rosters in residential operations) reduce ability of people to participate in community activities.	Yes
Strain on local education facilities due to increase in population	Yes

Decline in school population when mine downsizes/closes leads to reduction in education services	Yes
Education and training improvement initiatives implemented or supported by the mine not maintained.	Yes
Outward migration of skilled-up locals, changing the demographics of the local community.	Yes
Unequal access to training opportunities causes social conflict	Yes
People who receive mine-related training fail to obtain employment, creating disillusionment in the community	Yes
Significant elements of local community oppose mine	Yes
Changes due to mining alter local political structure leading to disenfranchisement of some groups e.g. women	Yes
Increased opportunities for corruption/excessive influence by political figures	Yes
Mine becomes a 'political football' for opposing political groups	Yes
Increased political conflict within community	Yes
Local political structures and processes not suited for dealing with issues related to mining operations e.g. planning decisions	Yes
Increased violence and disorder due to greater availability of alcohol	Yes
Opportunities created for property crime e.g. burglary and theft	Yes
Violent conflict between different groups living in or attracted to the community	Yes
Introduction of new or intensified social problems due to changes in recreational pursuits e.g. influx of a large number of male mine workers – growth of bars/alcohol, prostitution and subsequent consequences.	Yes
Criminal groups attracted to area due to opportunities e.g. illegal brothels, drug trafficking	Yes
Presence of mine changes power dynamics in community – increased internal conflict, less respect for elders etc.	Yes
Affected groups do not consent to resettlement.	Yes
Resettlement plans creates tension and disagreement in community.	Yes
Resettled communities are disadvantaged e.g. loss of livelihood, reduction in living conditions	Yes
Resettlement of Hadeco to make way for the mine results in conflict and controversy.	Yes
Opportunities that will make a positive difference	**Is it possible?**

Rejuvenate local population by providing incentives for mine workers and families to reside in local communities	Yes
Adopt employment policies aimed at increasing female representation in the mining workforce	Yes
Implement employment initiatives to encourage young people to stay in community	Yes
Encourage involvement of mine personnel in local organisations	Yes
Support capacity-building of local organisations	Yes
Promote community-building activities e.g. festivals, provision of community facilities such as meeting hall	Yes
Facilitate conflict resolution initiatives	Yes
Improve local education facilities and services	Yes
Improve skills of local teachers and educators	Yes
Implement or support initiatives to improve levels of school attendance e.g. school bus, school-based nutritional programs	Yes
Establish scholarship/bursary schemes for local students	Yes
Improve skill-base of local community through apprenticeship and trainee programs	Yes
Support community adult education initiatives	Yes
Support initiatives to develop skills and capabilities of local traditional and political leaders e.g. training on leadership	Yes
Support community crime prevention initiatives (e.g. neighbourhood watch, domestic violence programs)	Yes
Provide or support alternative activities for groups at risk of offending e.g. juveniles	Yes
Establish alternative, more sustainable livelihoods for resettled groups	Unlikely
Partner with NGO's to promote improvements in net welfare of affected groups	Yes
Use resettlement as an opportunity to showcase appropriate models of development e.g. community layout, housing, use of materials	Yes

6.1.2.3 Potential impacts

Development or rumours of development often causes an influx of people into an area. In the current economic conditions where high levels of unemployment exists,

the proposed mine will definitely attract people to the project area, even if it will not employ additional people. A number of social impacts are associated with an influx of people into an area. These impacts will start taking place in the construction phase, continue in the operational phase, and in the decommissioning phase there will be an outflow of people. At the time of closure a specific social impact assessment dealing with these impacts should be conducted.

It is important to take note that there are currently some trust issues between the mine and surrounding communities – both landowners and residents of the towns. There is a perception that the mine is not transparent about all its activities, not doing enough to mitigate its impact on the community and reluctant to share monitoring results and data. There is a historic component to these issues and some of it may be the legacy of previous owners but it should be managed carefully or it will impact negatively on Exxaro's social license to operate and their corporate image. Exxaro should use the opportunity to turn the situation around and earn the trust of the stakeholders.

There is already an influx of people into the area. The community of Siyathuthuka reports that most people working at the mine are not locals. They either come from other places in Mpumalanga such as Middelburg or eMalahleni, or from KwaZulu Natal. There are also reported to be a significant number of people from Mozambique, Swaziland and even as far as Ethiopia and Pakistan (these people are usually traders). There are high levels of unemployment in the area, and low levels of skills. The "outsiders" compete with the locals for jobs, and often get the jobs because they are better qualified. They then earn money in the Emakhazeni area, but spend the money in the areas where they come from. The local residents resent this as they feel it is to the detriment of development of local businesses in the area. As is the case elsewhere in South Africa there is a risk of xenophobic incidences. There is potential tension between local residents and new comers due to this discrepancy in opportunities and income.

Since the expansion of the mine will not entail recruiting more people, it is not foreseen that there will be significant changes in the crime patterns in the area, or that there will be an increase in formal settlements.

Hadeco Village is situated on Paardeplaats 380 JT Portion 40. There are 38 houses (approximately 195 people) and a government primary school with 150 pupils in the village. Children from the surrounding farms also attend the school. Most of the residents of the village work on the Hadeco farms or are retired Hadeco employees (10 families). There are also eleven traditional clay houses (approximately 37 people) on Paardeplaats 380 JT Portion 29 – the people who live there also work for Hadeco, some just on a seasonal basis. These sections fall within the mining rights application area. If Paardeplaats decide to mine the entire mining rights area, the village and traditional houses would need to be resettled. The Hadeco farm will also need to relocate or close down. This will have a severe negative social impact on the livelihoods and sense of community of the residents. Most residents are older people who have been living in the village or traditional houses for more than 20 years – the Extension of Security of Tenure Act of 1997 (ESTA) will apply to this group. ESTA protects the tenure rights of vulnerable communities. The Hadeco employees are all semi or unskilled workers, and they are seen as a vulnerable group, since it would be very difficult to create alternative livelihoods for them. The creation of alternative livelihoods is a long-term process. Relocation would also impacts the pupils that attend the school. This impact should be avoided if possible. There is a risk that a controversial debate about the sustainability of mining versus agriculture can be sparked in the public domain, especially given the short life of the mine. This impact can potentially turn into a political argument that can cause damage to Paardeplaats's reputation.

6.1.2.4 Impact assessment

Table 13: Conflict between local residents and newcomers

Impact name:	Conflict between local residents and newcomers
Phase:	Construction and Operation
Alternative:	All alternatives
Description of impact:	There is a potential for social unrest and conflict between local residents and newcomers due to discrepancies in income and

	opportunities that is generated by the mine.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	3	3	
Duration of Impact	3	2	
Magnitude of Impact	3	2	
Reversibility of Impact	3	3	
Probability	5	4	
Environmental Risk (Pre-mitigation)			**-15**
Environmental Risk (Post-mitigation)			**-10**
			High
Recommended Mitigation Measures			
Implement a community relations programme. Develop a business forum and ensure local SMME's are utilised for projects. Implement local procurement policy. Encourage and enable staff to live locally.			
Impact Prioritisation			
Public Response			2
Issue has been brought up in the consultation process.			
Cumulative Impacts			2
This is an existing impact and other businesses in the area contribute to the impact. It cannot be mitigated in isolation.			
Degree of potential irreplaceable loss of resources			1
There is a risk of community unrest that may impact on the social capital of the community.			
Prioritisation Factor			1,333333333
Final Significance			**-13,33333333**

Table 14: Resettlement

Impact name:	Resettlement of Hadeco Village		
Phase:	Pre Construction		
Alternative:	Mining on entire mining rights area		
Description of impact:	Hadeco Village and some traditional clay houses are in the mining rights area.The affected people will be resettled if the area is mined. This will impact on their livelihoods and social and community structures		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	3	3	
Duration of Impact	4	4	
Magnitude of Impact	5	4	
Reversibility of Impact	5	3	

Probability	4	3	
Environmental Risk (Pre-mitigation)			**-17**
Environmental Risk (Post-mitigation)			**-10,5**
Degree of confidence in impact prediction:			High
Recommended Mitigation Measures			
Impact should be avoided if possible. A relocation specialist should be appointed to compile a relocation action plan (RAP) in line with international best practice standards. The RAP should be monitored and audited and implemented by a specialist.			
Impact Prioritisation			
Public Response			3
Several stakeholders expressed concern regarding this impact.			
Cumulative Impacts			3
Relocation leads to a number of secondary impacts and spin-offs and some relocated communities never recover economically or socially from the trauma of relocation. This is a severe negative impact that should be avoided.			
Degree of potential irreplaceable loss of resources			3
Social capital and community cohesion will be lost and it is unlikely that it will be replicated to the same extent in the host community.			
Prioritisation Factor			2
Final Significance			**-21**

6.1.3 Local/regional economy

6.1.3.1 Factors to consider

- Extent of existing labour pool in relevant communities;
- Levels of unemployment;
- Size of operation and extent to which labour is sourced locally;
- Dependence of other industries/activities on labour;
- Comparativeness of pay rates;
- Existing industries in the region;
- Profile of mining in region and supporting industries in the region;
- Cumulative impacts of other mining operations;

- Existing beneficiary arrangements;
- Relationships between levels of government;
- Community expectations;
- Nature, size and diversity of local economy;
- Extent of community reliance on traditional livelihoods;
- Types of traditional livelihoods;
- Land values and existing land uses;
- Presence and status of existing lease arrangements;
- Patterns of traditional ownership; and
- Legal recognition of traditional rights and interest in land.

6.1.3.2 Opportunities and threats

The following tables list opportunities and threats from the perspective of changes that may occur in the local/regional economy. It is important to consider that opportunities and threats are not impacts, but has the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
Demand from mining operation creates labour shortages in local community leading to wage inflation, chronic skill shortages, etc	Yes
Closure/downsizing of operation creates a labour surplus leading to unemployment, wage reductions etc.	Yes
Other industries in area are unable to compete for labour, leading to a reduction in economic diversity	Yes
Local labour market is unable to meet operation's requirements	Yes
Mining operation does not meet local expectations with respect to the creation of job opportunities	Yes
Opposition to mine from existing industries	Yes
Increased local prices/high inflation or hyper inflation	Yes

Local economy collapses/deteriorates approaching closure	Yes
Mining activity prevents other uses of land	Yes
Supporting industries are not sustained beyond closure	Yes
Decreased viability/profitability of other local industries e.g. tourism	Yes
Reduced diversity of regional economy	Yes
Increased competition for existing infrastructure and services e.g. water	Yes
Lack of supporting industries for a 'greenfield' site	Yes
Community expectations exceed the amount of funding available, leading to frustration, resentment and conflict	Yes
Unequal division of benefits among levels of government: local communities perceive not getting fair share of benefits from mine	Yes
Corruption prevents benefits flowing to designated communities	Yes
Perceived unequal distribution of benefits between different communities creates conflict	Yes
Projects funded by SLP funding are not sustained once mining cease	Yes
SLP projects not used to benefit community	Yes
Local recruitment for mine operation removes labour pool for supporting traditional livelihoods.	Yes
Long term loss of skills and knowledge (e.g. in farming) due to shift to mine-related employment.	Yes
Access to land is cut-off by the mining operation, preventing activities such as the use of gardens for local food sources.	Yes
Mining activities damage traditional food sources	Unlikely
Generation of excessive claims for compensation	Yes
Damage to adjoining land e.g. subsidence	Yes
Reduction in land values due to proximity to mine	Yes
Misidentification of traditional owners	Yes
Landowners refuse to sell requiring exercise of compulsory acquisition powers	Unlikely
Opportunities that will make a positive difference	**Is it possible?**
Provide skills and job readiness training to local population to expand the local labour pool	Yes

Work with suppliers to generate local training and employment opportunities	Yes
Facilitate the development of other economic activities (e.g. tourism, horticulture) to provide employment when the mine closes or downsizes	Yes
Develop a mobile mining workforce which can find other mining related employment post-closure	Yes
Increase linkages with existing industries (e.g. provision of services to the mine, synergies)	Yes
Attract supporting industries to the region	Yes
Facilitate business development training for local community	Yes
Provide assistance to support the creation of new businesses	Yes
Improve capacity of communities to use SLP to support projects that have long term benefits	Yes
Structure payments to increase chances of continued funding for projects e.g. invest a portion into a capital fund-to-fund maintenance and replacement of assets in the future.	Yes
Partner with other organisations on livelihood projects	Yes
Use rehabilitation as an opportunity to establish new livelihoods	Yes

6.1.3.3 Potential impacts

Mining has an undeniable impact on the economic functioning of communities. Unemployment levels in the area are very high, and the Paardeplaats Mine is creating much-needed jobs. This is a significant positive impact, and is magnified by supporting businesses in the area. The proposed Paardeplaats extension will prolong the life of the mine for another seven years and secure the existing jobs.

As part of their Social and Labour Plan, Paardeplaats Mine will invest in bursaries, internships and other skills development initiatives, some of which has already been initiated. The Paardeplaats Mine gives a much-needed economic injection and brings skills to an area where there is a dire need for development.

The Hadeco flower farm is situated in the mining rights area, with most of their infrastructure placed on Paardeplaats 380 JT Portion 40. The firm employs 60 permanent workers and between 12 and 150 seasonal workers on the Belfast farm.

Eighty-five jobs at the head office in Krugersdorp are directly dependent on the Belfast farm. Mining the entire mining rights are will force Hadeco to relocate and change their business. This will have serious impacts on the livelihoods of their employees, most of which are unskilled, middle-aged workers. It is therefore recommended that this area should be excluded from the mining area.

Another serious concern is that economic activities in the area are concentrated around the mine and its activities, and when the mine close down, the economy of the area will collapse and a large number of people will loose their jobs.

The residents of Siyathuthuka and the local municipality have high expectations about the role that the mine will play in the area, especially in terms of the development of infrastructure and economic opportunities. These expectations are not always realistic as the mine cannot be the universal remedy for all the problems the community and municipality experience. The mine did make commitments in their social and labour plan, especially with regard to training facilities and the development of small businesses, which are welcomed by the community and municipality. There are also community members that feel that it is too little too late – the mine has been in the area for a long time. There is little understanding for the impact of change of ownership and the extent of the requirements in terms of local economic development as stipulated in the MPRDA.

6.1.3.4 Impact assessment

Table 15: Expectations

Impact name:	Expectations regarding the benefits of the project	
Phase:	Construction and Operation	
Alternative:	All alternatives	
Description of impact:	The community have a number of expectations regarding the benefits of the project. Not all the expectations are realistic, as some of the things the community expect from the mine are really the function of the government.	
Environmental Risk		
Attribute	**Pre-mitigation**	**Post-mitigation**
Nature of Impact	-1	-1
Extent of Impact	4	3
Duration of Impact	2	1
Magnitude of Impact	4	3

Reversibility of Impact	3	2	
Probability	5	4	
Environmental Risk (Pre-mitigation)			**-16,25**
Environmental Risk (Post-mitigation)			**-9**
			High
Recommended Mitigation Measures			
Implement community relations stragety. Communicate frequently with the affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.			
Impact Prioritisation			
Public Response			3
Expectations were confirmed during community consultation process			
Cumulative Impacts			2
There are similar expectations of other mines in the area			
Degree of potential irreplaceable loss of resources			1
Unless managed well there may be reputational risk to Exxaro			
Prioritisation Factor			1,5
Final Significance			**-13,5**

Table 16: Skills development

Impact name:	Skills development		
Phase:	Pre-Construction, construction, operation		
Alternative:	All alternatives		
Description of impact:	The social and labour plan makes provision for significant skills development initiatives. This includes bursaries, learnerships and a training centre		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	1	1	
Extent of Impact	4	4	
Duration of Impact	4	5	
Magnitude of Impact	4	5	
Reversibility of Impact	5	5	
Probability	4	5	
Environmental Risk (Pre-mitigation)			**17**
Environmental Risk (Post-mitigation)			**23,75**
Degree of confidence in impact prediction:			High
Recommended Mitigation Measures			

Ensure the local Emakhazeni communities are the beneficaries of skills development initiatives. Implement the skills development initiatives that have been identified in the SLP. Establish a skills training centre as per the SLP.	
Impact Prioritisation	
Public Response	3
This aspect have been discussed with the communities that have been consulted and everybody reacted very positive towards it.	
Cumulative Impacts	3
A number of positive secondary social impacts are associated with skills development. This includes an increase in quality of life and general social well-being.	
Degree of potential irreplaceable loss of resources	1
From a social perspective skills development create new resources.	
Prioritisation Factor	1,666666667
Final Significance	**39,58333333**

6.1.4 Local/regional infrastructure

6.1.4.1 Factors to consider

- Availability and capacity of local services/utilities;
- Cost and consistency of supply;
- Size of population changes attributable to mine;
- Levels of demand and use;
- Local regulatory capacity and policies;
- Existing transport infrastructure;
- Level of use during and following mine operation;
- Regional planning frameworks;
- Capacity of community/government to maintain infrastructure;
- Proximity of housing areas to mine;
- Housing availability and future requirements;

- Size and strength of local housing market;
- Level of regional mining activity;
- Existing recreational facilities and usage patterns;
- Recreational interests of mine personnel/families and community; and
- Local land ownership and management.

6.1.4.2 Opportunities and threats

The following tables list opportunities and threats related to local/regional infrastructure. It is important to consider that opportunities and threats are not impacts, but has the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
Increased strain on utilities (power/water, waste disposal) due to increase in population	Yes
Overreliance on mine to provide and maintain services / utilities	Yes
Increased competition for scarce resource or service, e.g. water, results in price increases or reduced availability for non-mine users	Yes
Relevant government authorities lack resources and/or capacity to meet additional demands on infrastructure	Yes
Community groups disrupt operations by targeting infrastructure	Yes
New/improved road access leads to uncontrolled in-migration	Unlikely
Overreliance on mine to provide and maintain transport infrastructure for the community	Unlikely
Decreased amenity values of areas around transportation corridors (e.g. increased dust and noise levels)	Yes
Community groups disrupt operations by targeting infrastructure e.g. road blockades	Yes
Community develops expectation that infrastructure will be maintained indefinitely	Yes
Housing shortages due to influx of workforce and in-migration	Yes
Lack of capacity of local housing industry to support required expansion	Yes
Lack of suitable land for housing developments	Yes
Poor standard or unsuitability of local housing stock impacts adversely	Yes

on recruitment and retention	
Conflict within workforce and/or community due to variable standards of housing	Yes
Reduced affordability of housing due to demand pressures or activities of speculators	Yes
Negative impact on property values due to proximity to mine or transport corridor	Yes
Damage to housing due to mining activities e.g. subsidence, blasting	Yes
Housing market adversely affected by downsizing/closure	Yes
Increased demand leads to pressure on local recreation facilities / areas	Unlikely
Conflict between community and mine personnel/families over use of recreational areas and facilities	Unlikely
Opportunities that will make a positive difference	**Is it possible?**
Improve quality & reliability of supply of services to communities (e.g. clean water supply, sanitation)	Yes
Develop local / regional waste recycling and disposal systems	Yes
Develop local business and employment opportunities to provide and maintain services	Yes
Development of sustainable infrastructure for communities	Yes
Develop local business and employment opportunities to service the housing market	Yes
Improve community housing stock by setting high standards for company housing	Yes
Make unused or rehabilitated areas available for new housing developments	Yes
Accommodation facilities and housing made available for local community purposes when no longer required by mine	Yes
Fund/build/provide recreation facilities (e.g. swimming pool, walking tracks)	Yes
Make mine-site recreational facilities (such as swimming pool, gym, tennis courts) available for local communities	Yes
Support/undertake rehabilitation of recreational areas	Yes
Develop new recreational facilities or areas as part of closure program	Yes

6.1.4.3 Potential impacts

There is already a significant negative impact on transport infrastructure such as roads. The Glisa Mine currently contributes to the impact, and the impact will continue should the mining right for the expansion be rewarded. Local residents reported that there are sometimes rows of trucks waiting to enter the mine, and that this is a safety hazard. There are many heavy vehicles from various companies travelling through the area that have a negative impact on the quality of the roads.

Housing is currently a problem in the area, especially in Siyathuthuka. Part of the problem is the lack of available stands that have infrastructure such as water and electricity. The current housing infrastructure is not able to meet the demand, especially for lower income groups – there is a long housing waiting list.

A number of people have complained about cracks in their house that they attribute to the mining activities. The most complaints were from Siyathuthuka, Belfast town and farmers close to the current mine. They claimed that the mine was currently not sympathetic to their plight. They fear that there will be an increase in blasting activities should the extension be granted. The damage caused to houses as a result of the blasting have financial and nuisance implications.

It must be acknowledged that some of the impacts discussed in the paragraphs above will be dealt with in separate specialist studies. The impacts are mentioned here from a social perspective, and the mitigation will be from a social perspective and should as such be seen as supplementary to the other specialist studies such as traffic and services.

6.1.4.4 Impact assessment

Table 17: Infrastructure

Impact name:	Impact on infrastructure such as roads and housing.		
Phase:	Construction and Operation		
Alternative:	All alternatives		
Description of impact:	Activities of the mine such as the transport of coal have a negative impact on the road infrastructure. There is not adequate housing available for staff, especially in the lower income group.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	

Nature of Impact	-1	-1		
Extent of Impact	3	3		
Duration of Impact	3	2		
Magnitude of Impact	4	3		
Reversibility of Impact	3	2		
Probability	4	3		
Environmental Risk (Pre-mitigation)				**-13**
Environmental Risk (Post-mitigation)				**-7,5**
				Medium
Recommended Mitigation Measures				
Engage with the municipalities to discuss strategic long-term planning w.r.t. services such as road maintenance and housing. Coordinate the outcomes of the Social and Labour plan with the Integrated Development Plans of the municipalities. Become a member of the IDP Forum.				
Impact Prioritisation				
Public Response				2
Have been mentioned by a number of stakeholders				
Cumulative Impacts				2
Other industrial activities in the area contribute to the impact. Impact is already taking place.				
Degree of potential irreplaceable loss of resources				1
May be a threat to natural resources if informal settlements are established. Not currently a threat, as there are no informal settlements in the area.				
Prioritisation Factor				1,333333333
Final Significance				**-10**

Table 18: Blasting

Impact name:	Blasting			
Phase:	Construction and Operation			
Alternative:	All alternatives			
Description of impact:	Farms in close proximity of the mine and residents of Belfast and Siyuthuthuka complain about cracks in their houses due to the blasting operations of the mine.			
Environmental Risk				
Attribute	**Pre-mitigation**	**Post-mitigation**		
Nature of Impact	-1	-1		
Extent of Impact	3	2		
Duration of Impact	3	2		
Magnitude of Impact	4	3		
Reversibility of Impact	3	2		
Probability	4	3		
Environmental Risk (Pre-mitigation)				**-13**

Environmental Risk (Post-mitigation)	**-6,75**
	Medium
Recommended Mitigation Measures	
Conduct a crack survey at properties in a certain radius of the mine. Explore alternative blasting methods that may have a lower physical impact.	
Impact Prioritisation	
Public Response	2
A number of people mentioned this when interviewed for the SIA	
Cumulative Impacts	2
It is an existing impact, and any new impacts will be cumulative to the existing impact	
Degree of potential irreplaceable loss of resources	1
Impact on the financial resources of the affected households	
Prioritisation Factor	1,333333333
Final Significance	**-9**

6.1.5 Physical environment

6.1.5.1 Factors to consider

- Sources and availability of water;
- Other water users;
- Current and anticipated water demand levels;
- Existing water quality;
- Regulatory framework;
- Environmental management legislation;
- Current land uses;
- Proximity of protected areas and sensitive environmental areas to mine;
- Size of current population and project population increase;
- Scale and type of mining activity undertaken;
- Proximity of mining and processing operations to communities;

- Presence of other industries; and
- Community experience of mining amenity issues.

6.1.5.2 Opportunities and threats

The following tables list opportunities and threats related to the physical environment that will affect the neighbouring communities. The opportunities and threats are viewed from a community perspective, not from a natural environmental perspective. It is important to consider that opportunities and threats are not impacts, but has the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
Increase in population associated with mining development places pressure on natural resources (e.g. clearing for firewood)	Yes
Mining activities damage/destroy vegetation of value to community	Yes
Mining activities lead to a loss of biodiversity (e.g. the loss of endangered/rare local species due to the removal of vegetation)	Yes
Increased mine-related traffic	Yes
Noise from mine activities e.g. trucks, processing plants	Yes
Dust	Yes
Airblast and vibration from blasting	Yes
Intrusive lights	Yes
Loss of visual amenity	Yes
Mining operation seen as contributing to local water scarcity	Yes
Mining operation displaces other water users	Yes
Damage or loss of functions of water courses and aquifers	Yes
Decreased water quality due to contaminants e.g. salts, heavy metals, acid mine drainage	Yes
Mine is blamed for changes in water quality	Yes
Opportunities that will make a positive difference	**Is it possible?**
Create alternative livelihood opportunities to take pressure off natural resources	Yes
Initiate action to protect sensitive natural areas (e.g. fence off endangered vegetation and/or habitats; undertake weed eradication program)	Yes

Rehabilitate disturbed land in a way that contributes to the biodiversity of the area	Yes
Support programs to educate local community on value of natural resources e.g. promote sustainable agriculture practices	Yes
Support community re-vegetation programs in degraded areas	Yes
Use offsets to realise net improvements in biodiversity	Yes
Use infrastructure to improve reliability and quality of water supply.	Yes
Facilitate improvements in water management practices for other users e.g. bore capping, offtake maintenance, dam covers	Yes
Take action to address non-mine related sources of contaminants	Yes
Establish water efficiency synergies with other industries or mines	Yes

6.1.5.3 Potential impacts

Impacts on the physical environment are assessed in the Environmental Impact Assessment report and bio-physical specialist studies, and the detailed assessment and mitigation of these impacts fall outside the scope of the SIA. It must be considered however, that bio-physical impacts can cause social impacts. The most significant potential social impact is the loss of livelihoods due to impacts on the physical environment. Aspects to consider here is loss of grazing, impact of the coal dust on plants and access to clean water for domestic animals, as the areas around the mine are mainly used for agriculture.

The Hadeco flower farm is in the mining right area. If Paardeplaats 380 JT Portion 30 is mined, the infrastructure of the farm will not be affected, but there is concern that the coal dust may affect the flowers. Cut flowers are grown on the farm and there are strict quality requirements. Tree- farmers in the area share the concern, as they claim that the dust prevent the plants from photosynthesizing. There are also concerns that the mining activities may cause pollution in the dam on the Hadeco property, and that it may affect the flowers.

Water pollution is a sensitive subject in the area. The town of Carolina is 52km from Belfast and has been in the news throughout 2012 due to water quality problems after acid mine water polluted the town's dam. Residents are nervous about the fact

that the town's dam is down-stream from the mine, and many feels that it is an accident waiting to happen. Surrounding farmers are concerned about their own water resources and the potential impact that the mine may have on it. Fears and perceptions around the safety of water and the potential impacts on the water should not be discarded, as many stakeholders share the concern.

Another consideration is the impact on the sense of place through nuisance factors such as dust, noise and vibrations. Residents of the town and surrounding farms have mentioned that they already experience impacts related to dust, noise and vibration. It affects their quality of life and the livability of their environment. All these aspects are covered in other specialist studies, but from a social perspective it is important to acknowledge that the impacts may occur, and to put measures on communicating the mitigation of these impacts in place. Baseline studies of current conditions should also be conducted and kept to use in the future.

6.1.5.4 Impact assessment

Table 19: Dust

Impact name:	Dust		
Phase:	Construction and Operation		
Alternative:	All alternatives		
Description of impact:	Coal dust has a negative impact on the livelihoods of the agricultural community since it affects the quality of their products.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	3	3	
Duration of Impact	3	3	
Magnitude of Impact	4	3	
Reversibility of Impact	3	2	
Probability	4	3	
Environmental Risk (Pre-mitigation)			**-13**
Environmental Risk (Post-mitigation)			**-8,25**
			Medium
Recommended Mitigation Measures			
Engage with the experts and the affected parties to find suitable solutions.			
Impact Prioritisation			

Public Response	2
Impact mentioned by a number of affected parties	
Cumulative Impacts	2
Dust is already a problem in the area due to current mining activities. If the activities are moved closer to the receptors the impact will be greater.	
Degree of potential irreplaceable loss of resources	3
Some of the bulbs that Hadeco produces are only grown on this farm in South Africa. There are no other suitable areas to grow these bulbs in the country, and the only alternative would be to move the business abroad.	
Prioritisation Factor	1,666666667
Final Significance	**-13,75**

Table 20: Water pollution

Impact name:	Water pollution		
Phase:	Operation		
Alternative:	All alternatives		
Description of impact:	There are fear and perception around water pollution in the community, especially since areas in close proximity has been affected by incidents related to acid mine water.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	-1	-1	
Extent of Impact	4	3	
Duration of Impact	3	2	
Magnitude of Impact	4	3	
Reversibility of Impact	3	2	
Probability	4	3	
Environmental Risk (Pre-mitigation)			**-14**
Environmental Risk (Post-mitigation)			**-7,5**
			Medium
Recommended Mitigation Measures			
Address community's fear by being open about monitoring data. Utilise experts to educate the community about the scientific facts. Install and communicate pollution prevention measures.			
Impact Prioritisation			
Public Response			3
This is a very controversial issue and should be addressed thoroughly.			
Cumulative Impacts			2
Water is a sensitive matter and the water resources in Mpumalanga is already under pressure.			
Degree of potential irreplaceable loss of resources			3
South Africa is a water-scarce country and damage to water resources will have a severe social			

impact.	
Prioritisation Factor	1,833333333
Final Significance	**-13,75**

6.1.6 Government and other stakeholders

6.1.6.1 Factors to consider

- Legislative and regulatory framework;
- Respective roles and responsibilities of different levels of government;
- Government presence and influence in local region;
- Perceived legitimacy and authority of government by local communities;
- Size and ownership structure of mine operation (e.g. multinational companies are likely to attract more NGO interest);
- Level of interest by external organisations in operation; and
- Relationship of external organisations with communities.

6.1.6.2 Opportunities and threats

The following tables list opportunities and threats related to the government and other stakeholders that will affect the neighbouring communities. It is important to consider that opportunities and threats are not impacts, but has the potential to become impacts – positive or negative.

What could go wrong?	Is it possible?
Local opposition to national government makes mine a target for political action	Yes
Inadequate government expenditure in mining affected communities/regions leads to pressure on mine to provide services and infrastructure	Yes
Conflict between community and government over dispersion of	Yes

royalties and taxes	
Inefficient or corrupt government processes leads to delays in obtaining regulatory approvals	Yes
Government lacks resources to provide regulatory oversight, leading to inability to provide independent verification of company performance	Yes
Intervention by organisations critical of mining reduces support for project	Yes
Involvement of external organisations creates community conflict	Yes
Opportunities that will make a positive difference	**Is it possible?**
Initiate discussions with government on revenue sharing arrangements between local, regional and national levels	Yes
Provide training and educational opportunities to upskill the local/regional public service e.g. scholarships	Yes
Involve reputable NGO's in providing verification of performance	Yes
Establish consultative mechanisms that include representatives of local, regional and national government agencies	Yes
Partner with external organisations to deliver community development and/or environmental improvement programs	Yes
Use respected NGOs to provide external verification of social and environmental performance	Yes

6.1.6.3 Potential impacts

The government is an important stakeholder in the project, since they will act as regulatory authority, but also will need to assist with the mitigation of most of the potential social impacts. If the government fails to fulfil their role, the affected communities will experience the worst of the impacts. The mine can involve the local government actively through the social and labour plan.

NGO's often perform the role of activists and have an important role to play as part of civil society. There is a risk that they can oppose the proposed mine, or cause conflict in the community through misdirected activism. They can also be engaged with and work in partnership with the mine throughout all the phases of the mine to

assist with the management and mitigation of social and environmental impacts, and play a positive role.

6.1.6.4 Impact assessment

Table 21: Cooperative governance

Impact name:	Co-operative governance		
Phase:	Pre-construction, construction and operation		
Alternative:	All alternatives		
Description of impact:	The government is an important role player in the project. If the mine and the government work together they have the potential to make a positive contribution to the local community.		
Environmental Risk			
Attribute	**Pre-mitigation**	**Post-mitigation**	
Nature of Impact	1	1	
Extent of Impact	4	4	
Duration of Impact	3	4	
Magnitude of Impact	3	4	
Reversibility of Impact	2	2	
Probability	4	5	
Environmental Risk (Pre-mitigation)			**12**
Environmental Risk (Post-mitigation)			**17,5**
			Medium
Recommended Mitigation Measures			
Establish good working relationships with local and district government by attending their forums and individual interaction.			
Impact Prioritisation			
Public Response			1
Cumulative Impacts			2
This impact can have a high positive impact in affected communities if all the industries in the area work towards a common goal.			
Degree of potential irreplaceable loss of resources			1
This may be beneficial to all parties involved.			
Prioritisation Factor			1,166666667
Final Significance			**20,41666667**

7 Mitigation measures suggested

7.1 Community health and safety: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Form a partnership with a Non Profit Organisation (NPO) such as Future Families (www.futurefamilies.co.za) to provide the necessary social services to people whose lives are affected by infectious diseases.	Written partnership agreement in place Monitoring and evaluation reports from NPO	Paardeplaats Mine NPO	Pre-construction Construction Operation Decommission
Develop an in-house infectious diseases strategy to address health issues with the workforce. Align strategy with community HIV strategy followed by NPO.	Documented strategy	Paardeplaats Mine NPO	Construction Operation
Encourage workforce to live in established residential areas. Provide transport from these areas to the mine.	Signed transport agreements with relevant service providers	Paardeplaats Mine	Construction Operation
Develop and implement a Workforce Code of Conduct to maximise positive employee behaviour in the local	Approved Workforce Code of Conduct	Contractor	Pre-construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
community, and optimise integration.	Direct involvement of community in developing Code of Conduct		
Implement a Health and Safety Program on site, including safety consciousness and awareness training. The program should also include relevant health aspects, e.g. sexual health, fatigue management, social health.	Provision of safety training on site to all workers.	Paardeplaats Mine Contractor	Pre-construction Construction Operation Decommission
Provide advanced communication (i.e. signage, advertisements in local papers) about changes to local access, potential road hazards and expected traffic volumes during construction.	Design of appropriate signage and communication material	Paardeplaats Mine Contractor	Pre-construction
Develop an Employee Assistance Program (EAP) to assist employees in dealing with personal issues and minimise impact on family assistance services locally.	Approved EAP provided to employees and their immediate family members.	Paardeplaats Mine Contractor	Pre-construction Construction Operation

7.2 Change in Social Environment: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Appoint a community liaison officer that deals specifically with the surrounding communities. Compile a community relations plan. Establish a community liaison forum that meet every three months – at this forum the mine can give feedback on its activities and keep the communities informed about matters that concern them. It can be a useful mechanism to manage expectations and build relationships.	Appointment letter of community liaison officer. Completed community relations plan Established community liaison forum	Paardeplaats Mine	Pre-construction Construction Operation Decommission
Establish a detailed grievance mechanism for communities to lodge concerns, suggestions and complaints which can be dealt with by the Project in a timely manner.	Completed community grievance mechanism Mechanism communicated to local residents through a variety of media	Paardeplaats Mine Contractor	Pre-construction Construction Operation Decommission
Develop and implement a Workforce Code of Conduct to maximise positive employee behaviour in the local community, and optimise integration.	Approved Workforce Code of Conduct Direct involvement of community in	Paardeplaats Mine Contractor	Pre-construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
	developing Code of Conduct		
Continue to engage with SMME's at the business forum and ensure that local businesses are utilized where possible.	Minutes of business forum Procurement contracts with local service providers	Paardeplaats Mine Municipality Local Business Forum	Pre-construction Construction Operation Decommission
Provide housing subsidies and encourage staff that travel from outside the municipal area to reside locally through incentives such as preferential skills development opportunities for local residents.	Housing policy encouraging local residency Skills development opportunities limited to local residents.	Paardeplaats Mine	Construction Operation
Implement workforce education programs on cultural diversity and tolerance.	Developed and presented information materials on cultural diversity to the workforce	Paardeplaats Mine Contractor	Construction Operation
Appoint a relocation specialist to compile a relocation action plan according to best practice international	Appointment of relocation specialist Internationally accepted relocation	Paardeplaats Mine	Pre-construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
standards such as the IFC Resettlement Guidelines and the World Bank Resettlement Guidelines	action plan		
Implement the relocation action plan and make provision for monitoring and management, as well as external audits	Progress reports Monitoring reports External audits	Paardeplaats Mine External specialists	Long term

7.3 Local/regional economy: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Invest in skills development plans, bursaries and internships to ensure scarce skills will be available in time.	Social and Labour plan	Paardeplaats Mine	Pre-Construction Construction Operation
Provide business mentorship to identified local businesses through forums run by the Chambers of Commerce/Business forums.	Project management staff have made allocated time available to assist in mentoring local businesses	Paardeplaats Mine Contractor Chambers of	Construction Operation

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
	on tender requirements and quality standards	Commerce/ Business forums	
Where practical, investigate opportunities for integration of Project apprentices into local businesses to facilitate skills transfer to the local community.	Suitable local businesses and Project apprentices are identified and matched Relevant agreements signed	Paardeplaats Mine Contractor	Construction Operation
Develop a recruitment policy that allows equal opportunity to all people (woman, disabled) and give preference to local labour from Emakhazeni. Communicate the policy and requirements to the affected communities through the media, community leadership and a community liaison forum. Establish labour desks in easy accessible areas.	Approved recruitment policy Communication plan related to recruitment policy Establishment of labour desks	Paardeplaats Mine Contractor	Pre-Construction Construction Operation Decommission
Enter in discussions with other mines in the area about potential opportunities for sharing resources related to skills development e.g. training courses and internship	Strategic agreement about skills development in the region	Paardeplaats Mine Other interested mining groups	Pre-Construction Construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
agreements.		Municipalities	Operation
Appoint a community liaison officer that deals specifically with the surrounding communities. Compile a community relation plan. Establish a community liaison forum (CLF) that meet every three months – at this forum the mine can give feedback on its activities and keep the communities informed about matters that concern them in a transparent and honest manner. The CLF must be representative of all the groups in the area and include women, youth and the elderly. It can be a useful mechanism to manage expectations and build relationships.	Appointment letter of community liaison officer. Completed community relations plan Established community liaison forum	Paardeplaats Mine	Pre-construction Construction Operation Decommission
Work on a strategy to actively manage expectations. This includes the sharing of relevant information in a way that is accessible to all members of the community. Frequent	Written strategy approved by the board and reviewed on a quarterly basis.	Paardeplaats Mine	Pre-construction Construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
communication is a key aspect in the management of expectations.			Operation Decommission
Establish a detailed grievance mechanism for communities to lodge concerns, suggestions and complaints which can be dealt with by the Project in a timely manner.	Completed community grievance mechanism Mechanism communicated to local residents through a variety of media	Paardeplaats Mine Contractor	Pre-construction Construction Operation Decommission

7.4 Local/regional infrastructure: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Engage with the municipalities to discuss strategic long-term planning with regard to services such as road maintenance and housing. Coordinate the outcomes of the Social and Labour plan with the Integrated Development Plans of the municipalities. Become a	Minutes of meetings Social and Labour Plan Membership of IDP Forum	Paardeplaats Mine Municipality	Pre-construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
member of the IDP Forum.			
Plan for worker accommodation in time – this relates to housing and associated services. Integrate planning process with local government – make sure it is in line with spatial development planning of the area.	Minutes of meetings with local planning departments	Paardeplaats Mine Local and district municipalities	Pre-construction Construction
Do a crack survey at the houses of directly affected neighbours. Investigate different blasting procedures.	Crack survey Research on blasting procedures	Paardeplaats Mine	Pre-construction Construction Operation

7.5 Physical environment: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Obtain baseline data about water resources and boreholes on neighbouring properties before any activities start, and provide affected parties with the	Baseline reports Monitoring results	Paardeplaats Mine	Construction Operation

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
information. This information should be kept for the life of the mine to use as evidence in any disputes. Monitor against these baselines and release the monitoring results to affected parties.			
Establish an environmental forum to give feedback to affected communities twice a year regarding environmental aspects such as dust, water and noise pollution and how Paardeplaats manage and mitigate these aspects. Engage with agriculture community with regard to dust suppression strategies that minimize the impact on their produce. Establish fund for pollution incidents and compensate affected parties for actual financial losses.	Environmental forum established Minutes of meetings with agricultural communities. Pollution fund established	Paardeplaats Mine Agricultural communities	Pre-construction
Actively address the fears of community members relating to water pollution by using experts to explain impacts via	Newspaper reports Interviews on local radio station	Paardeplaats Mine	Pre-construction

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
newsletters and on community radio stations. Compile community relations strategy to ensure on-going communication.	Community relations strategy		Construction Operation

7.6 Government and other stakeholders: Mitigation and management plan

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
Establish good working relationships with local and district government by attending their forums and individual interaction.	Membership of LED forums Minutes of meetings	Paardeplaats Mine Affected municipalities	Pre-construction Construction Operation
Ensure good relationships with affected communities by becoming a member of the community and being a responsible neighbour. Attend significant events in the community. Communicate via community liaison forum. Compile community relations strategy and appoint	Minutes of CLF meetings Community relations strategy Appointed champion to deal with community issues	Paardeplaats Mine Affected communities	Pre-construction Construction Operation

Action	Broad Key Performance Indicator (KPI)	Responsibility	Timeframe
champion to deal with community processes.			
Engage with NGO's that are active in the area. Look for partnerships and ways of working together. Mine to approach NGO's to suggest working together.	Partnerships between mine and NGO's in place	Paardeplaats Mine Local NGO's	Pre-construction Construction Operation

8 Recommendations

Three alternatives are being investigated for the proposed project, namely:

- The No Go option;
- Mining only Portion 30; and
- Mining as per the mining schedule.

Before making any recommendations, the three options will be summarised briefly for the benefit of the reader.

8.1 The No Go option

The No Go option means that no mining will take place on the proposed Paardeplaats site and current activities on the site can continue as per usual. As the proposed mining activities is intended as an expansion of the Glisa mine, it also means that the Glisa mine will have to close down in a few years and this would result in job losses. The impact of No Go option, and the resultant closure of the Glisa mine, is mainly economic and will be de discussed in more detail in the economic impact assessment. From a social perspective, the measures stipulated in the Social and Labour Plan relating to closure should be adhered to, to support employees of the Glisa mine.

As there currently seems to be trust issues with Exxaro that can affect their social license to operate, it is recommended that Exxaro implements a community relations programme and investigate the implementation of some of the other measures recommended for the other alternatives. It would be very important for Exxaro to communicate in an open and transparent way that does not create the impression that they are only going through the motions.

8.2 Mining only Portion 30

Mining only on Portion 30 means that people currently residing on the remainder of the proposed site can continue to do so. For Portion 13 it means that they can in all

likelihood continue with their activities as usual. Impacts experienced by residents of Portion 13 will be cumulative or similar to existing impacts such as cracks, vibrations, noise, dust, etc. The extent of impacts will be addressed in the relevant specialist studies and is mentioned in the SIA from a nuisance perspective.

Residents of the Hadeco Village as well as the clay village will not have to be relocated. Whether their livelihoods will be impacted on, will be determined by whether it will be possible for Hadeco to continue with their business in a viable way if mining takes place on Portion 30. Whether Hadeco will be able to continue with their business depends on the impact of the mining activities on bio-physical aspects such as the soil quality, air quality, water, etc. which falls outside the scope of the SIA. It is recommended that Exxaro enters in discussion with Hadeco on the impact of mining of Portion 30 on Hadeco's business activities as soon as possible.

The following potential impacts can be expected for this alternative:

- Increase in HIV/AIDS and other infectious diseases;
- Health impacts;
- Conflict between local residents and newcomers;
- Expectations regarding the benefits of the project;
- Skills development;
- Impact on infrastructure such as roads and housing;
- Blasting;
- Dust;
- Water pollution; and
- Co-operative governance.

The following recommendations are made for this alternative:

- Start a communication process with Hadeco as soon as possible to discuss and mitigate potential impacts.
- Form a partnership with a Non Profit organisation (NPO) to provide the necessary social services to people whose lives are affected by infectious diseases.
- Develop an in-house infectious diseases strategy to address health issues with the workforce.
- Align infectious diseases strategy with community HIV strategy followed by NPO.
- Follow mitigation measures suggested in bio-physical studies relating to dust to address potential health impacts.
- Implement community relations programme.
- Develop a business forum and ensure local SMME's are utilised for projects.
- Implement local procurement policy.
- Encourage and enable staff to live locally.
- Communicated frequently with affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.
- Ensure that local Emakhazeni communities are the beneficiaries of skills development initiatives.
- Implement the skills development initiatives that have been identified in the SLP.
- Establish a skills training centre as per the SLP.
- Engage with municipalities to discuss strategic long-term planning with regard to services such as road maintenance and housing.

- Coordinate the outcomes of the SLP with the IDPs of the municipalities.
- Become a member of the IDP Forum.
- Conduct a crack survey at properties within a certain radius from the mine.
- Explore alternative blasting methods that may have a lower physical impact.
- Engage with experts and affected parties to find suitable solutions for dust impact.
- Address community's fear regarding water pollution by being open about monitoring data;
- Utilise experts to educate the community about the scientific facts regarding water impacts;
- Install and communicate water pollution prevention measures.
- Establish good working relationships with local and district government by attending their forums and individual interaction.

8.3 Mining as per the mining schedule

Mining as per the mining schedule means that Hadeco, Hadeco village, the clay village as well as the residents of Portion 13 will have to be relocated. In addition, there will be a number of job losses. Job losses will be discussed in more detail in the economic impact assessment. This will have severe impacts from a social perspective and will be a very costly exercise for Exxaro, especially in terms of the special needs of the Hadeco operations.

The following potential impacts can be expected for this alternative:

- Increase in HIV/AIDS and other infectious diseases;
- Health impacts;
- Conflict between local residents and newcomers;

- Resettlement of Hadeco Village;
- Expectations regarding the benefits of the project;
- Skills development;
- Impact on infrastructure such as roads and housing;
- Blasting;
- Dust;
- Water pollution; and
- Co-operative governance.

The following recommendations are made for this alternative:

- Form a partnership with a Non Profit organisation (NPO) to provide the necessary social services to people whose lives are affected by infectious diseases.
- Develop an in-house infectious diseases strategy to address health issues with the workforce.
- Align infectious diseases strategy with community HIV strategy followed by NPO.
- Follow mitigation measures suggested in bio-physical studies relating to dust to address potential health impacts.
- Implement community relations programme.
- Develop a business forum and ensure local SMME's are utilised for projects.
- Implement local procurement policy.
- Encourage and enable staff to live locally.

- Appoint a relocation specialist to compile a relocation action plan in line with international best practice standards.
- Communicated frequently with affected stakeholders to ensure that they understand the processes and do not develop more unrealistic expectations.
- Ensure that local Emakhazeni communities are the beneficiaries of skills development initiatives.
- Implement the skills development initiatives that have been identified in the SLP.
- Establish a skills training centre as per the SLP.
- Engage with municipalities to discuss strategic long-term planning with regard to services such as road maintenance and housing.
- Coordinate the outcomes of the SLP with the IDPs of the municipalities.
- Become a member of the IDP Forum.
- Conduct a crack survey at properties within a certain radius from the mine.
- Explore alternative blasting methods that may have a lower physical impact.
- Engage with experts and affected parties to find suitable solutions for dust impact.
- Address community's fear regarding water pollution by being open about monitoring data;
- Utilise experts to educate the community about the scientific facts regarding water impacts;
- Install and communicate water pollution prevention measures.
- Establish good working relationships with local and district government by attending their forums and individual interaction.

From a social perspective, Mining on Portion 30 will be the preferred alternative as it also has some positive impacts associated with it, no relocation of residents will be required, and it would enable the Glisa mine to remain operational, avoiding the negative economic impacts associated with its closure.

9 Conclusion

When considering the social impacts of the proposed Paardeplaats Mine, the importance of the project on a national scale must be considered. Electricity supply is a critical issue in South Africa at the moment and the proposed project will add to the stability of the service. The need for the proposed project is undeniable in the current economic conditions. It is therefore recommended that the project proceed with mining on Portion 30.

The management of social impacts is a long-term process. It is recommended that the SIA should be updated throughout the life of the mine to accommodate the changing social environment and include new impacts that may occur. The potential impact of the mine on the social environment in the long term should be considered in the strategic planning process of the mine. The only way in which the social impacts will be managed successfully is through partnerships with different role players, as the management of social impacts cannot and should not be the responsibility of only one party. From a greater societal perspective the project will thus have a positive impact.

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REPORT

for Environmental Impact Management Services
by

INSTITUTE FOR SOIL CLIMATE AND WATER
AGRICULTURAL RESEARCH COUNCIL

SOIL, LAND USE AND LAND CAPABILITY SURVEY FOR THE PROPOSED EXXARO PAARDEPLAATS COAL MINING PROJECT, NEAR BELFAST, MPUMALANGA PROVINCE

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Declaration:

I hereby declare that I am qualified to compile this report as a registered Natural Scientist and that I am independent of any of the parties involved and that I have compiled an impartial report, based solely on all the information available.

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September 2012