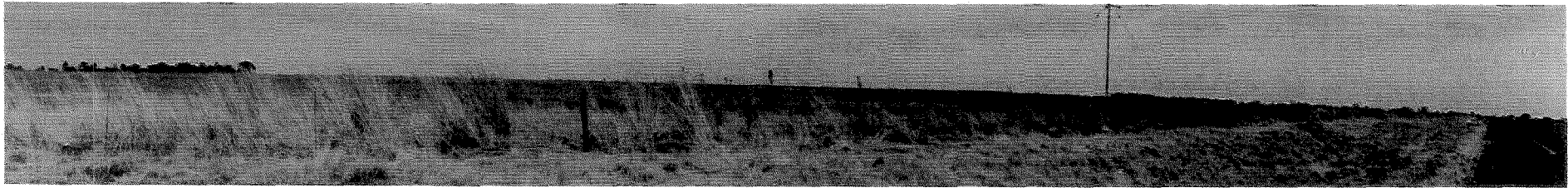


**END**

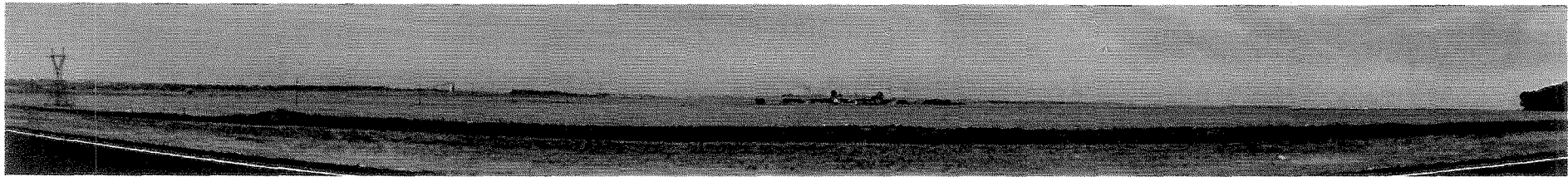




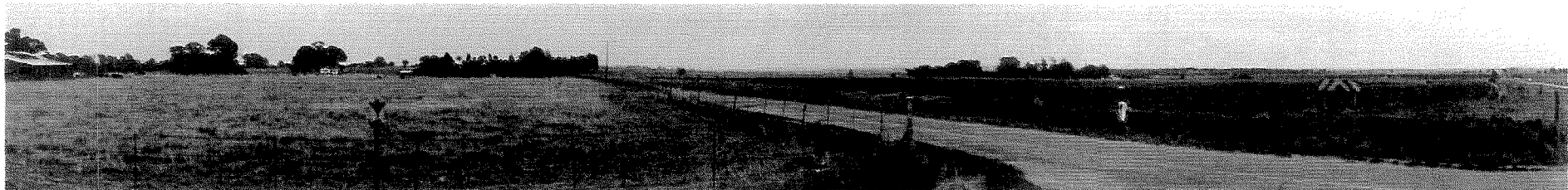
View 17: from R545, looking north, settlement of New Largo sheltered in cluster of Eucalyptus trees



View 18: from N14, looking south-west, typical flat topography with agricultural fields



View 19: from N14, looking south, agricultural fields, Kendal Power Station in background

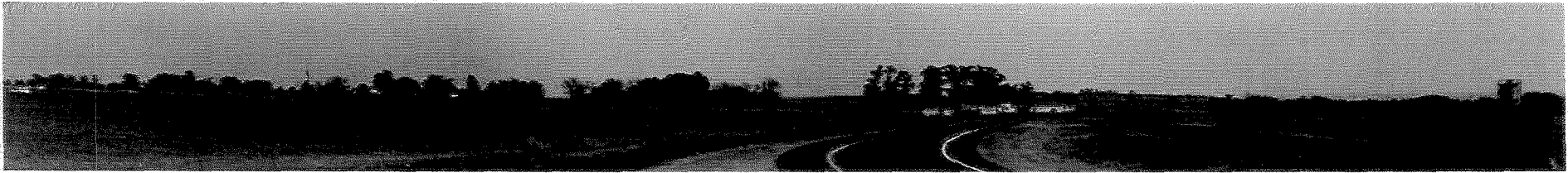


View 20: from R555, looking north-east towards Kendal Forest Holdings behind trees to the right

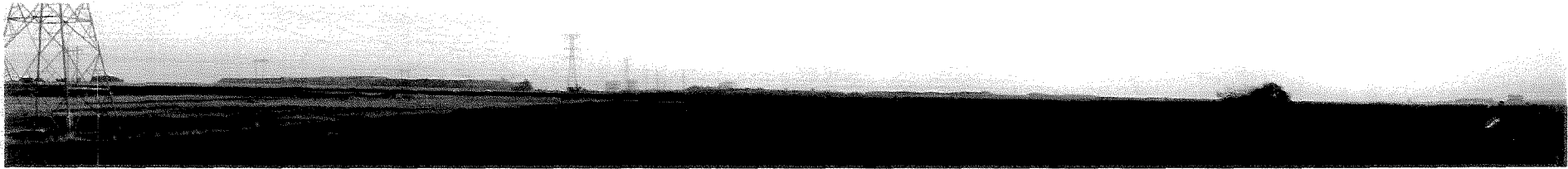
Refer to Figure 3 for location of views

## Figure 10: LANDSCAPE CHARACTER (Views 17 - 20) - Phola-Kusile Coal Conveyor





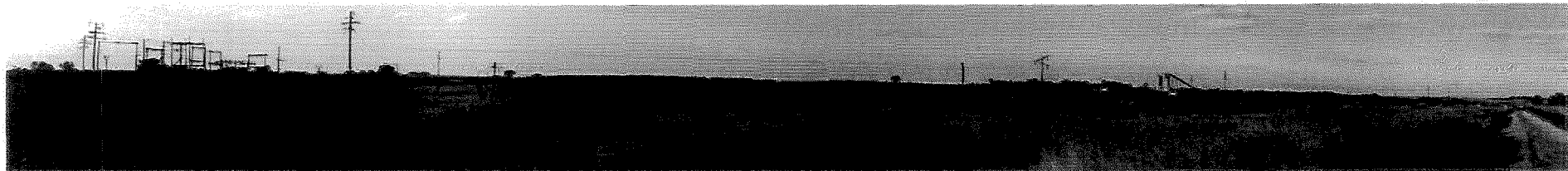
View 21: from N14 off ramp to R545, looking south-west, Kendal Forest Holdings behind trees



View 22: from N14, looking south-west, typical flat topography with agricultural activities in foreground and mining activities in background



View 23: from R555, looking north-east, exiting mining infrastructure



View 24: from R555, looking north-east existing open cast mining activities and mining infrastructure

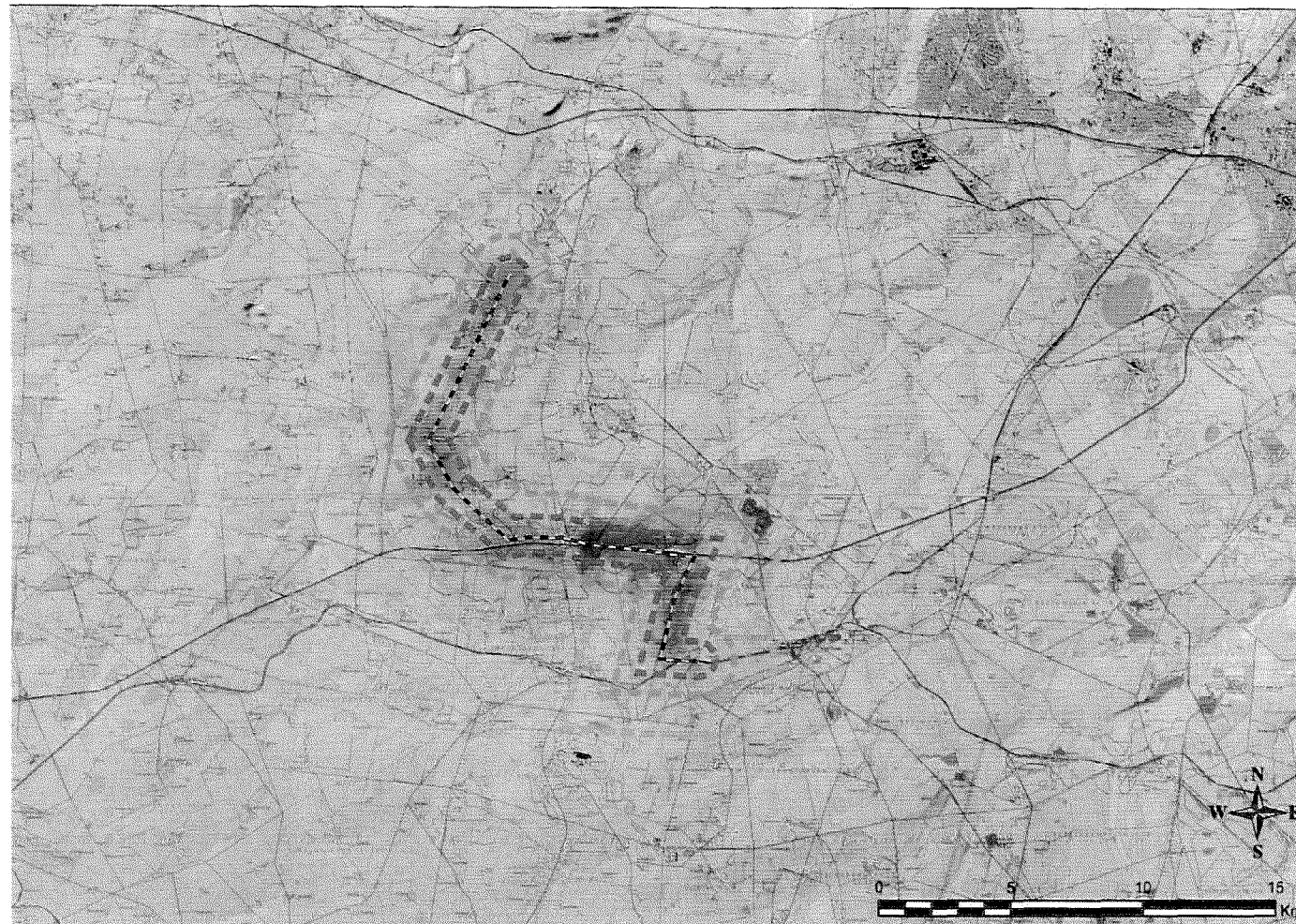
Refer to Figure 3 for location of views

## Figure 11: LANDSCAPE CHARACTER (Views 21 - 24) - Phola-Kusile Coal Conveyor


September 2011










**LEGEND**

 Proposed Conveyor Route Option 3

**Visual Exposure**

 High: 0 - 800m

 Moderate: 800m - 1.5km

 Low: 1.5 - 3.0km

Insignificant: 3.0km <

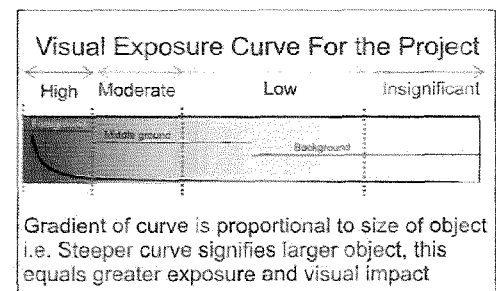
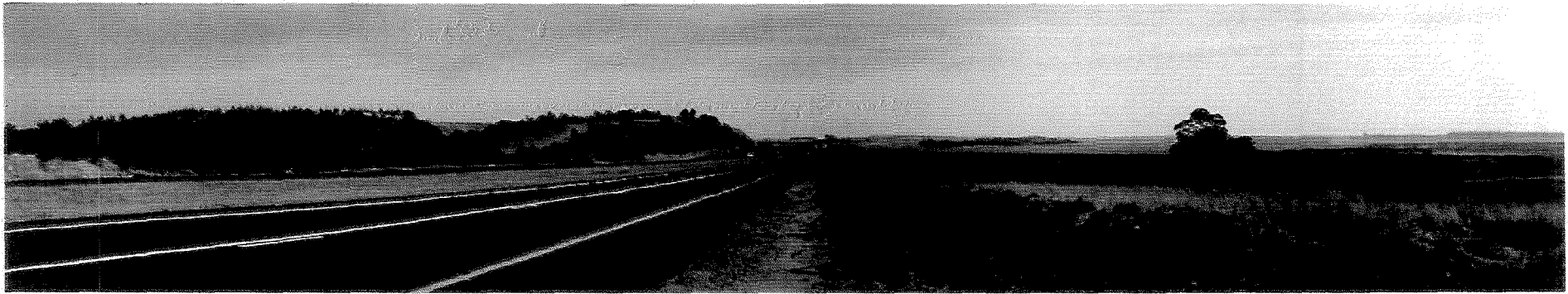
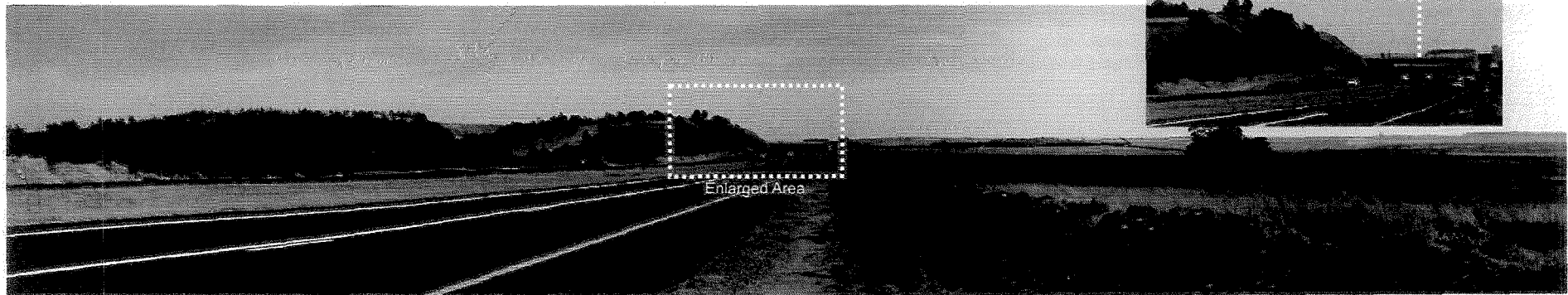


Figure 12: VIEWSHED - Phola-Kusile Coal Conveyor



Before : View from N12 west of R556 crossing, looking west



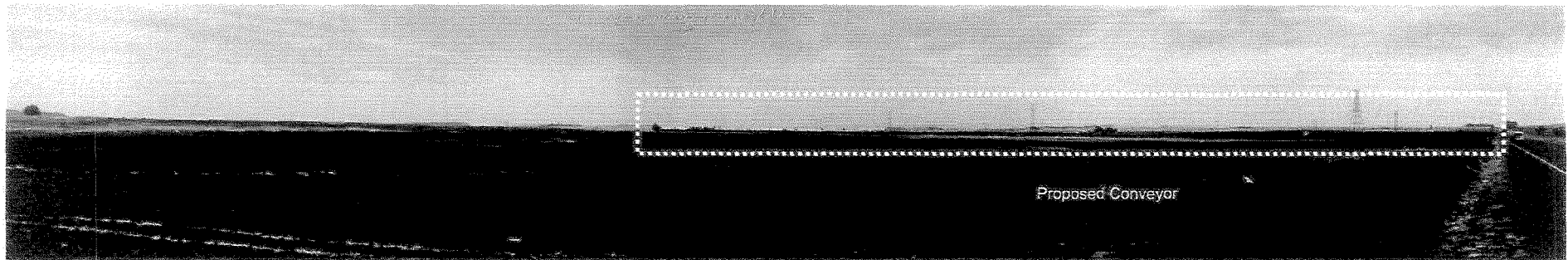
Refer to Figure 3 for locations of simulations

After

## Figure 13: SIMULATION 1 - Phola-Kusile Coal Conveyor



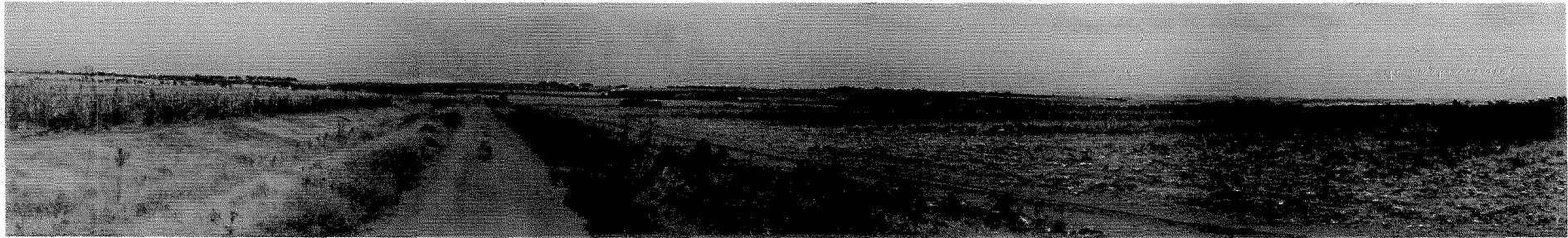
Before : View from N12 east of mine dumps, looking west, proposed conveyor to follow utilities corridor



After

Refer to Figure 3 for locations of simulations

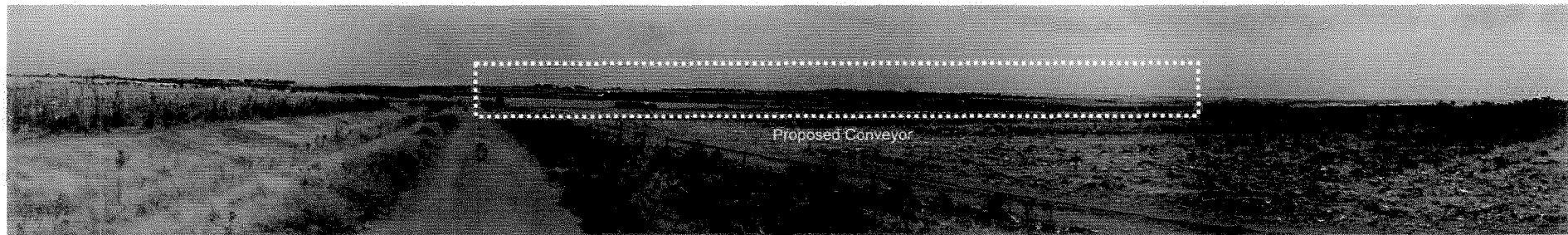
Figure 14: SIMULATION 2 - Phola-Kusile Coal Conveyor



Before : View from local farm road east of proposed conveyor, looking south-west



Enlarged Area



Proposed Conveyor

After

Refer to Figure 3 for locations of simulations

## Figure 15: SIMULATION 3 - Phola-Kusile Coal Conveyor



## APPENDIX B: DETERMINING A LANDSCAPE AND THE VALUE OF THE VISUAL RESOURCE

In order to reach an understanding of the effect of development on a landscape resource, it is necessary to consider the different aspects of the landscape as follows:

### **Landscape Elements and Character**

The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, savannah, trees, water bodies, buildings and roads are generally quantifiable and can be easily described.

Landscape character is therefore the description of pattern, resulting from particular combinations of natural (physical and biological) and cultural (land use) factors and how people perceive these. The visual dimension of the landscape is a reflection of the way in which these factors create repetitive groupings and interact to create areas that have a specific visual identity. The process of landscape character assessment can increase appreciation of what makes the landscape distinctive and what is important about an area. The description of landscape character thus focuses on the *nature of the land*, rather than the response of a viewer.

### **Landscape Value – all encompassing (Aesthetic Value)**

(after Crawford 1994 and The Visual Resource Management System, Developed by The Bureau of Land Management (BLM) in the Department of the Interior of the USA Government).

Studies for perceptual psychology have shown human preference for landscapes with a higher visual complexity particularly in scenes with water, over homogeneous areas. On the basis of contemporary research landscape quality increases when:

- Topographic ruggedness and relative relief increase - topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured;
- Where water forms are present - The degree to which water dominates the scene is the primary consideration in selecting the rating score;
- Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when considering "colour" are variety, contrast, and harmony.
- Where diverse patterns of grasslands and trees occur - give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetational features which add striking and intriguing detail elements to the landscape (e.g. gnarled or wind beaten trees, and Quiver trees);
- Scarcity: This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
- Where natural landscape increases and man-made landscape decreases;
- And where land use compatibility increases and land use edge diversity decreases - Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit.

Aesthetic value is the emotional response derived from the experience of the environment with its particular natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay

1993). Thus aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character and sense of place (Schapper 1993). Refer also to Appendix A for further elaboration.

Aesthetic appeal (value) is considered high when the following are present (Ramsay 1993):

- *Abstract qualities*: such as the presence of vivid, distinguished, uncommon or rare features or abstract attributes;
- *Evocative responses*: the ability of the landscape to evoke particularly strong responses in community members or visitors;
- *Meanings*: the existence of a long-standing special meaning to a particular group of people or the ability of the landscape to convey special meanings to viewers in general;
- *Landmark quality*: a particular feature that stands out and is recognised by the broader community.

**Sense of Place**

Central to the concept of a sense of place is that the place requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape together with the cultural transformations and traditions associated with historic use and habitation. According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own". Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases these values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and therefore, strong sense of place.

**Scenic Beauty of Visual Resource**

In determining the scenic quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are considered to be scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is considered to be very high.

When considering both objective and subjective factors associated with the landscape there is a balance between landscape character and individual landscape features and elements, which would result in the values as follows:

**Value of Visual Resource**

Derived from The Landscape Institute with the Institute of Environmental Management and Assessment (2002)

High (Distinct)	Moderate (Common)	Low (Minimal)
Areas that exhibit a very positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to be of particular importance to conserve and which may be sensitive change in general and which may be detrimental if change is inappropriately dealt with.	Areas that exhibit positive character but which may have evidence of alteration to /degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change in general; again change may be detrimental if inappropriately dealt with but it may not require special or particular attention to detail.	Areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

**Scenic Quality Inventory and Evaluation Chart**

(Developed by: The Bureau of Land Management (BLM), In the Department of the Interior of the USA Government)

Key factors	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. <b>5</b>	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosion patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. <b>3</b>	Low rolling hills, foothills, or flat valleys; or few or no interesting landscape features. <b>1</b>
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. <b>5</b>	Some variety of vegetation, but only one or two major types. <b>3</b>	Little or no variety or contrast in vegetation. <b>1</b>
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. <b>5</b>	Flowing, or still, but not dominant in the landscape. <b>3</b>	Absent, or present, but not noticeable. <b>0</b>
Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. <b>5</b>	Some intensity or variety in colors and contrast of the soil, rock and vegetation, but not a dominant scenic element. <b>3</b>	Subtle color variations, contrast, or interest; generally mute tones. <b>1</b>
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. <b>5</b>	Adjacent scenery moderately enhances overall visual quality. <b>3</b>	Adjacent scenery has little or no influence on overall visual quality. <b>0</b>
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. <b>* 5+</b>	Distinctive, though somewhat similar to others within the region. <b>3</b>	Interesting within its setting, but fairly common within the region. <b>1</b>
Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. <b>2</b>	Modifications add little or no visual variety to the area, and introduce no discordant elements. <b>0</b>	Modifications add variety but are very discordant and promote strong disharmony. <b>-4</b>



## **APPENDIX C: METHOD FOR DETERMINING THE SEVERITY OF LANDSCAPE AND VISUAL IMPACT**

A visual impact study analysis addresses the importance of the inherent aesthetics of the landscape, the public value of viewing the natural landscape, and the contrast or change in the landscape from the project.

For some topics, such as water or air quality, it is possible to use measurable, technical international or national guidelines or legislative standards, against which potential effects can be assessed. The assessment of likely effects on a landscape resource and on visual amenity is more complex, since it is determined through a combination of quantitative and qualitative evaluations. (The Landscape Institute with the Institute of Environmental Management and Assessment (2002).

Landscape impact assessment includes a combination of objective and subjective judgements, and it is therefore important that a structured and consistent approach is used. It is necessary to differentiate between judgements that involve a degree of subjective opinion (as in the assessment of landscape value) from those that are normally more objective and quantifiable (as in the determination of magnitude of change). Judgement should always be based on training and experience and be supported by clear evidence and reasoned argument. Accordingly, suitably qualified and experienced landscape professionals carry out landscape and visual impact assessments (The Landscape Institute with the Institute of Environmental Management and Assessment (2002),

Landscape and visual assessments are separate, although linked, procedures. The landscape baseline, its analysis and the assessment of landscape effects all contribute to the baseline for visual assessment studies. The assessment of the potential effect on the landscape is carried out as an effect on an environmental resource, i.e. the landscape. Visual effects are assessed as one of the interrelated effects on population.

### **Landscape Impact**

Landscape impacts derive from changes in the physical landscape, which may give rise to changes in its character and from effects to the scenic values of the landscape. This may in turn affect the perceived value ascribed to the landscape. The description and analysis of effects on a landscape resource relies on the adoption of certain basic principles about the positive (or beneficial) and negative (or adverse) effects of change in the landscape. Due to the inherently dynamic nature of the landscape, change arising from a development may not necessarily be significant (Institute of Environmental Assessment & The Landscape Institute (2002)).

### **Visual Impact**

Visual impacts relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity. Visual impact is therefore measured as the change to the existing visual environment (caused by the physical presence of a new development) and the extent to which that change compromises (negative impact) or enhances (positive impact) or maintains the visual quality of the area.

To assess the magnitude of visual impact four main factors are considered.

- Visual Intrusion:** The nature of intrusion or contrast (physical characteristics) of a project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use.
- Visibility:** The area/points from which project components will be visible.
- Visual exposure:** Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
- Sensitivity:** Sensitivity of visual receptors to the proposed development

### **Visual Intrusion / contrast**

Visual intrusion deals with the notion of contextualism i.e. how well does a project component fit into the ecological and cultural aesthetic of the landscape as a whole? Or conversely what is its contrast with the receiving environment. Combining landform / vegetation contrast with structure contrast derives overall visual intrusion/contrast levels of high, moderate, and low.

Landform / vegetation contrast is the change in vegetation cover and patterns that would result from construction activities. Landform contrast is the change in landforms, exposure of soils, potential for erosion scars, slumping, and other physical disturbances that would be noticed as uncharacteristic in the natural landscape. Structure contrast examines the compatibility of the proposed development with other structures in the landscape and the existing natural landscape. Structure contrast is typically strongest where there are no other structures (e.g., buildings, existing utilities) in the landscape setting.

Photographic panoramas from key viewpoints before and after development are presented to illustrate the nature and change (contrast) to the landscape created by the proposed development. A computer simulation technique is employed to superimpose a graphic of the development onto the panorama. The extent to which the component fits or contrasts with the landscape setting can then be assessed using the following criteria.

- Does the physical development concept have a negative, positive or neutral effect on the quality of the landscape?
- Does the development enhance or contrast with the patterns or elements that define the structure of the landscape?
- Does the design of the project enhance and promote cultural continuity or does it disrupt it?

The consequence of the intrusion / contrast can then be measured in terms of the sensitivity of the affected landscape and visual resource given the criteria listed below. For instance, within an industrial area, a new sewage treatment works may have an insignificant landscape and visual impact; whereas in a *valued* landscape it might be considered to be an intrusive element. (Institute of Environmental Assessment & The landscape Institute (1996)).

## Visual Intrusion

High	Moderate	Low	Positive
<p>If the project:</p> <ul style="list-style-type: none"> <li>- Has a substantial negative effect on the visual quality of the landscape;</li> <li>- Contrasts dramatically with the patterns or elements that define the structure of the landscape;</li> <li>- Contrasts dramatically with land use, settlement or enclosure patterns;</li> <li>- Is unable to be 'absorbed' into the landscape.</li> </ul>	<p>If the project:</p> <ul style="list-style-type: none"> <li>- Has a moderate negative effect on the visual quality of the landscape;</li> <li>- Contrasts moderately with the patterns or elements that define the structure of the landscape;</li> <li>- Is partially compatible with land use, settlement or enclosure patterns.</li> <li>- Is partially 'absorbed' into the landscape.</li> </ul>	<p>If the project:</p> <ul style="list-style-type: none"> <li>- Has a minimal effect on the visual quality of the landscape;</li> <li>- Contrasts minimally with the patterns or elements that define the structure of the landscape;</li> <li>- Is mostly compatible with land use, settlement or enclosure patterns.</li> <li>- Is 'absorbed' into the landscape.</li> </ul>	<p>If the project:</p> <ul style="list-style-type: none"> <li>- Has a beneficial effect on the visual quality of the landscape;</li> <li>- Enhances the patterns or elements that define the structure of the landscape;</li> <li>- Is compatible with land use, settlement or enclosure patterns.</li> </ul>
<p><i>Result</i></p> <p>Notable change in landscape characteristics over an extensive area and/or intensive change over a localized area resulting in major changes in key views.</p>	<p><i>Result</i></p> <p>Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.</p>	<p><i>Result</i></p> <p>Imperceptible change resulting in a minor change to key views.</p>	<p><i>Result</i></p> <p>Positive change in key views.</p>

Visual intrusion also diminishes with scenes of higher complexity, as distance increases, the object becomes less of a focal point (more visual distraction), and the observer's attention is diverted by the complexity of the scene (Hull and Bishop (1988)).

### Visibility

A viewshed analysis was carried out to define areas, which contain all possible observation sites from which the development would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1.8m above ground level. Topographic data was captured for the site and its environs at 10 m contour intervals to create the Digital Terrain Model (DTM). The DTM includes features such as vegetation, rivers, roads and nearby urban areas. These features were 'draped' over the topographic data to complete the model used to generate the viewshed analysis. It should be noted that viewshed analyses are not absolute indicators of the level of significance (magnitude) of the impact in the view, but merely a statement of the fact of potential visibility. The visibility of a development and its contribution to visual impact is predicted using the criteria listed below:

## Visibility

---

High	Moderate	Low
<i>Visual Receptors</i> If the development is visible from over half the zone of potential influence, and/or views are mostly unobstructed and/or the majority of viewers are affected.	<i>Visual Receptors</i> If the development is visible from less than half the zone of potential influence, and/or views are partially obstructed and or many viewers are affected	<i>Visual Receptors</i> If the development is visible from less than a quarter of the zone of potential influence, and/or views are mostly obstructed and/or few viewers are affected.

---

### Visual Exposure

Visual exposure relates directly to the distance of the view. It is a criterion used to account for the limiting effect of increased distance on visual impact. The impact of an object in the foreground (0 – 800m) is greater than the impact of that same object in the middle ground (800m – 5.0 km) which, in turn is greater than the impact of the object in the background (greater than 5.0 km) of a particular scene.

Distance from a viewer to a viewed object or area of the landscape influences how visual changes are perceived in the landscape. Generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance.

Areas seen from 0 to 800m are considered foreground; foliage and fine textural details of vegetation are normally perceptible within this zone.

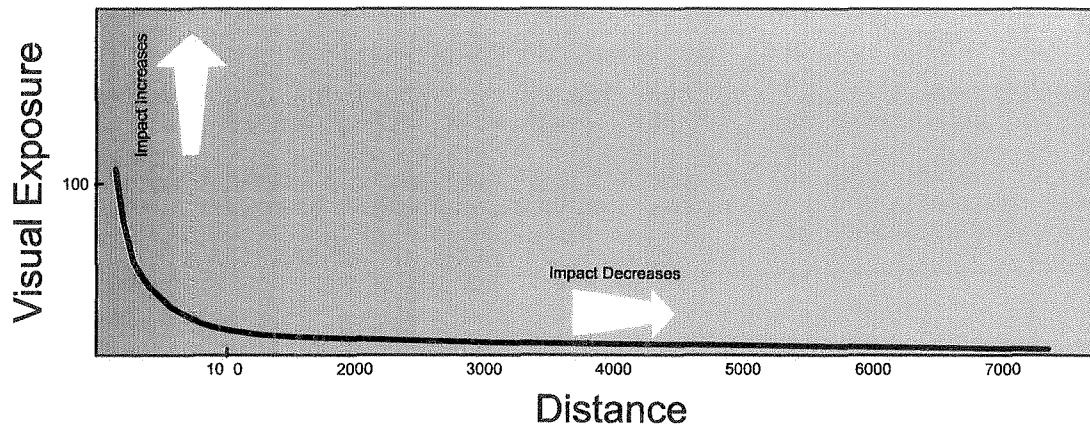
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

Areas seen from 5.0km to 8.0km and sometimes up to 16km and beyond are considered background. Landforms become the most dominant element at these distances.

Seldom seen areas are those portions of the landscape that, due to topographic relief or vegetation, are screened from the viewpoint or are beyond 16km from the viewpoint. Landforms become the most dominant element at these distances.

The impact of an object diminishes at an exponential rate as the distance between the observer and the object increases. Thus, the visual impact at 1000 m would be 25% of the impact as viewed from 500 m. At 2000 m it would be 10% of the impact at 500 m. The inverse relationship of distance and visual impact is well recognised in visual analysis literature (e.g.: Hull and Bishop (1988)) and is used as an important criteria for the study. This principle is illustrated in the Figure below.

## Effect of Distance on Visual Exposure



### Sensitivity of Visual Receptors

When visual intrusion, visibility and visual exposure are incorporated, and qualified by sensitivity criteria (visual receptors) the magnitude of the impact of the development can be determined.

The sensitivity of visual receptors and views will be depended on:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor;
- The importance of the view (which may be determined with respect to its popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).

The most sensitive receptors may include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;
- Occupiers of residential properties with views affected by the development.
- These would all be high

Other receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value);
- People travelling through or past the affected landscape in cars, on trains or other transport routes;
- People at their place of work.

The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

In this process more weight is usually given to changes in the view or visual amenity which are greater in scale, and visible over a wide area. In assessing the effect on views, consideration should be given to the effectiveness of mitigation measures, particularly where planting is proposed for screening purposes (Institute of Environmental Assessment & The Landscape Institute (1996).

### Sensitivity of Visual Receptors

High	Moderate	Low
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value);	The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view (i.e. office and industrial areas).
Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;	People travelling through or past the affected landscape in cars, on trains or other transport routes;	Roads going through urban and industrial areas
Occupiers of residential properties with views affected by the development.		

### Severity of the Visual Impact

Potential visual impacts are determined by analysing how the physical change in the landscape, resulting from the introduction of a project, are viewed and perceived from sensitive viewpoints. Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks, and conservation areas, highways and travel routes, and important cultural features and historic sites, especially in foreground views.

The magnitude of impact is assessed through a synthesis of visual intrusion, visibility, visual exposure and viewer sensitivity criteria. Once the magnitude of impact has been established this value is further qualified with spatial, duration and probability criteria to determine the *significance* of the visual impact.

For instance, the fact that visual intrusion and exposure diminishes significantly with distance does not necessarily imply that the relatively small impact that exists at greater distances is unimportant. The level of impact that people consider acceptable may be dependent upon the purpose they have in viewing the landscape. A particular development may be unacceptable to a hiker seeking a natural experience, or a household whose view is impaired, but may be barely noticed by a golfer concentrating on his game or a commuter trying to get to work on time (Ittleson *et al.*, 1974).

In synthesising these criteria a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement. (Institute of Environmental Assessment and The landscape Institute (1996)).

### Magnitude (Intensity) of Visual Impact

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements/features/characteristics of the baseline.	Partial loss of or alteration to key elements/features/characteristics of the baseline.	Minor loss of or alteration to key elements/features/characteristics of the baseline.	Very minor loss or alteration to key elements/features/characteristics of the baseline.
I.e. Pre-development landscape or view and/or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view and/or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view an/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.  Low scenic quality impacts would result.	I.e. Pre-development landscape or view and/or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the 'no change' situation.
High scenic quality impacts would result.	Moderate scenic quality impacts would result		Negligible scenic quality impacts would result.

### Cumulative effects

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility (visibility) of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions. (Institute of Environmental Assessment and The landscape Institute (1996)).



## APPENDIX D: CRITERIA FOR SIGNIFICANCE OF IMPACT ASSESSMENT

The impact assessment methodology is based on the Hacking method of determination of the significance of impacts (Hacking, 1998). Part A provides the definition for determining impact consequence (combining severity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

PART A: DEFINITION AND CRITERIA*		
<b>Definition of SIGNIFICANCE</b>	<b>Significance = consequence x probability</b>	
<b>Definition of CONSEQUENCE</b>	<b>Consequence is a function of severity, spatial extent and duration</b>	
<b>Criteria for ranking of the SEVERITY of environmental impacts</b>	<b>H</b>	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	<b>M</b>	Moderate / measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	<b>L</b>	Minor deterioration (nuisance or minor deterioration). Change not measurable / will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	<b>L+</b>	Minor improvement. Change not measurable / will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	<b>M+</b>	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	<b>H+</b>	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
<b>Criteria for ranking the DURATION of impacts</b>	<b>L</b>	Quickly reversible. Less than the project life. Short term
	<b>M</b>	Reversible over time. Life of the project. Medium term
	<b>H</b>	Permanent. Beyond closure. Long term.
<b>Criteria for ranking the SPATIAL SCALE of impacts</b>	<b>L</b>	Localised - Within the site boundary.
	<b>M</b>	Fairly widespread – Beyond the site boundary. Local
	<b>H</b>	Widespread – Far beyond site boundary. Regional / national

### PART B: DETERMINING CONSEQUENCE

#### SEVERITY = L

DURATION		H	Medium	Medium	Medium
Long term		H	Medium	Medium	Medium
Medium term		M	Low	Low	Medium
Short term		L	Low	Low	Medium

#### SEVERITY = M

DURATION		H	Medium	High	High
Long term		H	Medium	High	High
Medium term		M	Medium	Medium	High
Short term		L	Low	Medium	Medium

#### SEVERITY = H

DURATION		H	High	High	High
Long term		H	High	High	High
Medium term		M	Medium	Medium	High
Short term		L	Medium	Medium	High
			L	M	H

Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional / national
--	---	---

#### SPATIAL SCALE

PART C: DETERMINING SIGNIFICANCE					
PROBABILITY (of exposure to impacts)	Definite / Continuous	H	Medium	Medium	High
	Possible / frequent	M	Medium	Medium	High
	Unlikely / seldom	L	Low	Low	Medium
			L	M	H
CONSEQUENCE					

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	Decision guideline
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

\*H = high, M= medium and L= low and + denotes a positive impact.

## APPENDIX E: DECLARATION OF INDEPENDENCE

I, Mitha C Cilliers hereby declare that Newtown Landscape Architects cc, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

Consultant name: Mitha Cilliers

*MCCilliers*

Date: 2011-07-25

## APPENDIX F: CURRICULUM VITAE OF AUTHORS



Since 1994

## Graham Young PrLArch

PO Box 36, Fourways, 2055  
Tel: 27 11 462 6967  
Fax: 27 11 462-9284  
[www.newla.co.za](http://www.newla.co.za) [graham@newla.co.za](mailto:graham@newla.co.za)

*Graham is a registered landscape architect with interest and experience in landscape architecture, urban design and environmental planning. He holds a degree in landscape architecture from the University of Toronto and has practiced in Canada and Africa, where he has spent most of his working life. During his 30 year career he has received numerous Institute of Landscape Architects of South Africa and other industry awards. He has published widely on landscape architectural issues and has had projects published both locally and internationally in design journals and books. In addition to being a founding member of Newtown Landscape Architects he is currently a senior lecturer, teaching landscape architecture and urban design at post and under graduate levels, at the University of Pretoria. He has been a visiting studio critic at the University of Witwatersrand and University of Cape Town. A 'niche' speciality of his is Visual Impact Assessments for which he was cited with an ILASA Merit Award in 1999.*

- EXPERIENCE:** **NEWTOWN LANDSCAPE ARCHITECTS cc. *Founding Member***  
Current Responsible for project management, landscape design, urban design, and visual impact assessment.  
*Senior Lecturer:* Department of Architecture, University of Pretoria.
- 1991 - 1994 **GRAHAM A YOUNG LANDSCAPE ARCHITECT - *Sole proprietor***  
1988 - 1989 Designed major transit and CBD based urban design schemes; designed commercial and recreational landscapes and a regional urban park; participated in inter-disciplinary consulting teams that produced master plans for various beachfront areas in KwaZulu Natal and a mountain resort in the Drakensberg.
- 1989 - 1991 **CANADA - *Free Lance***  
Designed golf courses and carried out golf course feasibility studies (Robert Heaslip and Associates); developed landscape site plans and an end-use plan for an abandoned mine (du Toit, Allsopp and Hillier); conducted a visual analysis of a proposed landfill site. .
- 1980 - 1988 **KDM (FORMERLY DAMES AND MOORE) - *Started as a Senior Landscape Architect and was appointed Partner in charge of Landscape Architecture and Environmental Planning in 1984.*** Designed commercial, corporate and urban landscapes; completed landscape site plans; developed end-use master plans for urban parks, college and technikon sites; carried out ecological planning studies for factories, motorways and a railway line.

1978 - 1980

*DAYSON & DE VILLIERS - Staff Landscape Architect*

Designed various caravan parks; designed a recreation complex for a public resort; conducted a visual analysis for the recreation planning of Pilgrims Rest; and designed and supervised the installation of various private gardens.

**EDUCATION:**

Bachelor of Landscape Architecture, 1978, (BLArch), University of Toronto, Canada;  
Senior Lecturer - Department of Architecture, University of Pretoria.

**PROFESSIONAL:**

Registered Landscape Architect – South African Council for Landscape Architectural Profession (2001);  
Board of Control for Landscape Architects of South Africa (1987) – Vice Chairman 1988 to 1989;  
Professional Member - Institute of Landscape Architects Southern Africa (1982) – President 1986 - 1988;  
Member Planning Professions Board 1987 to 1989;  
Member International Association of Impact Assessment;

**AWARDS:**

Intermediate Phase(S'kumbuto, Moshate and Uitspanplek), Freedom Park: ILASA Merit Award (2009)

Corniche Bay Resort, Mauritius: ILASA Merit Award (2009)

Torsanlorenzo International Prize, Landscape design and protection 2<sup>nd</sup> Prize Section B: Urban Green Spaces, for Intermediate Phase Freedom Park (2009)

Phase 1 and Intermediate Phase Freedom Park: Loerie Awards Gold Statue (2008)

Phase 1 and Intermediate Phase Freedom Park: Special Mention World Architecture Festival, Nature Category (2008)

Moroka Park Precinct, Soweto: ILASA Merit Award for Design (2005) and Gold Medal United Nations Liveable Communities (LivCom) Award (2007)

Isivivane, Freedom Park: ILASA Presidential Award of Excellence Design (2005)

Information Kiosk, Freedom Park: ILASA Merit Award for Design (2005)

Moroka – Mofola Open Space Framework, Soweto: ILASA Merit Award for Planning (2005)

Mpumalanga Provincial Government Complex: ILASA Presidential Award of Excellence (with KWP Landscape Architects for Design (2003)

Specialist Impact Report: Visual Environment, Sibaya Resort and Entertainment World: ILASA Merit Award for Environmental Planning (1999);

Gillooly's Farm, Bedfordview (with Dayson and DeVilliers): ILASA Merit Award for Design;

## COMPETITIONS:

Johannesburg Inner City Park Design competition – with MMA architects (2009) Finalist and considered “the strongest concept” by the adjudication panel.

Pan African Parliament International Design competition – with MMA architects (2007) Finalist

Leeuwpan Regional Wetland Park for the Ekurhuleni Metro Municipality (2004) Landscape Architectural Consultant on Department of Trade and Industries Building (2002) – Finalist

Landscape Architecture Consultant on Project Phoenix Architectural Competition, Pretoria (1999): Winner;

Mpumalanga Legislature Buildings (1998): Commissioned;

Toyota Fountain (1985): First Prize - commissioned;

Bedfordview Bike/Walkway System - Van Buuren Road (1982): First Prize -commissioned;

Portland Cement Institute Display Park (1982): Second Prize

## CONTRIBUTOR / AUTHOR:

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- *Freedom Park Phase Intermediate Phase (NBGM), Pretoria, Gauteng*

Van Ueffelen, C. *1000 X Landscapes*, Verlagshaus Braun, Germany (2008)

- *Freedom Park Phase 1 and Intermediate Phase (NBGM), Pretoria, Gauteng*
- *Riverside Government Complex (NLAKWP), Nelspruit, Mpumalanga;*
- *Moroka Dam Parks Precinct, Soweto, Gauteng.*



In *Johannesburg: Emerging/Diverging Metropolis*, Mendrision Academy Press, Italy (2007)

- *Moroka Dam Parks Precinct*, Soweto, Gauteng.

Research panel: Oberholzer, B. *Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1*. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town. (2005)

Malan, C. and McInerney, P (eds) *The Making of an African Building. The Mpumalanga Provincial Government Complex*, Johannesburg MPTS Architectural Library, Johannesburg (2001)

- *Riverside Government Complex (KWPNLA)*, Nelspruit, Mpumalanga;

Numerous publications in industry journals.

*Mitha is a landscape architect with seven years experience. She has worked as Landscape Architect in South Africa and Angola and has valuable expertise in the practice of landscape architecture and environmental planning. She currently focuses on gaining experience in Visual Impact Assessments subcontracting for NLA, she also subcontracts as Landscape Architect for other Landscape Architectural firms, as Landscape Designer for Landscape Contractors as well as undertaking private projects.*

## EXPERIENCE:

2008 to present: *Consultant:*

NEWTOWN Landscape Architects cc.

Visual Impact Assessments

KWP Landscape Architects & Environmental Consultants

Landscape Maintenance Auditing

Landscape Design and draughting

REAL Landscapes

Landscape Design

2005 – 2007 *Landscape Architect:*

KWP Landscape Architects & Environmental Consultants

Landscape design for various types of projects ranging from residential garden design to industrial landscaping, including the landscape upgrade of the SASOL plant in Secunda.

General project administration and documentation including Bill of Quantities, Tender Evaluation and site inspections.

Landscape Maintenance Auditing at the Nelspruit Riverside Government Offices

Preparation of Environmental Impact Assessment Reports for proposed housing developments.

Environmental Control Officer on various residential housing developments.

2003 – 2004 *Candidate Landscape Architect:*

Sigma Gibb – part of the GIBB Africa Group

Co-Landscape Architect on a residential housing estate in Luanda, Angola.

Design and draughting for various projects in Angola.

2003

*Candidate Landscape Architect:*

NEWTOWN Landscape Architects cc.

Design and draughting various projects ranging from private residential gardens to public parks.

Project administration including Bills of Quantities and Tender Evaluation and site inspections

PROFESSIONAL:

Registered Landscape Architect – South African Council for Landscape Architectural Profession (2007)

Committee Member – South African Council for Landscape Architectural Profession (2009 & 2011)

Member Green Building Council of South Africa

EDUCATION:

Bachelor of Landscape Architecture, 2001, (BLArch), University of Pretoria.



the **dedet**

Department:  
Economic Development, Environment and Tourism  
MPUMALANGA PROVINCIAL GOVERNMENT

**Details of specialist and declaration of interest in respect of an application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010**

**PROJECT TITLE**

New Largo Phola-Kusile Coal Conveyor

<b>Specialist:</b>	Newtown Landscape Architects		
<b>Nature of specialist study compiled:</b>	Visaul Impact Assessment		
<b>Contact person:</b>	Mitha Cilliers		
<b>Postal address:</b>	PO Box 36, Fourways		
<b>Postal code:</b>	2055	<b>Cell:</b>	082 824 5830
<b>Telephone:</b>	011 462 6967	<b>Fax:</b>	011 462 9284
<b>E-mail:</b>	mithaworx@gmail.com		
<b>Qualifications &amp; relevant experience:</b>	B LArch		
<b>Professional affiliation(s) (if any)</b>	SACLAP		

## The specialist appointed in terms of the Regulations

I, Mitha Catharina Cilliers declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of specialist:

Newtown Landscape Architects

Name of company:

26/09/2011

Date:

Signature of Commissioner of Oaths

26-09-2011

Date:

Designation:	021
Official stamp (below):	2011-09-26
	0028
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**Appendix N:  
Social Specialist Assessment**





### Structuring of the Specialist Studies in terms of GNR 543 Section 32 Requirements

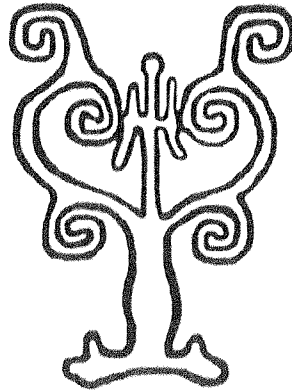
Legal and Regulatory Requirement	Cross Reference to Report Section
<b>GNR 543 Section 32</b>	
<b>Specialist reports and reports on specialized processes</b>	
1. An applicant or the EAP managing an application <u>may appoint a person to carry out a specialist study or specialized process.</u>	Appendices to the EIA main report
2. The person referred to in sub-regulation (1) must comply with the requirements of regulation 17 [declaration of independence]	Declaration of independence signed by specialists provided at back of each specialist report
3. A specialist report or a report on a specialized process prepared in terms of these Regulations must contain-	
(a) Details of- (i) <u>the person who prepared the report;</u> and (ii) <u>the expertise of that person to carry out the specialist study or specialized process;</u>	Page vi
(b) <u>A declaration that the person is independent</u> in a form as may be specified by the competent authority;	Declaration of independence signed by specialists provided at back of each specialist report
(c) <u>An indication of the scope of,</u> and the purpose for which, the report was prepared;	Chapter 1 - Introduction Chapter 4 - Baseline description of the social environment
(d) A description of the <u>methodology</u> adopted in preparing the report or carrying out the specialized process;	Chapter 3, Section 3.3 - Methodology
(e) A description of any <u>assumptions</u> made and any uncertainties or <u>gaps</u> in knowledge;	Chapter 3, Section 3.2 - Assumptions and limitations
(f) A description of the <u>findings and potential implications of such findings</u> on the impact of the proposed activity, including identified alternatives, on the environment;	Chapter 6 - Social Impact Assessment Chapter 7 – Analysis of alternatives
(g) <u>Recommendations</u> in respect of any <u>mitigation measures</u> that should be considered by the applicant and the competent authority;	Provided in each specialist report, where relevant Chapter 8 - Conclusions and recommendations
(h) <u>A description of any consultation process</u> that was undertaken during the course of carrying out the study;	Consultation Process discussed in EIA main report
(i) <u>A summary and copies of any comments</u> that were received during any consultation process; and	All issues received to date included in Section 6 of the EIA main report
(j) Any other <u>information requested by the competent authority.</u>	Not applicable



# Proposed Phola-Kusile Overland Coal Conveyor in the Emalahleni area

---

Social Impact Assessment



Prepared by:

Ptersa Environmental Management Consultants

PO Box 915 751

Faerie Glen

0043

Contact person: IlseAucamp

Prepared for:

Synergistics Environmental Services (Pty) Ltd

**August2011**

## Executive summary

Anglo American is proposing to construct an overland conveyor system, the Phola-Kusile Overland Conveyor, to transport coal from the Phola Coal Processing Plant to Eskom's Kusile Power Station in the Mpumalanga Province through its subsidiary, Anglo American Inyosi Coal, to meet the demand for coal at the Kusile Power Station. The conveyor system will be approximately 23 km in length, depending on the final route selection. There will be four conveyor flights and a total of five transfer stations.

The proposed conveyor will be located in the Emalaheni and Victor Khanye Local Municipalities, which form part of the Nkangala District Municipality in Mpumalanga. The project area is surrounded by mining and agricultural activities.

A stakeholder analysis has been conducted, and four groups of primary stakeholders have been identified. These groups are the farming community, the directly affected communities, mines/industries in the area and the para-statal that will be affected by the proposed project. Dialogue with the para-statal and industrial role players will be very important for the potential construction and implementation of the project. Some of these dialogues have commenced and are taking place on a corporate level. The farming community should be consulted and kept informed about project activities and progress.

The following table summarise the potential social change processes that may occur, the social impacts that these changes may cause and the stakeholder group that will be affected by each change.



Social Change Process	Possible Social Impact	Affected stakeholder group
In-migration: Presence of construction workers	Safety of people and property Lack of services (water, sewage, accommodation)	Farming community Directly affected communities
Change in land use	Uncertainty Positive & negative impacts on livelihoods Safety of people and property Disruption to daily activities (change in movement patterns and maintenance of servitude) Sense of place (noise, dust, visual)	Farming community Directly affected communities
Economic activities	Sterilisation of resources Impact on commercial activities Loss of productive farm land Creation of employment and economic opportunities	Mines/Industries Farming community Directly affected communities

When considering the social impacts of the proposed conveyor system, 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. From a greater societal perspective the project will thus have a positive impact. It is worth noting concerns about the long term impact on food security due to cumulative loss of high potential agricultural land. The proposed project will take place in an area surrounded by industrial development, and many of the impacts are already taking place. Stakeholders are also familiar with the potential impacts. A small number of stakeholders will bear the majority of impacts of a project that is in the interest of the country at large. These impacts can be mitigated and managed – long term management is crucial to enhance Anglo's social licence to operate and to minimise impacts on affected parties. The largest number of impacts will result from a change in land use. Although the proposed



conveyor system has a limited lifespan, it will still affect stakeholders for all or a big portion of their economic active years.

Many social impacts occur as a result of bad communication processes, and positive relationships can go a long way in dealing with issues. The way in which issues are approached is a crucial aspect in the success with which it can be dealt with. The following general recommendations are made:

### **Construction**

- Compile and implement a community relations strategy;
- Appoint a stakeholder relationship manager to assist with management of social impacts and dealing with community issues;
- Consult with the directly affected communities and note special concerns;
- Install proper grievance and communication systems;
- Involve the community in the process as far as possible – encourage co-operative decision-making and management and partnerships with local entrepreneurs;
- Be accessible and sensitive to community needs;
- Appoint security firm to patrol construction area;
- Implement access control system and make sure construction teams can be identified easily; and,
- Start discussions with commercial role players.

### **Operation**

- Appoint a permanent stakeholder relationship manager to deal with communities and build relationships with affected communities;
- Ensure security of servitude via fire management programme and security firm;
- Make monitoring activities part of the Safety, Health and Environmental systems; and,
- Develop and implement community relations programme.

The need for the proposed project is undeniable in the current economic conditions. It is therefore recommended that the project proceed. The mitigation measures



should be adhered to in order to ensure the proper management and mitigation of impacts.



## Declaration of Independence

Ptersa Environmental Management Consultants declare that:

- All work undertaken relating to the proposed project were done as an independent consultant;
- They have the necessary required expertise to conduct social impact assessments, including the required knowledge and understanding of any guidelines or policies that are relevant to the proposed activity;
- They have undertaken all the work and associated studies in an objective manner, even if the findings of these studies were not favourable to the project proponent;
- They have no vested financial interest in the proposed project or the outcome thereof, apart from remuneration for the work undertaken under the auspices of the above mentioned regulations;
- They have no vested interest, including any conflicts of interest, in either the proposed project or the studies conducted in respect of the proposed project, other than complying with the required regulations; and,
- They have disclosed any material factors that may have the potential to influence the competent authority's decision and/or objectivity in terms of any reports, plans or documents related to the proposed project as required by the regulations.





## Record of Experience

This report was compiled by Ilse Aucamp and San-Marié Aucamp.

**Ilse Aucamp** has more than 10 years of experience in Social Impact Assessment. She holds a Masters degree in Environmental Management as well as a degree in Social Work and is frequently a guest lecturer in pre- as well as post-graduate programmes at various tertiary institutions. Her expertise includes social impact assessments, social management plans, social and labour plans, social auditing, training as well as public participation. She is the past international chairperson of the Social Impact Assessment section of the International Association of Impact Assessment (IAIA) as well as a past member of the National Executive Council of IAIA South Africa.

**San-Marié Aucamp** is a registered Research Psychologist with extensive experience in both the practical and theoretical aspects of social research. She has more than 10 years' experience in social research and she occasionally presents guest lectures in social impact assessment. Her experience includes social impact assessments, social and labour plans, training, group facilitation as well as social research. She is a past council member of the Southern African Marketing Research Association (SAMRA).

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## GLOSSARY OF TERMS

**Sense of place:** Defining oneself in terms of a given piece of land. It is the manner in which humans relate or feel about the environments in which they live.

**Social impact:** 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.

**Social change process:** A discreet, observable and describable process which 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.

**Social Impact Assessment:** 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.

**Social license to operate:** The acceptance and belief by society, and specifically local communities, in the value creation of activities.

**LIST OF ABBREVIATIONS**

CS	Community Survey
DM	District Municipality
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
ESOMAR	European Society for Opinion and Marketing Research
GDP	Gross Domestic Product
GGP	Gross Geographical Product
HDSA	Historically Disadvantaged South African
IDP	Integrated Development Plan
LM	Local Municipality
NEMA	National Environmental Management Act
SAMRA	Southern African Marketing Research Association
SIA	Social Impact Assessment
UNEP	United Nations Environmental Programme



## 1 Introduction

The purpose of this report is to provide baseline information regarding the social environment, to identify possible social risks/fatal flaws and social impacts that may come about as a result of the proposed development and to suggest ways in which these impacts can be mitigated. This will assist decision-makers on the project in making sound decisions, by providing information on the potential or actual consequences of their actions. The process entailed the following:

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

Disregarding social impacts can alter the cost-benefit equation of development and, in some cases, even undermine the overall viability of a project. A proper social 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.

Synergistics Environmental Services (Pty) Ltd was appointed to manage the environmental impact assessment (EIA) process and they appointed Ptersa Environmental Management Consultants to perform the social impact assessment for the proposed project.

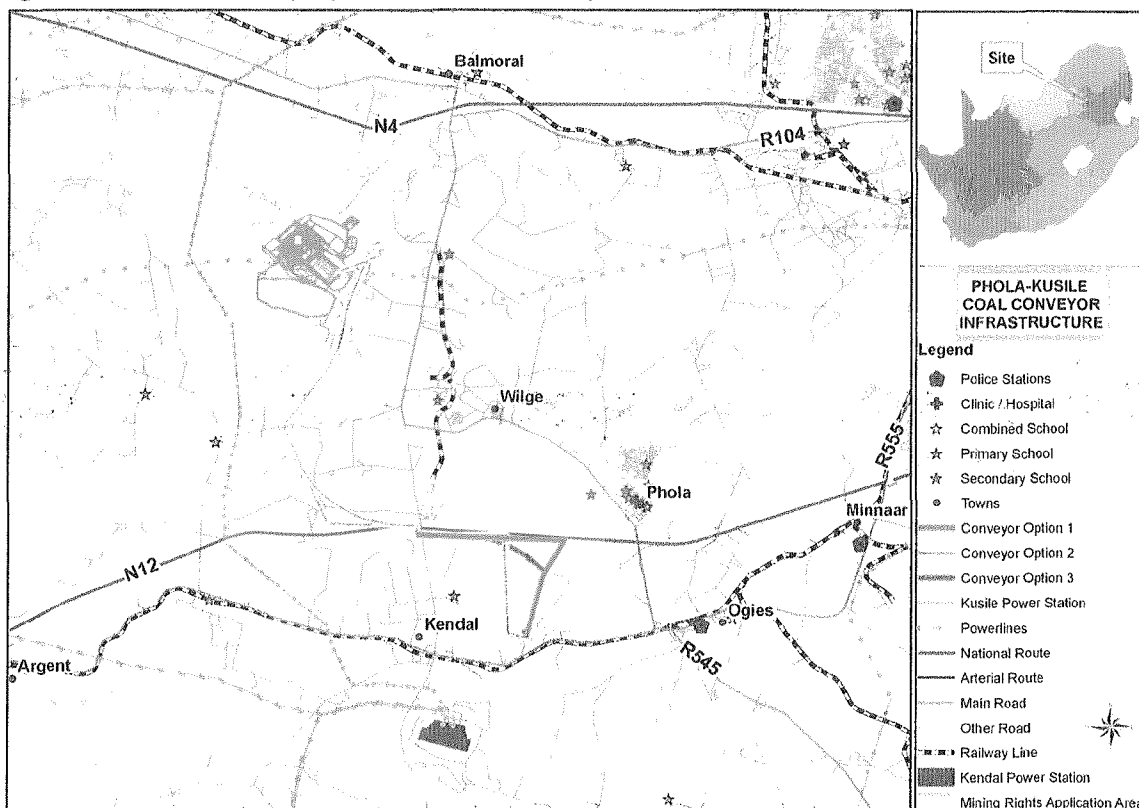




## 2 Project overview

Anglo American is proposing to construct an overland conveyor system, the Phola-Kusile Overland Conveyor, to transport coal from the Phola Coal Processing Plant to Eskom’s Kusile Power Station in the Mpumalanga Province through its subsidiary, Anglo American Inyosi Coal, to meet the demand for coal at the Kusile Power Station. Three alternative corridor routes were initially identified for the conveyor, but two corridors were discarded, mainly on environmental grounds, and one corridor was identified as the preferred corridor. Various route alignments along the preferred corridor exist. Figure 1 shows the locality of the proposed corridor and the route alignments in the preferred corridor as well as current infrastructure. The mining rights application area for their proposed New Largo mine is also shown as it is anticipated that the coal will be sourced from there.

Figure 1: Location of the proposed overland conveyor



The conveyor system will be approximately 23 km in length, depending on the final route selection. There will be four conveyor flights and a total of five transfer stations. Lighting will be provided at all the transfer points. The conveyor will be approximately 1.35 metres wide and will run at an average speed of approximately 4.5 metres per second. It will be provided with a sheet metal cover that is open on the one side. The fenced conveyor servitude will be approximately 30 metres wide and will include a service road and a storm water management system along the length of the conveyor. Pedestrian and road crossings will be provided where needed. Power will be supplied through a 22 kV power line.



### **3 Study approach**

#### **3.1 Information base**

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

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

#### **3.2 Assumptions and limitations**

The following assumptions and limitations were relevant:

1. 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.
2. 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.
3. 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.
4. 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.
5. 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).

For the purpose of this SIA, the following Social Impact Assessment categories were investigated:

- 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.

For the purpose of this study, 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, World Bank Environmental, Health and Safety guidelines and Anglo America's Socio-Economic Assessment Toolkit (SEAT) 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) 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 expresses 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, it 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, but 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. The following groups were interviewed:

- Councillors from Emalahleni Local Municipality
- Farmers
- Residents from Phola
- Residents from Kendal Forest Holdings

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 has 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 purpose 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 Baseline description of the social 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.

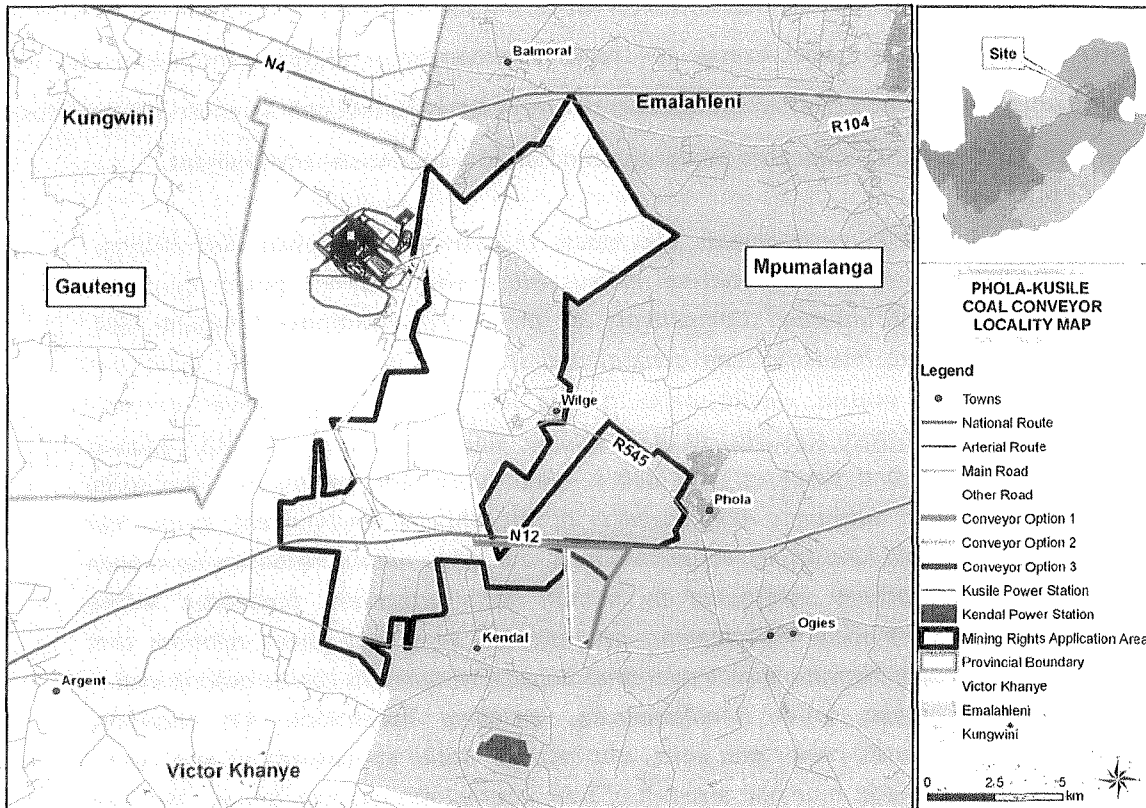
### 4.1 Description of the area

The proposed conveyor will be located in the Emalahleni and Victor Khanye Local Municipalities, which forms part of the Nkangala District Municipality in Mpumalanga. The baseline description of the social environment will include these areas. Figure 2 shows the location of the proposed



projected within municipal boundaries.

Figure 2: Locality of the proposed overland conveyor system



4.1.1 The Mpumalanga Province

The Mpumalanga Province is located in the north eastern part of South Africa and covers an area of approximately 82 333 km<sup>2</sup> ([www.mputopbusiness.co.za](http://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 GertSibande, 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](http://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 Victor Khanye, Dr JSMoroka, Emalahleni, Emakhazeni, Steve Tshwete, and Thembisile, as well as the Mdala District Management Area.

The district is approximately 17 000 km<sup>2</sup> 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](http://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 JSMoroka 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).

**Emalahleni Local Municipality (ELM)** is one of the six local municipalities forming part of the Nkangala District Municipality and borders the Gauteng Province. The Emalahleni LM is situated strategically within provincial context and in relation to the national transport network. It is situated closely to the City of Johannesburg Metropolitan, City of Tshwane Metropolitan Municipality and the Ekurhuleni Metropolitan Municipality. It is connected to these areas by the N4 and N12 freeways as well as a railway network. The Maputo Corridor runs through the municipality. There are rich coal reserves in the area as well as a number of power stations such as Kendal, Matla, Duvha, Ga-Nala as well as the Kusile power station that is currently under construction.

The main urban centre is the town of Emalahleni with the other towns / activity nodes being Ogies, Phola, Ga-Nala, Thubelihle, Rietspruit, Van Dyksdrift and Wilge. The development patterns in the area are fragmented, not only because of previous policies of segregation by race, but also due to the fact that large areas are undermined or have mining rights which resulted in further physical separation of areas, as well as the presence of natural features like flood plains and marshlands (Emalahleni IDP, 2009/10).

The **Victor Khanye Local Municipality** is situated on the Western Highveld in the Nkangala District Municipality and is strategically located close to the metropolitan areas of Ekurhuleni and Tshwane in Gauteng. Main towns and settlements in the area include Delmas, Eloff, Sundra, Botleng, Abor, Argent, Lionelton, Brakfontein, Dryden and Waaikraal (Victor Khanye IDP). The area is characterised by an increase in the number of mining and related activities in the Leandra area (Nkangala IDP). In addition to mining (concentrating on coal and silica), other important sectors in the area are agriculture, finance and manufacturing. Agriculture is the main source of employment in the municipality ([www.delmasmunic.co.za](http://www.delmasmunic.co.za)).

#### **4.2 Description of the population**

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 Emalahleni and Victor Khanye local municipalities 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](http://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; and, 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 which 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 field work. 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.

#### 4.2.1 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 on approximately 3.87 people per household, indicating an average household size of 3-4 people (leaning towards 4) for most households which are 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, but NkangalaDM and Emalahleni LM experienced growth rates well above the national average with the population in Emalahleni LM more than doubled since 2001. The Victor Khanye LM has a much smaller population than the Emalahleni LM and showed a negative growth rate since 2001. Emalahleni LM has the largest household sizes of the areas under investigation and has also shown an increase in household sizes since 2001. The Victor Khanye LM has the smallest average household size and showed a decrease of almost one person per household since 2001.

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

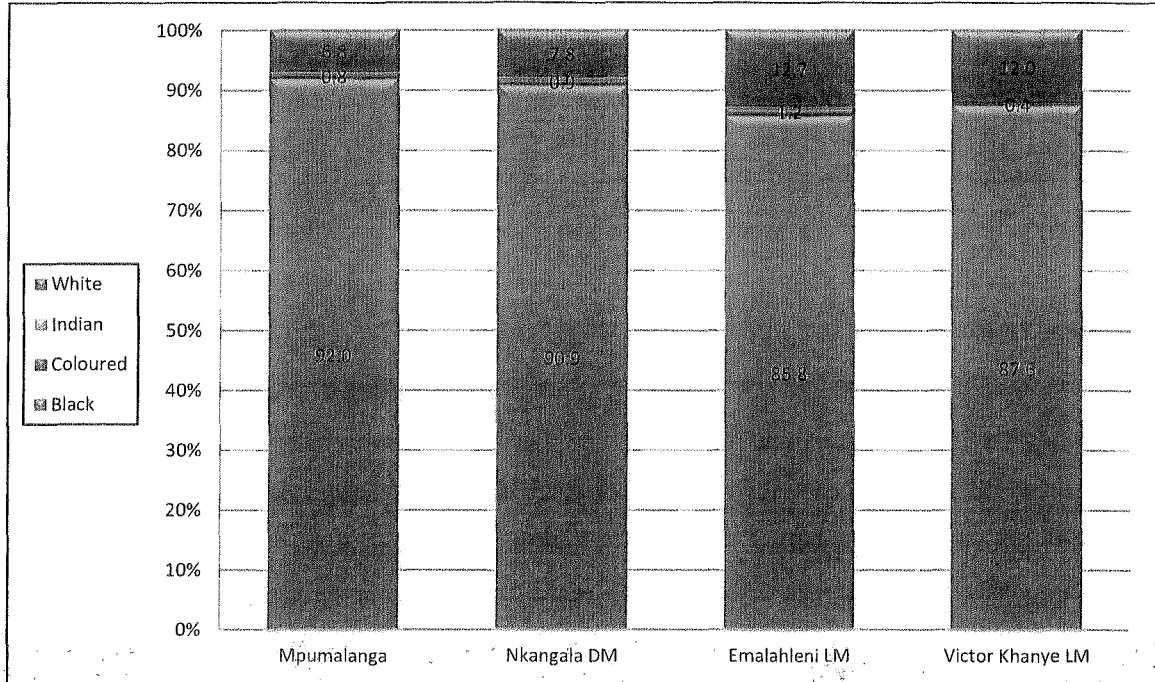
	Approximate population size	Estimated growth since 2001	Average household size
<b>Mpumalanga</b>	<b>3,643,435</b>	<b>8.25%</b>	<b>3.87</b>
Nkangala DM	1,226,500	20.38%	4.01
Emalahleni LM	435,217	57.45%	4.12
Victor Khanye LM	50,455	-10.24%	3.33

The majority of residents in the Emalahleni LM as well as the Victor Khanye LM belong to the Black



population (Figure 3). The proportion of people belonging to the Black population group in both the Emalahleni LM and Victor Khanye is lower than on district and provincial level, with a higher proportion of people belonging to the White population group. As such these two local municipalities can be expected to be culturally different from the district.

Figure 3: Population distribution (shown in percentage, source: CS 2007)



#### 4.2.2 Age

Table 2 shows that the Emalahleni LM has the highest average age (27.68 years) of the areas under investigation. This can possibly be ascribed to the more urban nature of the Emalahleni LM and the extent of industrial activities in the area compared to the district. Although there are larger urban areas in the Mpumalanga province than Emalahleni, there are also a number of tribal areas in the province which tend to have large proportions of young people that will bring down the average age of the population in the province.



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

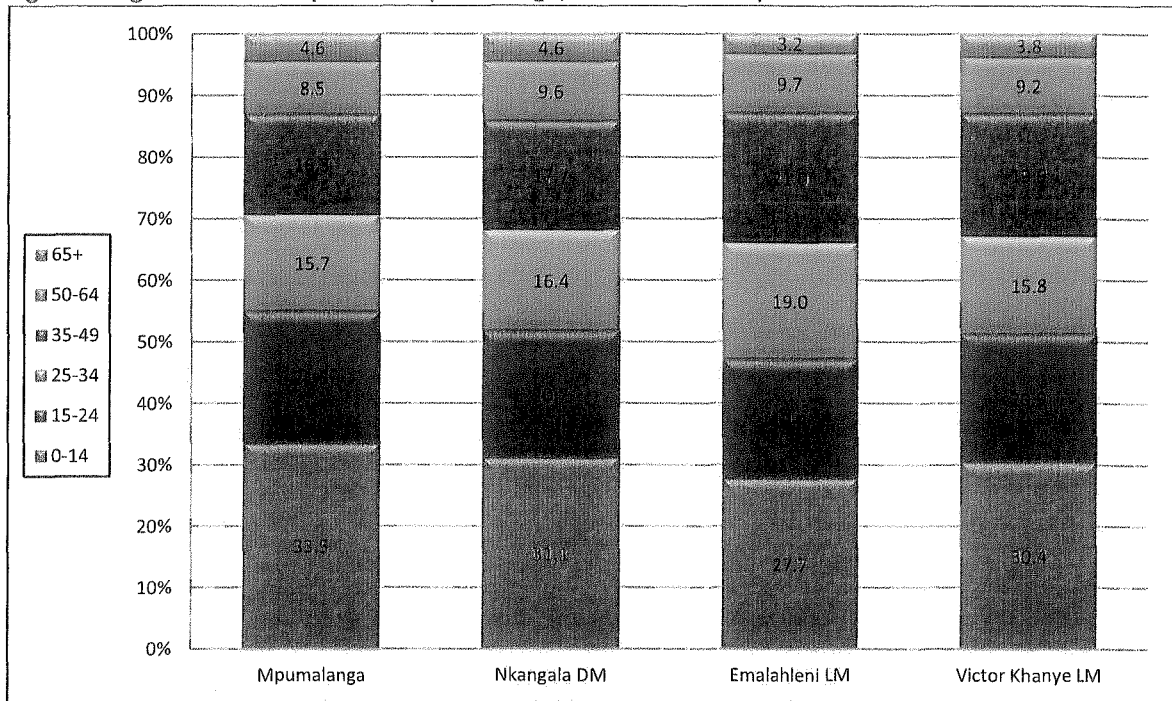
	Approximate average age (in years)
<b>Mpumalanga</b>	<b>25.98</b>
Nkangala DM	27.05
Emalahleni LM	27.68
Victor Khanye LM	26.93

A closer look at the age distribution (Figure 4) shows that the Emalahleni 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 – 49 years, which are of economically active aged. The profile of the Victor Khanye LM looks very similar to the profiles on district and provincial level. On provincial and district level 50% or more of the population are younger than 25 years. The high proportion of children younger than 15 years places a 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 is likely that many of these people will immigrate to areas such as Emalahleni where there are more industrial activities and as such potentially more job opportunities.





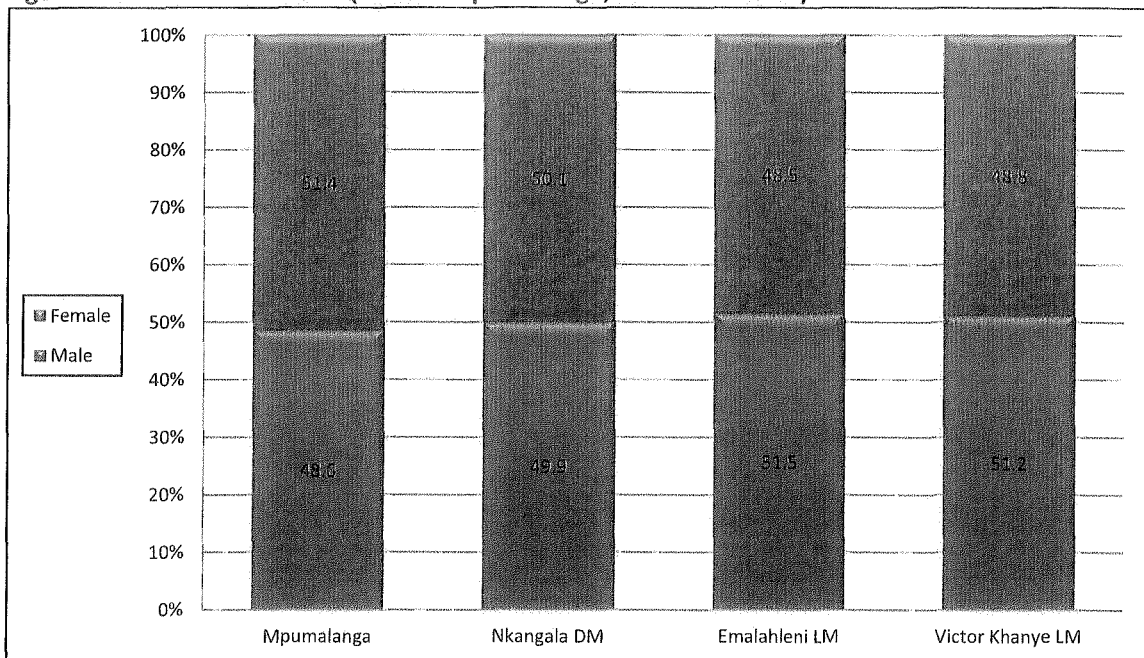
Figure 4: Age distribution (shown in percentage, source: CS 2007)



### 4.2.3 Gender

The gender distribution is fairly equal (Figure 5), with a slight bias towards males in the Emalahleni LM as well as the Victor Khanye LM, which can be ascribed to the industrial nature of the area.

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

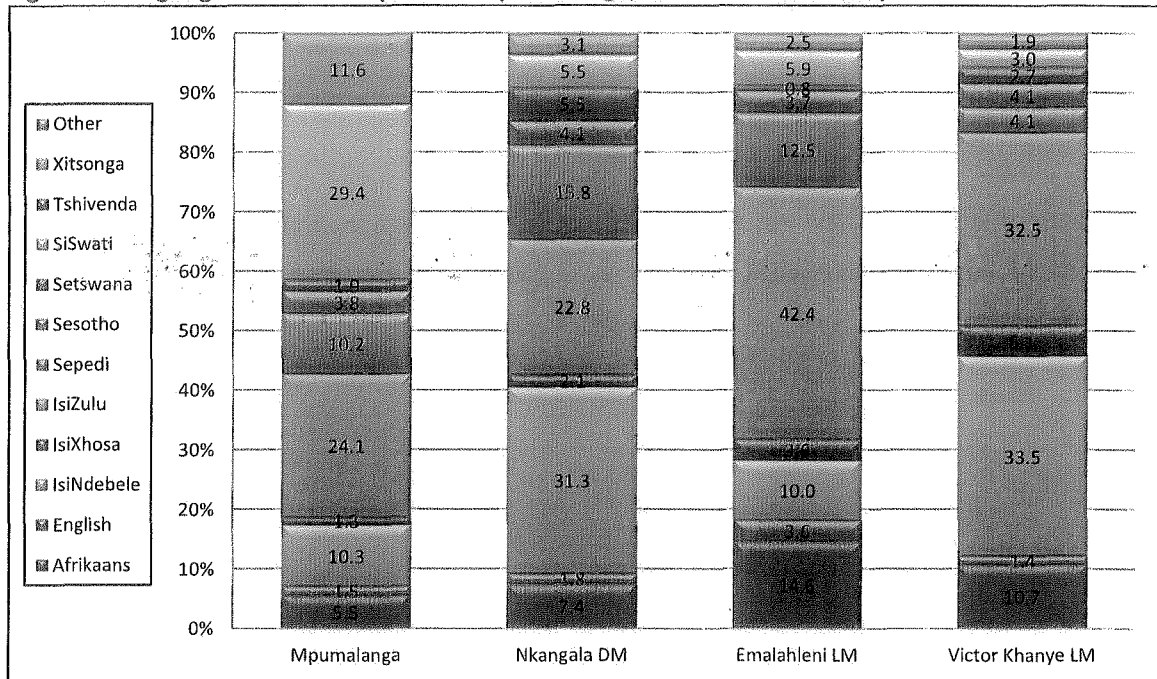




#### 4.2.4 Language

The language profiles for the areas are very different from one another (Figure 6). In 2001, the dominant home language in the Emalahleni LM was isiZulu (42.4%), followed by Afrikaans (14.6%), Sepedi (12.5%) and isiNdebele (10%). In the Victor Khanye LM the dominant home languages were isiNdebele (33.5%) and isiZulu (32.5%), followed by Afrikaans (10.7%). 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 easier with the local communities. Therefore it is suggested that communication with communities in the study area should mainly take place in isiZulu, Sepedi, Afrikaans and English to ensure the largest reach. Not doing so could create barriers for accessing these communities.

Figure 6: Language distribution (shown in percentage, source: Census 2001)



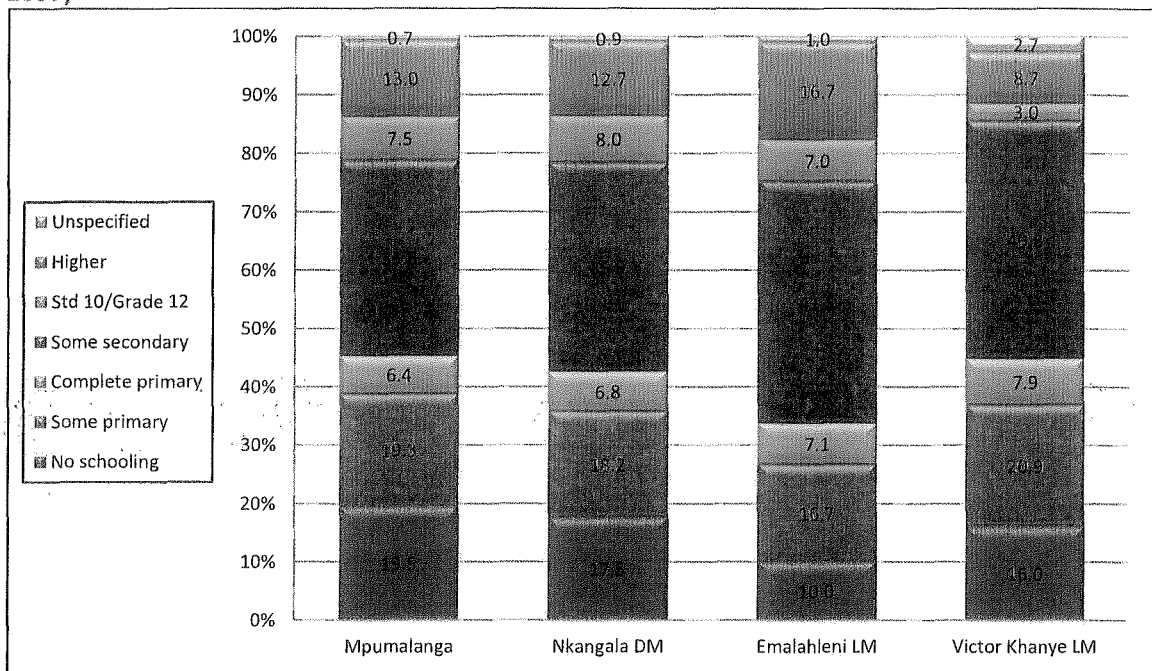
#### 4.2.5 Education

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 Emalahleni LM has a higher proportion of people (23.7%) indicating that they have obtained Grade 12 or a higher qualification than on district or provincial level (Figure 7). Even so, this proportion is still relatively low and this is limiting the employment potential of the population of the area. The Victor Khanye LM has the lowest proportion of people (11.7%) indicating that they have obtained Grade 12 or a higher qualification. The high proportion of people who did not attend an educational institution has led to 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 (Victor Khanye IDP).

Figure 7: 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).

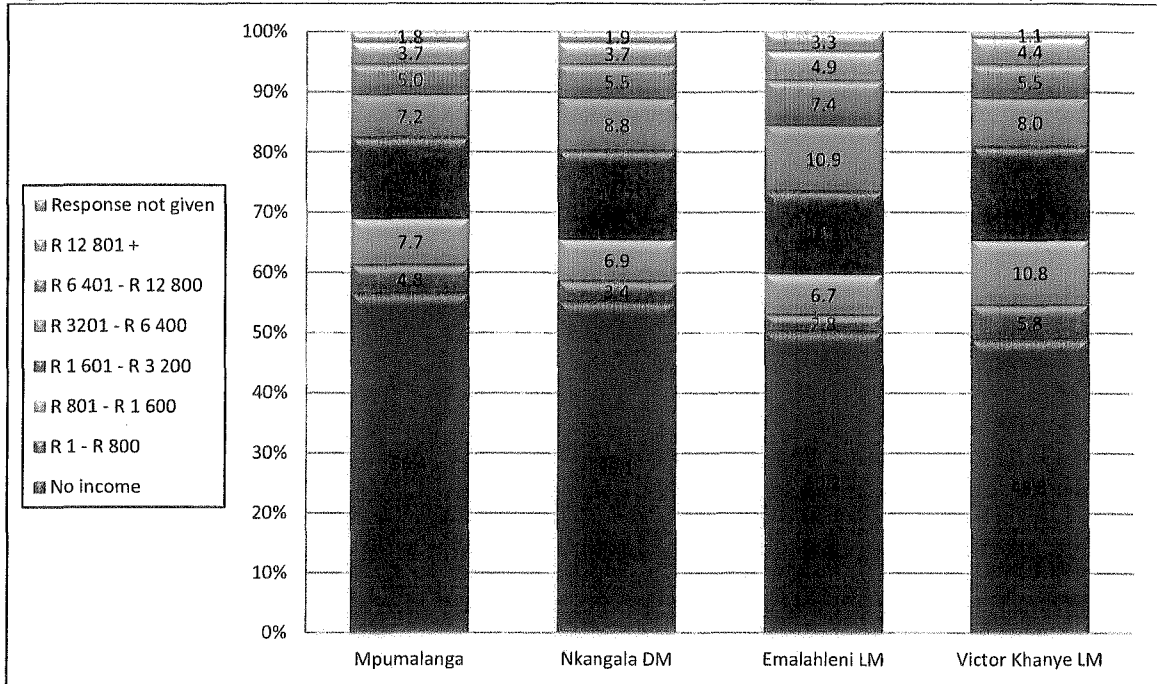
**4.2.6 Income**

On local, district and provincial level, 50% or more of the population between the ages of 15 and 65 years have indicated that they did not have any income (Figure 8) in 2007. The Emalahleni area is financially slightly better off than the district and the province, but the levels of poverty are still high.



The distribution of income in the Victor Khanye LM, looks similar to that on provincial and district level.

Figure 8: Individual Monthly Income distribution (shown in percentage, source: CS 2007)



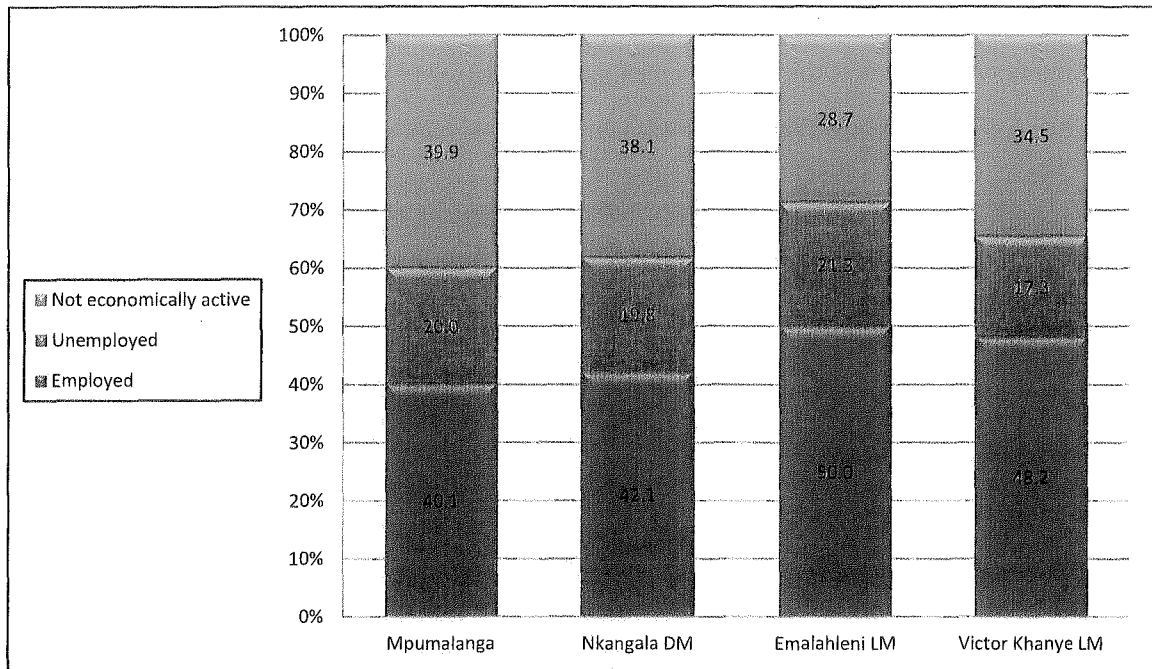
### 4.3 Industry

#### 4.3.1 Employment, occupations and industry

Half of the people in the Emalahleni LM and almost half of the people in the Victor Khanye LM who are of economically active age (aged between 15 and 65 years) have indicated that they are employed (Figure 9), compared to 42.1% in Nkangala and 40.1% in Mpumalanga, indicating the greater concentration of economic activities in the area.



Figure 9: Employment status distribution (shown in percentage, source: CS 2007)



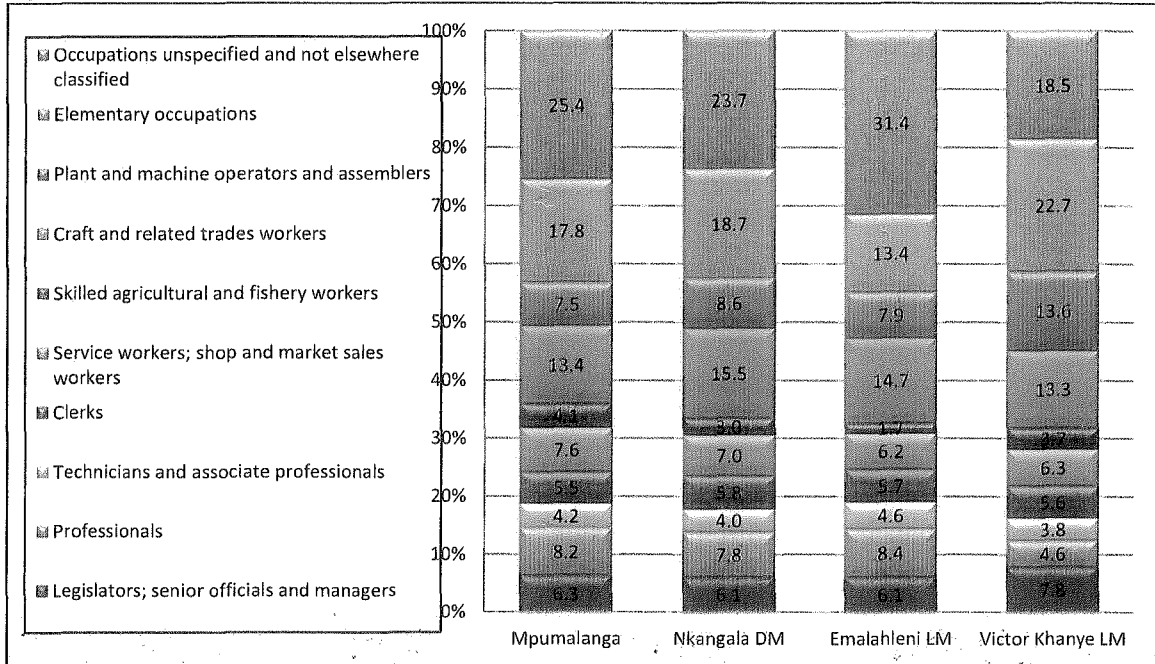
Only 21.3% of the inhabitants of the Emalahleni LM and 17.3% of inhabitants in the Victor Khanye LM have indicated that they wanted to work and had taken active steps around the time of the survey to find employment. The proportion for Emalahleni LM is very similar to the proportions on district and provincial level while the proportion for the Victor Khanye LM is slightly lower. The Emalahleni 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.

In general the largest proportion of the employed people in the study area on district and provincial level (Figure 10) 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 Emalahleni LM, Craft and related trades workers is the biggest occupational category, followed by Elementary occupations. 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. Elementary occupations is the biggest employment category in the Victor Khanye LM, followed by plant and machine operators and assemblers and Craft and related trades workers,

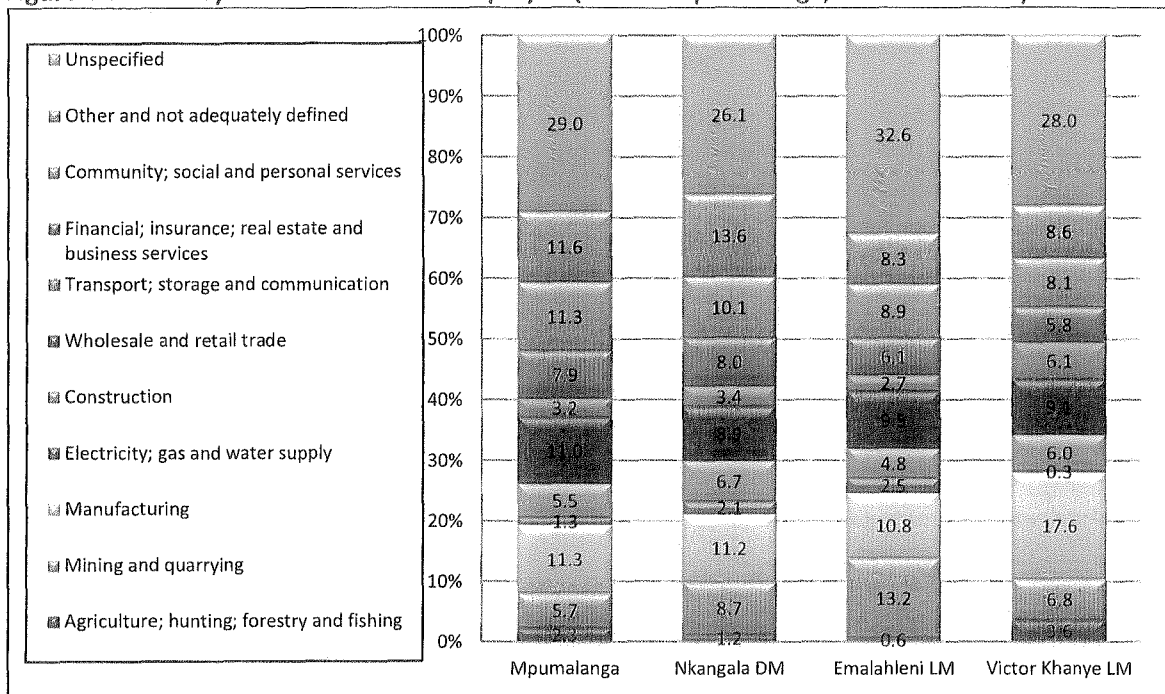
Figure 10: Occupation distribution of the employed (shown in percentage, source: CS 2007)



The industry profiles for the different areas under investigation look different from one another (Figure 11). 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 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. In the Emalahleni LM, the dominant industry of employment is Mining and quarrying, followed by Manufacturing. Manufacturing is the most dominant industry of employment in the Victor Khanye LM, followed by Wholesale and retail trade.



Figure 11: Industry distribution of the employed (shown in percentage, source: CS 2007)



#### 4.4 Infrastructure

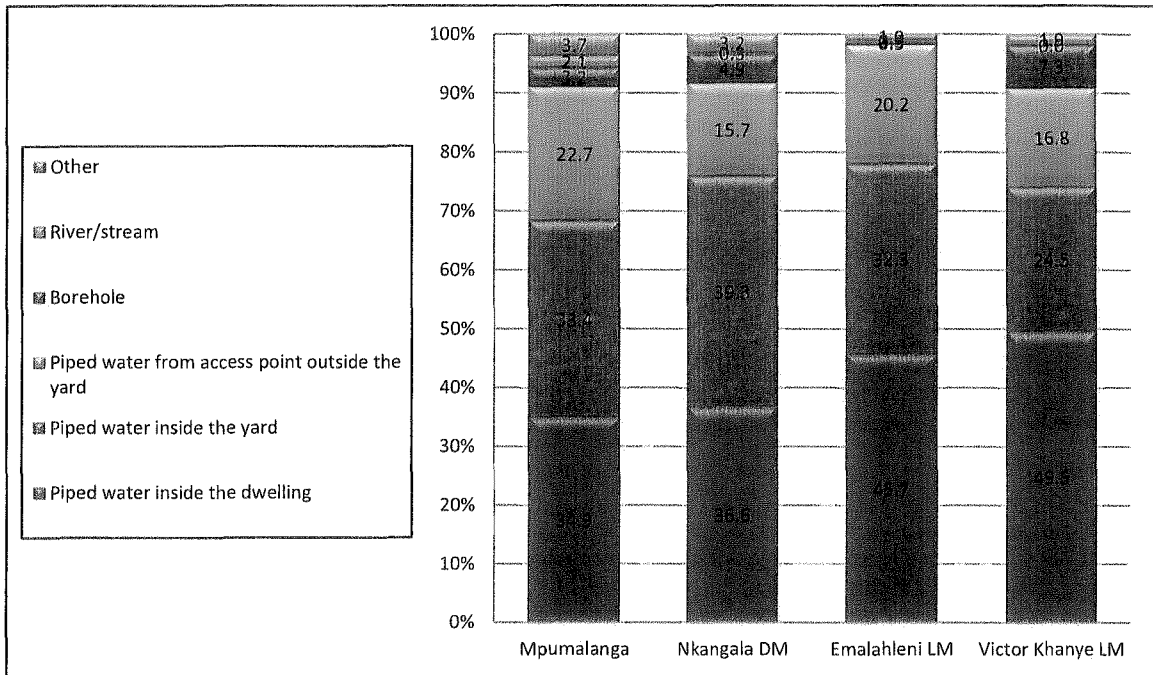
##### 4.4.1 Services: Water, Sanitation, Electricity and Refuse Removal

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 12) in 2007, compared to 74% or more on district level and local level. There are only about a third to just less than half of households, that have access to piped water inside their dwellings.



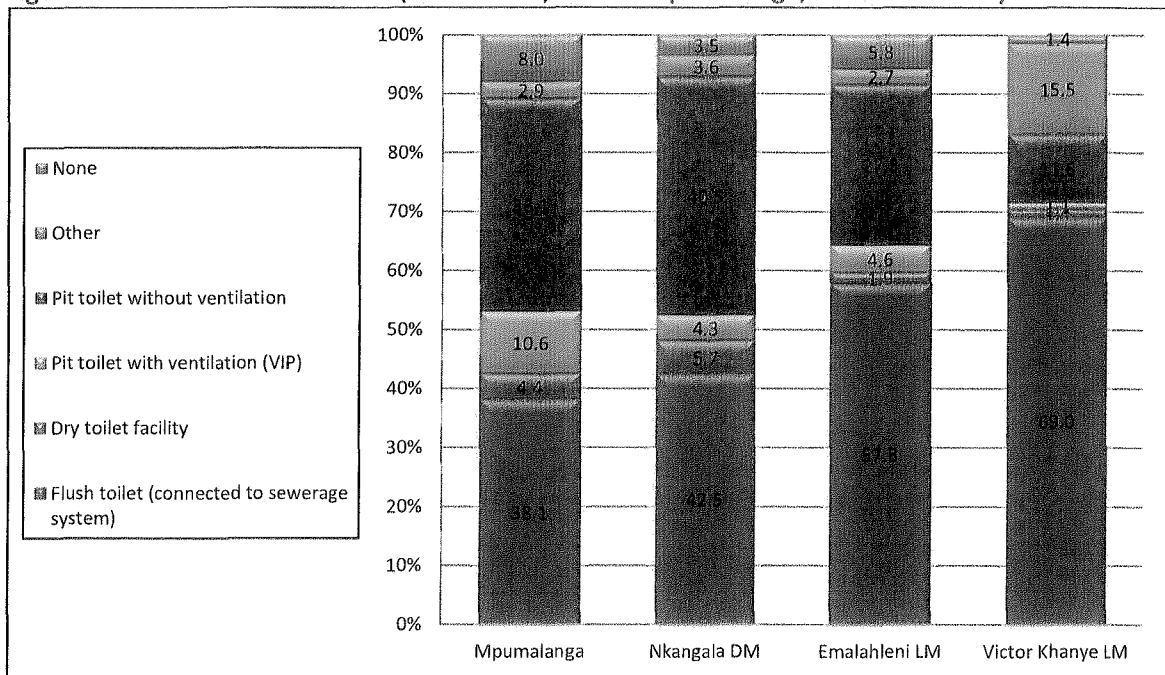


Figure 12: Distribution of water supply (households, shown in percentage, source: CS 2007)



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 Victor Khanye LM is the least deprived area in terms of sanitation services with almost 70% of households having access to flush toilets or pit toilets with ventilation (Figure 13), followed by the Emalahleni LM with 57.8%.

Figure 13: Sanitation distribution (households, shown in percentage, source: CS 2007)

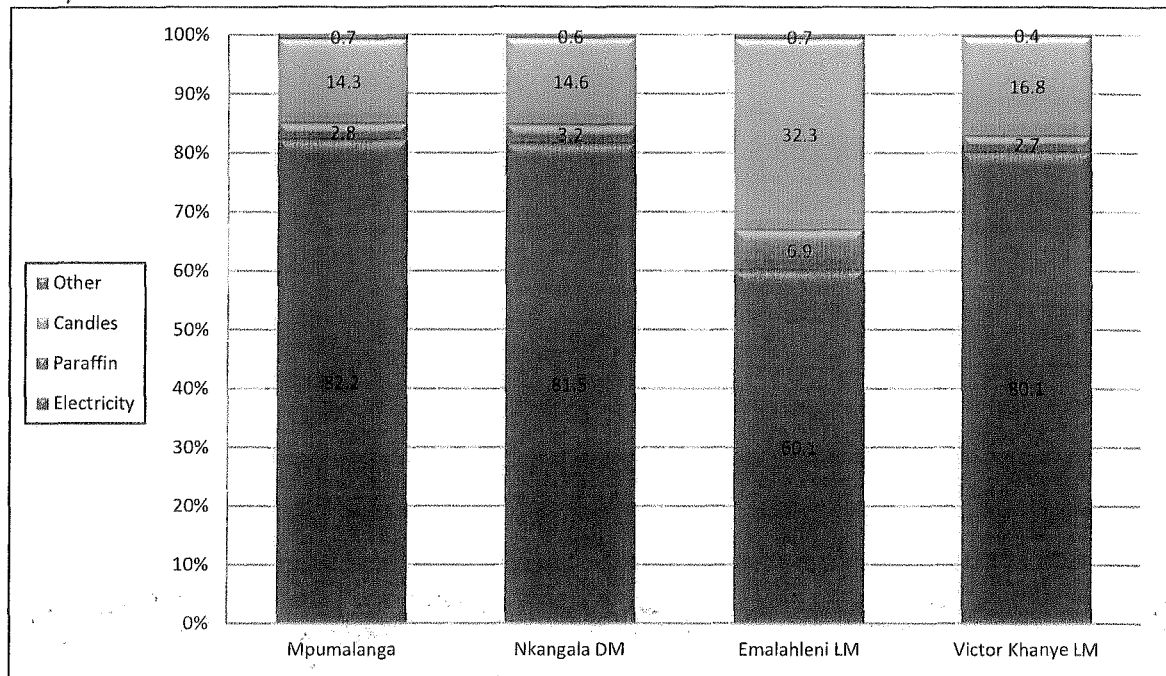






In the Emalahleni LM only about 60% of the households in the study area use electricity as source for lighting (Figure 14), followed by candles and paraffin. This is much lower than on district or provincial level where more than 80% of households use electricity for lighting purposes. The Victor Khanye profile looks similar to the provincial and district profiles.

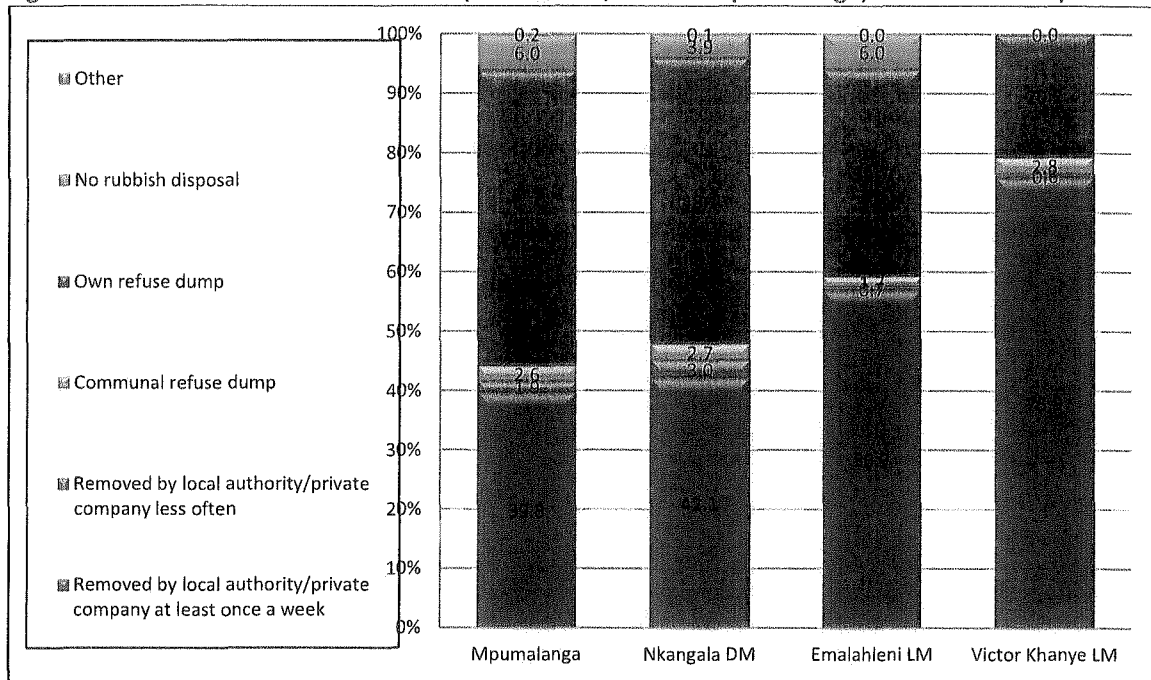
Figure 14: Distribution of energy source for lighting (households, shown in percentage, source: CS 2007)



The profiles for refuse removal on a provincial and district level are very similar (Figure 15). This figure is higher for the Emalahleni LM with more than half of the households having their refuse removed once a week. The Victor Khanye LM has the highest proportion of households (75.9%) who have their refuse removed by a local authority or private at least once a week.



Figure 15: Refuse removal distribution (households, shown in percentage, source: CS 2007)



Almost half of the households on provincial and district level, and about a third of households in the Emalahleni LM, have reported that they have their own refuse dumps compared to just over 20% in the Victor Khanye LM. 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.

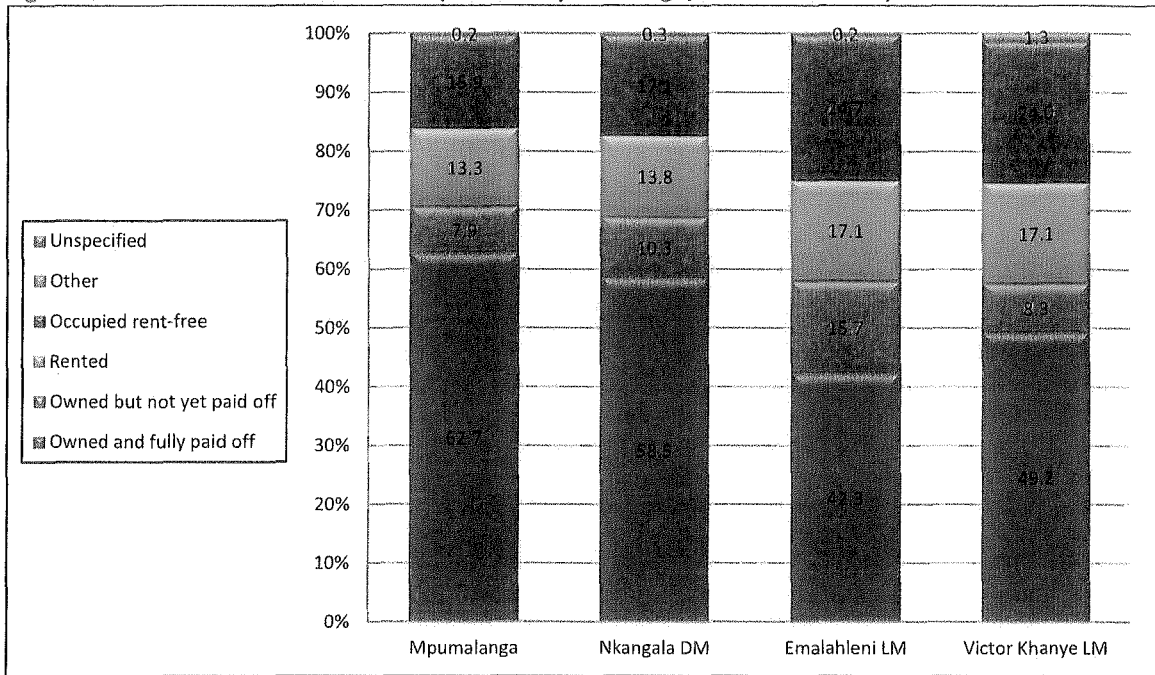
#### 4.4.2 Tenure

The Emalahleni 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 Victor Khanye 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 Victor Khanye 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)

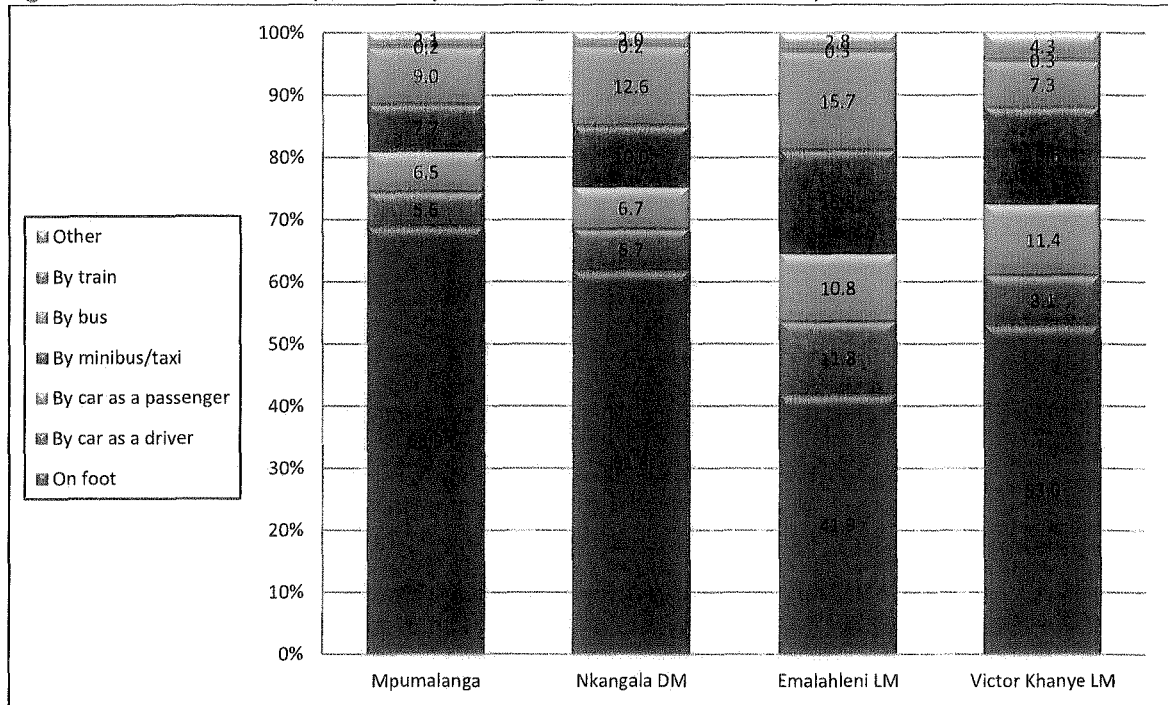


#### 4.4.3 Transport

In Mpumalanga almost 70% of people travel by foot as the mode of travel when travelling to their place of work or school (Figure 17). The category “on foot” also includes people who work from home as well as 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 Emalahleni LM where only about 41.9% of people travel by foot to their place of work or school.



Figure 17: Mode of travel (shown in percentage, source: Census 2001)



#### 4.1 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 police stations in the surrounding areas, namely Vosman and Ogies.

Figure 18 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, Mpumalanga and at the Vosman Police Precinct are contact crimes (crimes against the person). These include crimes such as murder, assault, robbery and sexual crimes. Property-related crimes are the most frequently reported crimes in the Ogies Police Precinct.



Figure 18: Crime for the April 2009 – March 2010 reporting period by main crime categories (source: www.saps.gov.za)

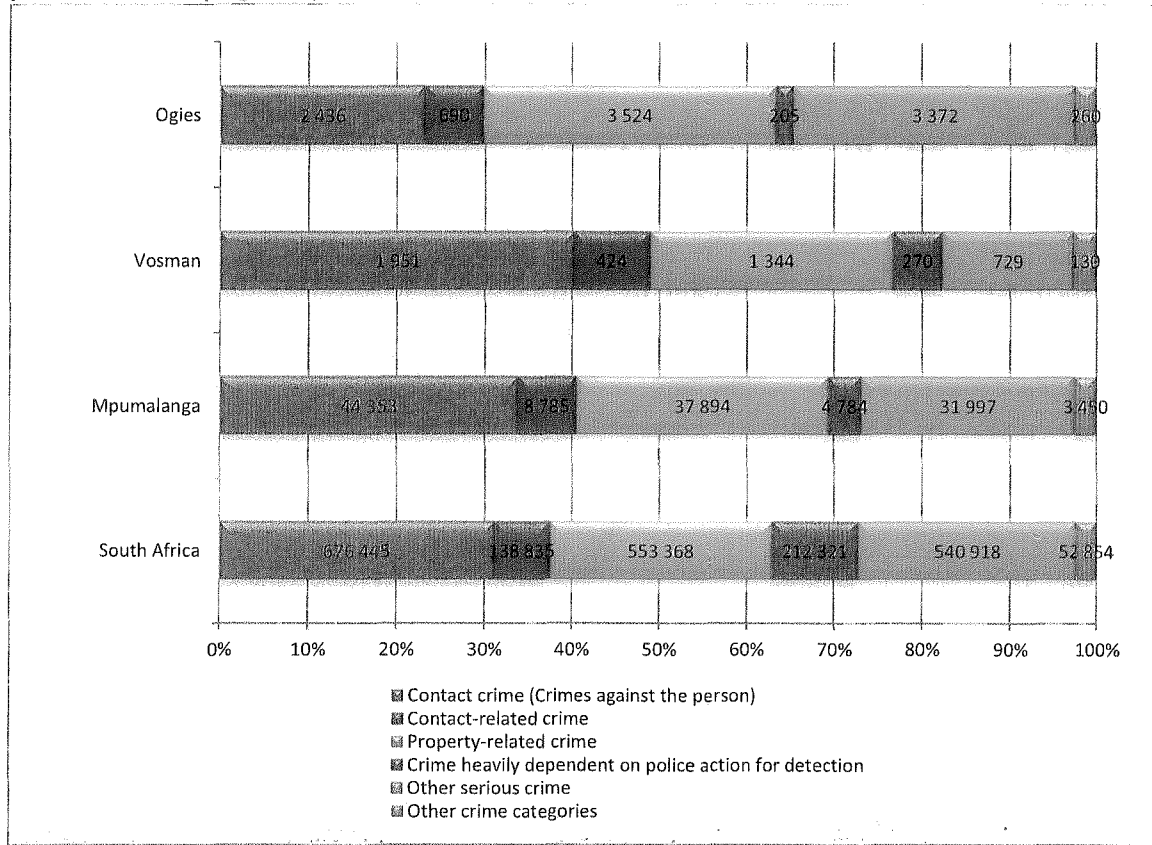
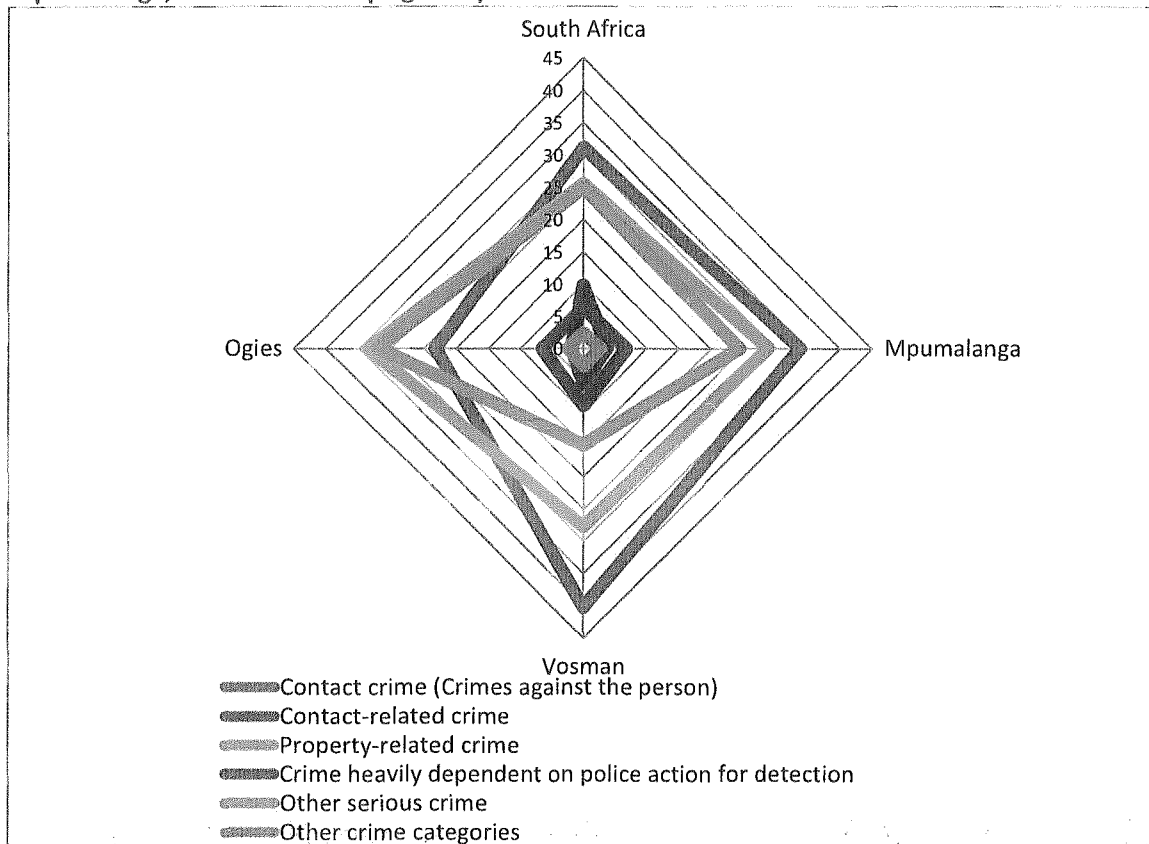


Figure 19 shows the crimes in the areas under discussion in percentage. The crime patterns for Mpumalanga look very similar to that of South Africa. In the Ogies Police Precinct there are proportionately less contact crimes and proportionately more other serious crimes. In the Vosman Police Precinct there are proportionately more contact crimes and less other serious crimes.



Figure 19: Crime for the April 2009 – March 2010 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).



## 5 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 objective of a 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 stakeholder analysis will help the project identify:

- The interests of all stakeholders who may affect or be affected by the project;
- Potential conflicts or risks that could jeopardise the initiative;
- Opportunities and relationships that can be built on during implementation;
- Groups that should be encouraged to participate in different stages of the project;
- Appropriate strategies and approaches for stakeholder engagement; and
- Ways to reduce negative impacts on vulnerable and disadvantaged groups (WWF, 2005).

The full participation of stakeholders in both project design and implementation of is a key to – but not a guarantee of – success. Stakeholder participation:

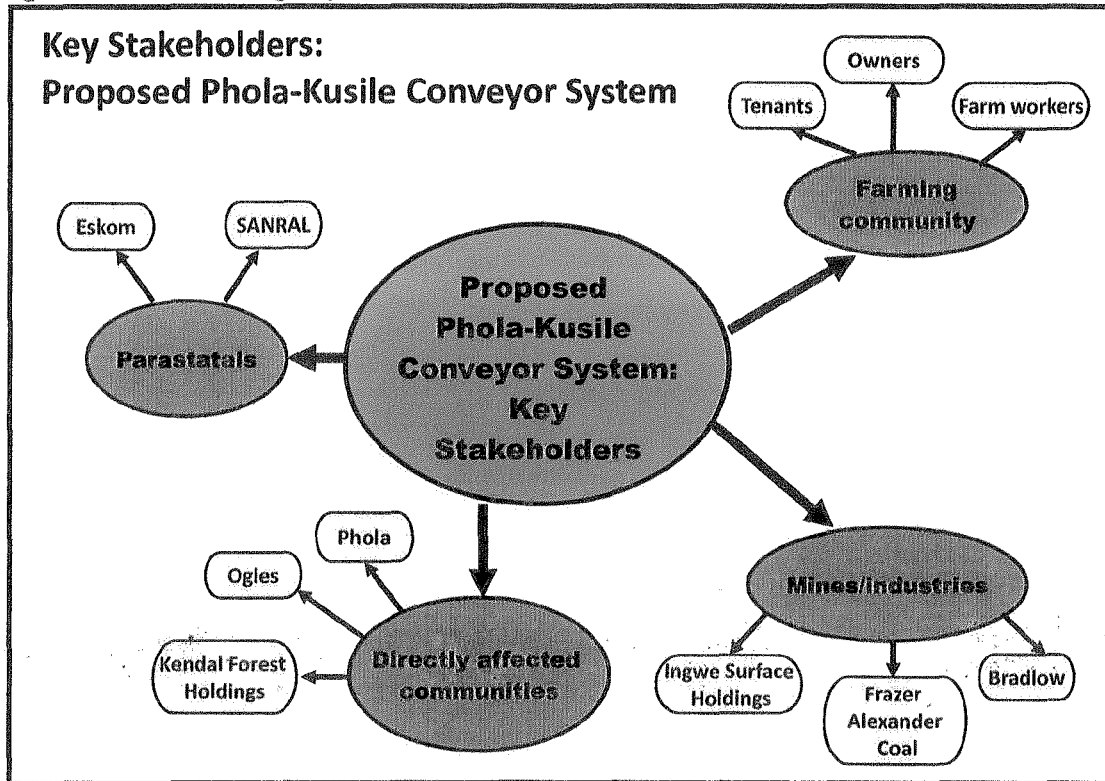
- Gives people some say over how the project may affect their lives;
- Is essential for sustainability;
- Generates a sense of ownership if initiated early in the development process;
- Provides opportunities for learning for both the project team and stakeholders themselves; and,
- Builds capacity and enhances responsibility (WWF, 2005).

For the purpose of the stakeholder analysis, stakeholders have been clustered in groups. The EIA process requires a stakeholder consultation process, but it is important to consider that stakeholder consultation is a continual process and communication with the stakeholders will be required for the life of the project. This has been considered when the stakeholder analysis has been conducted, and



it can be foreseen that these stakeholders will be important role players to consider throughout. The figure below indicates the key stakeholders in the project. A more detailed description of each group and its activities that may be impacted on by the activities related to the proposed conveyor system follows in the paragraphs below.

Figure 20: Stakeholder groups



**5.1 Farming community**

The farming community can be divided into three groups, namely the farmers who own the land, the farmers that rent the land from the owners, and the farm workers who live on the affected farms.

The farmers who own the land will lose a portion of high quality agricultural land to the servitude (25m wide) and in some cases the servitude will also cut across their properties which may impact on the movement of people and animals. They will be subjected to people travelling over their property to service the conveyor system. Nuisances like coal dust and noise, and the risk of fire from the conveyor system will become part of their lives.

Anglo has bought/is in the process of buying a number of the farms that will be affected. In some cases the land in question has been rented out, or is still rented out to farmers for cultivation or grazing. These rental contracts may change, and this will force the lessees to look for alternative land to rent. They will further be subjected to similar impacts than the landlords.

Both farmers who own the land and those who rent the land have farm workers that work on their properties. If lease contracts are given up these workers may lose their jobs. They often travel by





foot, and the proposed conveyor system may impact on their movements.

## **5.2 Directly affected communities**

There are three residential areas close to the proposed conveyor belt. Ogies, Phola and Kendal Forest Holdings will mostly be affected in the construction phase when job opportunities may become available, or if there is an influx of people into the area.

## **5.3 Mines/Industries**

There are a number of industries whose properties will be affected by the proposed conveyor system. Some of these are mining industries that may be in competition with the proponent, or who have resources that may be impacted on by the physical presence of the conveyor system. The following industries have property that the conveyor system will cross:

- Ingwe Surface Holdings
- Frazer Alexander Coal
- Bradlow

## **5.4 Para-statals**

There are two para-statals that own property that will be affected by the proposed conveyor system. The first is Eskom, but since the conveyor will be built to supply coal to Kusile power station, Eskom can be seen as a beneficiary and would therefore assist in managing the impacts on its property. The other affected para-statal is SANRAL, because there are areas where the proposed conveyor system will run parallel with the N12, which is a national road.

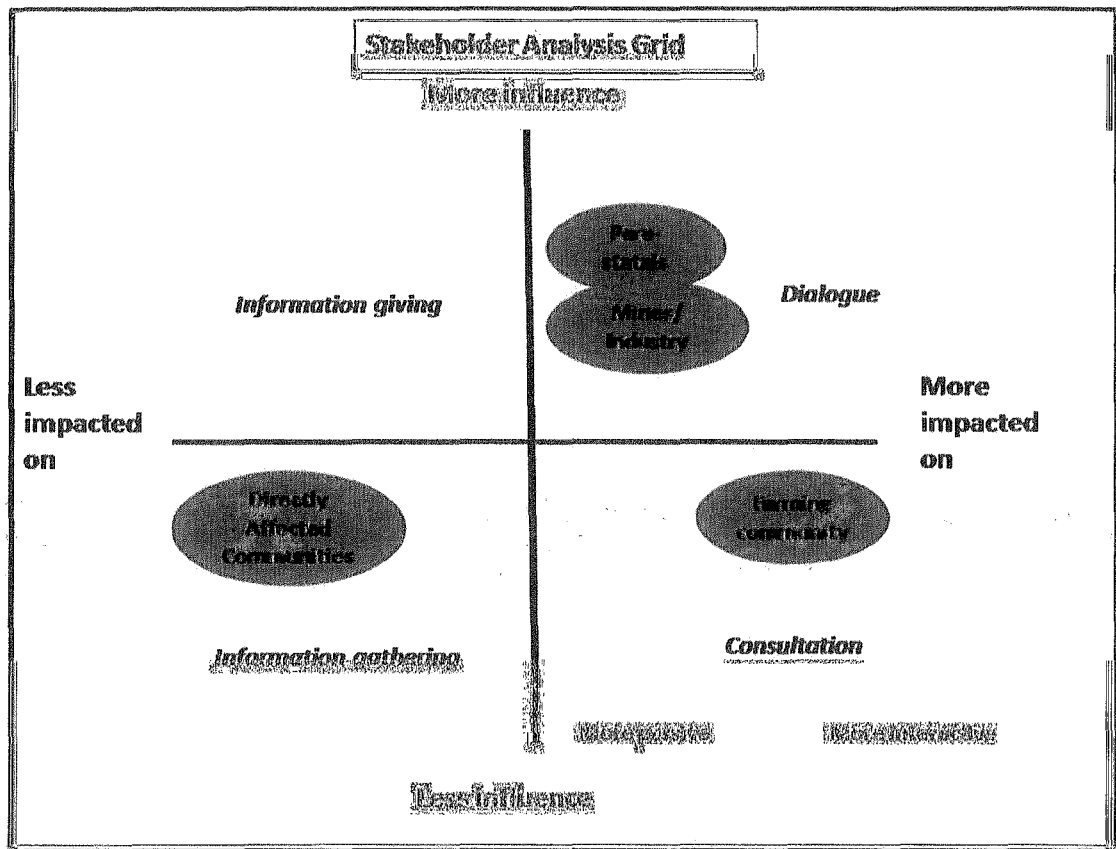
## **5.5 Stakeholder analysis**

The stakeholder analysis was done to determine what the levels of interaction with each stakeholder group should be, not just for the purpose of the EIA process, but rather for the purpose of the lifecycle of the development. The following figure represents the stakeholder analysis tool that was utilised to do the stakeholder analysis. It must be emphasised that the lines of the grid are not hard and fast boundaries, but are used as guidance only. The vertical line represents the line of influence the stakeholders may have on the project, and the horizontal line represent the magnitude of the potential impacts. If a stakeholder is seen as very influential, but the impact on the group would not be great, it is sufficient to provide them with information about the project. If a stakeholder is



influential and the magnitude of the impact is high, the proponent should engage in a dialogue with that stakeholder. If the stakeholder group is not very influential on the proposed project, and the magnitude of the impacts on the group is low, comments can be obtained from this group by giving them basic information. If a group are not very influential, but the impact on them may be high, they should be consulted with. The higher the impact the more intense the level of consultation should be.

Figure 21: Stakeholder analysis



From Figure 21 it can be seen that dialogue with the para-statal and industrial role players will be very important for the potential construction and implementation of the project. Some of these dialogues have commenced and is taking place on a corporate level. An important role player that should be consulted and kept informed is the farming community. Although they are not as influential and powerful as the other role players, they will experience the brunt of the impacts over the life of the proposed project, and therefore it is important to have a good relationship with this group. It may be challenging for this Anglo to involve this group because of the number of individual role players, each with their own agenda, and the difference in culture – corporate versus rural. The directly affected communities need to be kept informed about the proposed project, and local



benefits must be fed down to them where possible. They do not need to be consulted to the same level than the other stakeholders, since the impacts on them will be less and mostly during the construction phase.

A community relations programme is a useful tool to consider when planning long-term stakeholder engagement as would be required for this project. The impacts will be discussed in detail, assessed and mitigation and managing measures will be suggested in the following section.



## 6 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 period of time between the start of the construction phase and the completion of the SIA must be considered. Since the social environment is dynamic and adapts to change, it is highly likely that impacts predicted in this report might have changed when construction starts. 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. Many of the social impacts that will be experienced as a result of the proposed project are generic, and will take place regardless of which route will be chosen. Some social impacts are specific to certain stakeholder groups.

An attempt was made to simplify the impact assessment and to focus on aspects that can aid the decision-making process. For the purpose of this assessment social change processes that can potentially cause social impacts have been identified. 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). A number of social change processes have been identified. Under each social change process the following will be discussed:

- Statement of the situation;
- Potential impacts;
- Opportunity for mitigation/enhancement;
- Monitoring; and,
- Impact table.



The following table represents the social change processes that have been identified and the possible social impacts that may result because of these processes. It also identifies the stakeholder group that is most likely to be affected by the process.

**Table 3: Social change processes leading to impacts**

Social Change Process	Possible Social Impact	Affected stakeholder group
In-migration: Presence of construction workers	Safety of people and property Lack of services (water, sewage, accommodation)	Farming community Directly affected communities
Change in land use	Uncertainty Positive & negative impacts on livelihoods Safety of people and property Disruption to daily activities (change in movement patterns and maintenance of servitude) Sense of place (noise, dust, visual)	Farming community Directly affected communities
Economic activities	Sterilisation of resources Impact on commercial activities Loss of productive farm land Creation of employment and economic opportunities	Mines/Industries Farming community Directly affected communities

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 impact tables have been designed taking the following criteria into consideration:

The significance (quantification) of potential environmental impacts identified during scoping and identified during the specialist investigations have been determined using a ranking scale, based on the following:

- Occurrence
  - Probability of occurrence (how likely is it that the impact may occur?), and
  - Duration of occurrence (how long may it last?)
- Severity
  - Magnitude (severity) of impact (will the impact be of high, moderate or low severity?), and,



- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site?)

Each of these factors has been assessed for each potential impact using the following ranking scales:

Probability:	Duration:	Scale:	Magnitude:
5 – Definite/don't know	5 – Permanent	5 – International	10 - Very high/don't know
4 – Highly probable	4 - Long-term (ceases with the operational life)	4 – National	8 – High
3 – Medium probability	3 - Medium-term (5-15 years)	3 – Regional	6 – Moderate
2 – Low probability	2 - Short-term (0-5 years)	2 – Local	4 – Low
1 – Improbable	1 – Immediate	1 – Site only	2 – Minor
0 – None		0 – None	

The significance of each potential impact was assessed using the following formula:

$$\text{Significance Points (SP)} = (\text{Magnitude} + \text{Duration} + \text{Scale}) \times \text{Probability}$$

The maximum value is 100 Significance Points (SP). Potential social impacts were rated as high, moderate or low significance on the following basis:

- More than 60 significance points indicates high environmental significance.
- Between 30 and 60 significance points indicates moderate environmental significance.
- Less than 30 significance points indicates low environmental significance.

It must be stated that the impact tables and ratings have been adapted from the environmental sciences and that it is not always possible to compartmentalise the social impacts. For the sake of consistency this has been attempted, but it is not innate to social sciences. 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

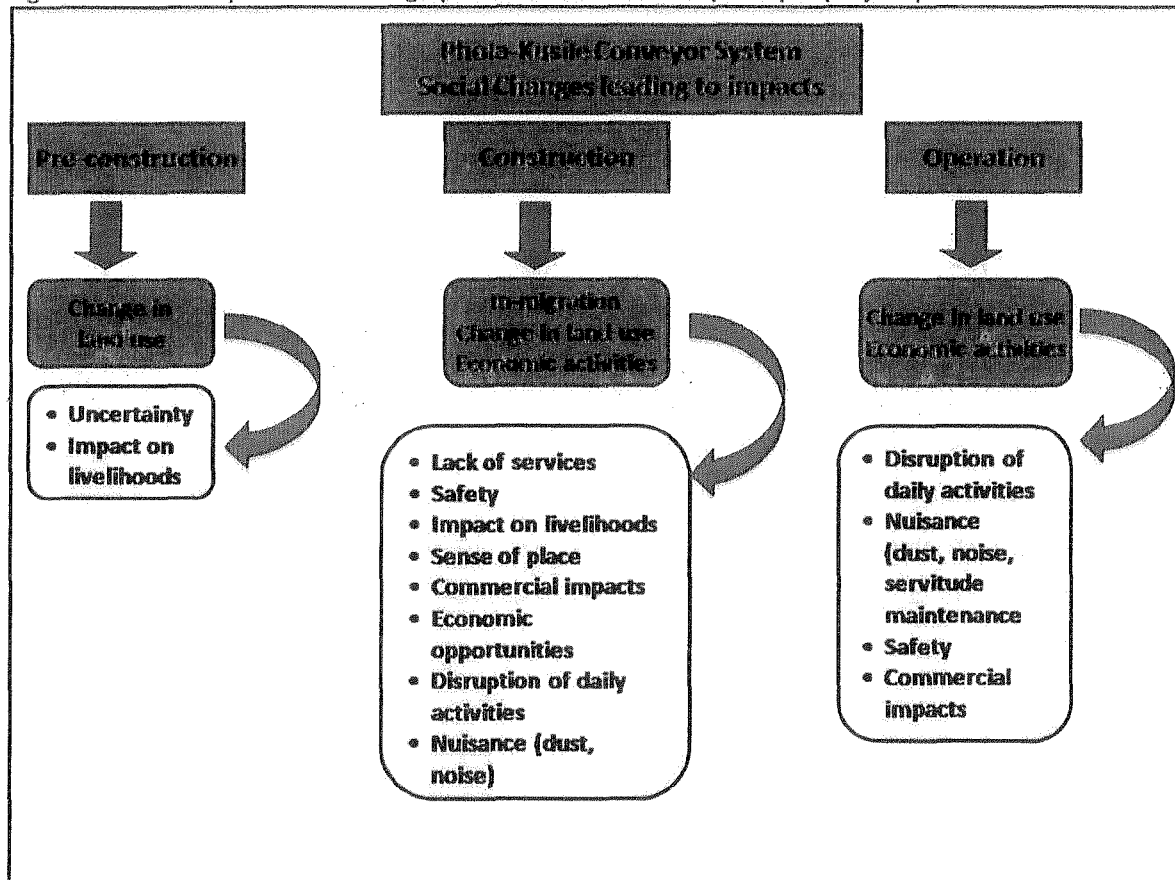


recommendations at the end of the report will focus on the best way to manage social impacts in the context of this project.

**Impacts identified, mitigation and social management plan**

The following section of the report focus on the identification of social change process, the social impacts associated with these changes, mitigation and management measures. Figure 22 below represents a summary of the social change processes and the impacts that may result from these changes in the different phases of the project.

Figure 22: Summary of social change processes and social impacts per project phase



**6.1 Social change 1: In-migration**

**6.1.1 Statement of situation**

In-migration is a demographic process that relates to the movement and composition of people in the study area. There may be a temporary in-migration of construction workers during the construction of the proposed conveyor system. There are already significant construction and



industrial activities in the area due to the construction of Kusile Power Station and surrounding mining activities, and the affected communities already experience the impact of an influx of people. The impacts associated with this process will therefore mostly be of a cumulative nature. It is not anticipated that the construction of the conveyor system will cause a significant additional influx of people, since the construction is specialised, and resources is likely to be drawn from existing local service providers (including internal resources).

### 6.1.2 Potential impacts

The **first impact** associated with in-migration is increased pressure on local services and infrastructure. This includes services such as sanitation, electricity, water, waste management and the availability of accommodation. Residents of Phola and Kendal Forest Holdings reported that the construction of Kusile Power Station caused a significant influx of people into these communities, and as a result residents have started to rent out accommodation to these people. Kendal Forest Holdings have no formal sewage system and residents are concerned about the potential impact on ground water. The area is also subjected to frequent power failures. Residents of Phola reported that their services were already inadequate and that extra people increase the pressure on the services. The construction of the conveyor system is not likely to cause a major influx of people, and therefore this impact is not seen as potentially severe.

The **second impact** associated with in-migration is around safety and security. This impact has a number of dimensions. The first dimension is the presence of strangers in a community. When there are more people around, opportunistic criminals will find it easier to engage in their activities unnoticed. People living on Kendal Forest Holdings reported that they have always felt safe there, but that there has been an increase in people moving around the area and to them it is a source of concern. Farmers who will have construction activities on their farms are seen as especially vulnerable. Farm attacks are a reality in South Africa, and farmers are concerned about the presence of strangers on their farms. Their fears are not necessary related to the construction teams, but to the opportunistic criminals who may take advantage of the fact that there will be an increase in people moving in the area.

Residents of Phola expressed concern about the increase in the incidence of sexually transmitted diseases, HIV and AIDS. They ascribe it to the presence of construction workers in the area. This is a second dimension of the impact on safety and security. An increase in sexually transmitted diseases is often associated with construction activities. This is usually the result of men being far away from their homes and as a result engages in sexual activity with local women. There can be secondary





impacts that will have a long-term impact on the host communities. Local women may provide sexual and housekeeping services to men in exchange for financial security – not to be confused with prostitution, but rather a livelihood strategy (this strategy has been confirmed by residents of Phola). This may result in pregnancies. There is a risk that these women may be left destitute when the construction workers move on to a new project in another area, leaving the local communities with the responsibility to ensure that these individuals survive. There could therefore be an increase in female-headed households in these areas.

The last dimension of impacts on safety and security relates to the social context in which the project will take place. Residents of Phola have been excluded from employment opportunities at Kusile due to the fact that they fall in a different municipality. This caused unrest in the community, because many of the people who were employed by Kusile are renting accommodation in Phola due to its proximity to the site. If the recruitment process for the Phola-Kusile conveyor system were perceived as unfair and discriminating against the local residents it could cause community unrest and delays in construction. This is referred to as a linked impact where an impact of another project (independent of the project in question) triggers another impact that would not have occurred otherwise.

### **6.1.3 Opportunity for mitigation/enhancement**

Some social impacts are difficult to mitigate on a project level, as proper mitigation would require input from government or other agencies outside the project area. It would not be practical for a project proponent to manage impacts that occur in a greater societal context. Another aspect to consider is that all the impacts described in this section are existing impacts, and the project will cumulatively add to these impacts. The mitigation of these impacts is therefore not the sole responsibility of the proponent, but other industries that contribute to these impacts should also contribute to their mitigation. Although there is a possibility that the construction workers associated with the proposed conveyor belt may have an impact on the services, this impact is deemed as insignificant and major mitigation is not required. It will be important to use local service providers to ensure workers already have accommodation in the area and no additional pressure will be placed on services.

Construction workers must wear identity tags with photographs. A contact person whom community members can phone if they have enquiries about the construction team must be identified. The servitude must be fenced before any activities commence on the farms. Contractors must be limited to move only within the fenced servitude, and all vehicles must be clearly marked. Before accessing



the farms they must follow the AgriSA protocol for access to farms. This will entail the following:

- Only per prior arrangement/appointment with the owner or other person in charge of the property;
- When accessing or entering the property or premises, report immediately to the owner or person in charge of the property;
- The contractor shall identify himself properly, explain the nature of his business and state how long he expects to remain on the property;
- The contractor shall perform no tasks or actions other than those that have been contractually agreed on; and,
- If the contractor does not succeed in making an appointment because he could not make contact with the owner or person in charge of the property, or because the request for an appointment was turned down, he must contact the proponent, who in turn must contact the local farmers' association or district agricultural union or the SAPS to assist him in the matter.

The proponent must hire a security company who will patrol the construction servitude at night. The contact number of the security company must be distributed to all the owners of affected properties. The company must liaise with the local police station to ensure that incidents can be reported and handled in an efficient manner.

HIV/AIDS awareness training must form part of the induction of staff. Condoms must be freely available on site. The workforce must be discouraged from engaging in casual sexual relationships with local people and informed of the consequences.

Recruitment processes must be fair and transparent. A labour desk should be established in Phola to ensure local labour is recruited. The ward committee should be consulted about the process that should be followed to ensure that it is participatory and perceived as fair and transparent. Residents from Phola should be recruited first, and people from outside the area should only be recruited if the skills are not available in Phola.

#### **6.1.4 Monitoring**

The access and HIV prevention requirements must be included in the Health and Safety system of the contractor and monitored with this system. This requirement must be written in the specifications of the contract to ensure it becomes a contractual requirement. The community liaison officer must ensure that recruitment protocols are followed.



### 6.1.5 Impact table

Before mitigation						Mitigation	After mitigation						
Finding	Phase	Impact (+/-)	Magnitude	Duration	Scale	Probability	Significance	Means of mitigation	Magnitude	Duration	Scale	Probability	Significance
Pressure on infrastructure	Construction	Negative	2	2	2	2	12 (Low)	No mitigation required Recruit locally to further minimise impact	2	2	2	2	12 (Low)
Safety of land owners with construction teams on their properties	Construction	Negative	8	2	2	4	48 (Moderate)	Restrict contractors to servitude Follow AgriSA access protocol Hire security company Liaise with local police	6	2	2	3	30 (Moderate)
Increase in STDs	Construction	Negative	8	3	2	4	52 (Moderate)	STD awareness training part of induction Condoms available	6	3	3	3	36 (Moderate)
Community unrest due to recruitment	Construction	Negative	8	2	2	4	48 (Moderate)	Involve ward committees in recruitment discussions Have fair and transparent process Establish labour desk in Phola Recruit from Phola first	6	2	2	3	30 (Moderate)

### 6.1.6 Cumulative impacts

Cumulative impacts can be viewed in two ways. The first is to add impacts that may be caused by this project to impacts caused by other projects in the area. The second way in which to understand cumulative impacts is to look at it from the reference point of the receiver as the totality of the impacts experienced. From the first perspective it must be taken into consideration that there are existing construction activities in the project area, so there is already an influx of construction workers in these areas. Therefore, many of the impacts that were described already occur in the area. An important consideration is the potential impact of community unrest due to past negative experiences on the project. This risk is deemed as significant due to the trend in communities within



South Africa to express their views via violent protest. From the second perspective, the stakeholders that will get the brunt of these impacts must be considered, and that is the land owners on whose properties the construction activities will take place.

#### **6.1.7 Residual impacts**

Some of the impacts cannot be mitigated to such an extent that they are no longer significant. A number of the impacts will be short term, and disappear after the construction phase. Residual impacts that are mentioned are those impacts that will be long term or permanent. STDs and HIV/AIDS are residual impacts. For all practical purposes these are permanent impacts that will be felt on an individual level. Unplanned pregnancies resulting in female-headed households are also a long-term residual impact that the proponent can do little about.

### **6.2 Social change 2: Change in land use**

#### **6.2.1 Statement of the situation**

Change in land use is a geographic process that affects the land use patterns of society. The changes in land use that are relevant to this project are the change from agricultural land to industrial (a conveyor system). This may cause a number of impacts. The visual changes to the landscape as a result of the project are another change that should be considered.

#### **6.2.2 Potential impacts**

Anglo is busy acquiring some of the affected properties and negotiating servitude rights on others. This is causing uncertainty amongst the owners who have not been bought out and in some cases amongst the tenants of the properties that have been bought by Anglo. Tenants are not sure whether their lease agreements will be honoured, and some cases where long term tenants has not been consulted or offered new contracts have been reported. These impacts on the livelihood strategies of the tenants (discussed further in the paragraphs below). Some stakeholders also reported that the manner in which the property acquisitions have been done was a negative experience. It seems as if the consultation process has been rushed and the stakeholders had to make important decisions in a very short timeframe. Their perception is that Anglo is not honest and does not operate in a transparent manner. Some of the stakeholders in the farming community are of the opinion that Anglo is causing tension amongst members of the community because of the way they operate. The mistrust in Anglo is a symptom of the impact that uncertainty have on the affected parties, and unless this impact is addressed and managed it may impact on Anglo's future



social licence to operate in the area.

The change in land use will also impact on the livelihoods of some of the stakeholder groups. For some stakeholders in the surrounding communities this impact will be positive, because they will be employed and therefore meet the need of their dependants. Some of the farmers may lose access to productive land in the area but AAIC is in the process of discussing compensation with each directly affected landowner. This may have a financial impact on these farmers. There is limited productive agricultural land available to replace the lost land. Some of the properties may become too small to allow a viable farming business with the remaining resources. These people would need to find an alternative livelihood. This will also impact on their staff, since some farmers may need to dismiss labourers due to less production. These labourers may find it difficult to find new jobs and this will force them and their dependants into a downward spiral of poverty. New businesses take time to build up, and this may result in a decrease in quality of life and a negative impact on social wellbeing.

Farmers expressed concerns about the possibility of fires starting on the conveyor system or the electricity supply to the system during the operational phase of the system. Should there be a fire, there is a risk that crops or huge grazing areas may be destroyed. This will have a devastating impact on the farming community, especially the smaller farmers. Another concern is strangers entering the properties for maintenance purposes, as farmers will have no control about these people accessing their properties. The farming community is of the opinion that this is a security risk and that opportunistic criminals may use the opportunity to scout for possible loot. This risk is intensified by the proximity of peri-urban communities with informal settlements where people may attempt to steal the fencing materials for constructing houses or coal for cooking and heating purposes.

The conveyor system may have an impact on the movement patterns of the farming community. Farming equipment and livestock may need to cross the servitude and if crossings are not provided this may result in additional costs. Farm workers generally do not have their own transport and travel by foot to major roads where they can utilise public transport opportunities such as buses and taxis. The conveyor system may disrupt their movement patterns resulting in increased monetary and temporal costs.

Environmental nuisances such as an increase in dust and noise due to construction activities and an increase in the number of heavy vehicles in the area may cause short-term frustration, and in some sensitive individuals even health impacts such as asthma, sinusitis or allergies. In the operational phase the dust impact will continue. This impact is already a problem. Residents report that their houses and gardens are affected. Although there are a lot of industries in the area and these impacts



already occur, people are still concerned about the sense of place – in this case rural and agricultural which will now change even more due to a conveyor system running through the area.

### **6.2.3 Opportunity for mitigation/enhancement**

Uncertainty is one of the most serious social impacts that can occur. The emotional impact of uncertainty is difficult to measure, but the consequences can be severe. A lack of constructive communication will intensify this impact, and therefore it is recommended that Anglo compile a stakeholder communication strategy and employ a stakeholder relationship manager for the project. This will give the farming community a contact person who can help them to keep updated with the progress of the project and who can assist in answering their queries. The profile of this person should be in line with the stakeholder group – it should be someone who the community can relate to and build a healthy trust relationship. This will assist Anglo with obtaining and maintaining a social licence to operate. Stakeholders are often not familiar with corporate and legal processes, and their perception of Anglo's behaviour might be more positive if they understand the corporate culture better. The stakeholder relationship manager can assist in explaining these processes – experience has shown that unfamiliar concepts often have to be explained repeatedly in order for stakeholders to fully understand the concepts. Clear guidelines about rental contracts should be made public and existing agreements should be honoured. Given the scarcity of land in the area a notice period of at least six months should be given to allow lessees to look for new properties to lease if the lease agreements cannot be renewed. This will allow them to find new properties instead of making their businesses smaller and having to dismiss labourers. Preference should be given to existing lessees and local farmers, since they bear the brunt of the impacts.

The servitude should be kept clear to minimise the risk of fires. The design of the system must include emergency stops, video surveillance and heat sensors that can detect severe changes in temperatures. The farming community must be supplied with 24 hour emergency numbers that they can contact in case of fire. This must include private and government fire fighting services. A fire fighting plan must be made available to each affected farmer. This must be discussed with farmers on an individual level. The stakeholder relationship manager can assist in distributing the plan and liaising between parties. There must be a protocol in place for accessing privately owned land areas outside the fenced conveyor servitude. Farmers should know how frequent inspections will take place and what the procedures for emergency access are. People moving in the servitude must wear identification cards with photographs and vehicles must be marked. Security guards must patrol the servitude at regular intervals.



Pedestrian, livestock and vehicle crossings should be discussed with stakeholders and constructed at places they suggest. The identification of the positions of these crossings must be a participatory process to ensure the needs of all the parties involved are met.

Environmental nuisances that occur during construction will be temporary. Given the fact that there are existing impacts from industries in the area, many of the nuisances will be cumulative. Where possible dust suppression must be used (technical measures included in the relevant specialist study). Construction vehicles must travel slowly and loads should be covered where possible. Ideally, no construction work should take place on Sundays, public holidays and during the night and if it does take place, regular liaison with nearby affected parties should be maintained and nuisance complaints should be dealt with promptly. Construction vehicles must travel outside peak traffic hours where possible.

Impacts related to dust already take place and the operation of the system will add to these impacts. The nuisance effects of dust can be subjective and are difficult to measure in any quantitative or objective way. They are also very dependent on the sensitivity of the receiving environment. As a result, the effects cannot be controlled or managed easily through the use of air quality guidelines, which is the approach taken with most other air contaminants.

Best practice industry guidelines should be followed to address the dust problem, but it must be acknowledged that this is a cumulative impact and should therefore be addressed by all the industries in the area that contribute to the problem. Anglo must have a user-friendly complaints procedure in place to deal with specific complaints, and this procedure should be public knowledge – it can be advertised in local newspapers or posters explaining the procedures can be put up in public places.

#### **6.2.4 Monitoring**

Anglo should consider an annual outside review of their land acquisition and rental practices. This review should include interviews with effected parties to establish their perception about the procedures that was followed. It should also investigate the adherence to rental and purchase agreements. This review must be documented to ensure continuity when there is a staff turnover and to act as a record for potential disputes. The stakeholder relationship manager must have formal interviews with landowners twice a year to discuss any concerns. This procedure must be written in the communications plan, which should be reviewed on an annual basis. Fire fighting and environmental nuisance monitoring must be written into the Health, Safety and Environmental Management system and monitored as part of the system.



### 6.2.5 Impact table

Before mitigation							Mitigation	After mitigation					
Finding	Phase	Impact (+/-)	Magnitude	Duration	Scale	Probability	Significance	Means of mitigation	Magnitude	Duration	Scale	Probability	Significance
Uncertainty	Construction & Operation	Negative	10	2	2	5	70 (High)	Design and implement stakeholder communication strategy Employ stakeholder relationship manager Compile clear guidelines for rental agreements Honour existing agreements Preference to local farmers Inform people in time about end of lease	6	2	2	3	30 (Moderate)
Safety and security	Operation	Negative	10	4	2	5	80 (High)	Clear servitude Include safety features in design Fire management plan and contact people Security firm patrolling servitude	6	4	2	3	36 (Moderate +)
Movement patterns	Operation	Negative	8	4	2	4	56 (Moderate)	Provide pedestrian, livestock and vehicle crossings	6	4	2	2	24 (Low)
Environmental nuisances	Construction & Operation	Negative	8	4	2	4	56 (Moderate)	Dust suppression Travel restrictions Complaints procedures	6	4	2	3	36 (Moderate)

### 6.2.6 Cumulative impacts

The proposed conveyor system will be situated in an area where there are already mines, power stations and other industries in close proximity. Many of the impacts associated with a change in land use are already experienced in the area, and the new conveyor will add to the existing impacts. This is true about dust and other environmental nuisance impacts. The construction activities will add to these impacts creating a bigger nuisance for local residents.





### **6.2.7 Residual impacts**

Given the amount of existing impacts in the area, it is almost impossible to manage the impacts in such a way that no impact remain after mitigation. Many of the impacts will be present for the life of the conveyor system, and should therefore be managed and monitored.

## **6.3 Social change 3: Economic activities**

### **6.3.1 Statement of the situation**

There are high levels of unemployment in the area. A large number of the population are semi-literate or illiterate and have limited skills. Issues surrounding employment can have positive or negative social impacts in the study area. Construction will be done by specialist contractors that will bring in a number of their own staff given the specialist nature of the work. Opportunities for local labour will therefore be limited to work that does not require specialised skills. It must be acknowledged that there is some skilled labour available in the area due to industrial projects that have been implemented in the past. The work opportunities during the construction period will be short term. The proposed conveyor system will cross some commercial properties and there is a risk that resources may be sterilised and operational activities may be impacted on. Commercial negotiations are understandably sensitive and details will therefore not be discussed in the SIA – recommendations on the need and motivation for such discussions will be made. There is a separate economic impact assessment report that will discuss economic impacts in detail. Impacts on agricultural land will be discussed in an agriculture potential study. These impacts are mentioned and discussed briefly because they have significant social dimensions. It must be reiterated that these impacts and their mitigation will be discussed in detail in the relevant specialist studies.

### **6.3.2 Potential impacts**

The construction process will create a number of opportunities for low skilled people. The focus should be on local people who are not employed elsewhere. There is a risk that women will not be given equal opportunities to men because of the perception that they cannot do manual labour. This will have a negative impact on the number of opportunities for women. If local people, including women, are employed, this will have a very positive short-term impact, and if there is sufficient transfer of skills the positive impact can be extended. The risks associated with employment procedures have been discussed under the social change process related to in-migration.



Another positive impact is the indirect employment opportunities that will be created. These opportunities will be experienced in the industries that provide services to the construction team such as transport, hospitality and equipment rental etc. These opportunities can also be extended to local entrepreneurs such as women's groups that provide a laundry service or sell meals.

If resources are sterilised it will have a negative impact on the commercial activities of some of the stakeholders. The sterilisation of resources has two components. The first component is industrial resources such as mining reserves, and the second component is agricultural land. Loss of both of these resources will have a negative economic impact on the relevant stakeholders.

### **6.3.3 Opportunity for mitigation/enhancement**

Local unemployed people must be given preference in the recruitment process. Contractors must refrain from employing people who are currently employed in permanent positions. There must be an employment desk in Phola specifically. A standard recruitment policy must be implemented. The local recruitment process must be agreed with local leadership. This process must then be advertised in an accessible way – radio advertisements, community meetings and press releases in local languages. No false expectations must be created and it must be underlined that the employment opportunities are specifically for the unemployed. A percentage of the workforce must be female.

Indirect employment/entrepreneurship opportunities must be enhanced. Anglo must support local entrepreneurs as far as possible through local procurement. If possible, skills development should form part of the initiative.

Anglo must initiate discussions with commercial role players to find a timely solution for the sterilisation of resources. Agricultural land on Anglo properties that is not in use must be made available to affected farmers to rent as compensation for the loss of productive land and to ensure their production levels are maintained.

### **6.3.4 Monitoring**

Anglo must keep records of the number of locally employed people, clearly stating the number and gender of the workforce. The community liaison officer (already appointed by Anglo and active within the communities) should ensure that local partnerships are formed and managed.



### 6.3.5 Impact table

Before mitigation							Mitigation	After mitigation					
Finding	Phase	Impact (+/-)	Magnitude	Duration	Scale	Probability	Significance	Means of mitigation	Magnitude	Duration	Scale	Probability	Significance
Local job opportunities	Construction	Positive	8	2	2	4	44 (Moderate)	Employ local people Employ a minimum percentage of women Standardise a recruitment process Involve local communities in developing the recruitment process	10	2	2	4	56 (Moderate)
Indirect employment opportunities	Construction	Positive	8	2	2	4	48 (Moderate)	Create opportunities for local entrepreneurs Support local entrepreneurs Create an enabling environment for the entrepreneurs to benefit financially Combine support with skills development initiatives	10	2	2	5	70 (High)
Sterilisation of resources	Construction & Operation	Negative	10	4	2	5	80 (High)	Initiate discussions with commercial role players Adhere to recommendations of relevant specialist studies (economic and agriculture)	8	4	2	4	56 (Moderate)

### 6.3.6 Cumulative impacts

Cumulative impacts on local entrepreneurs will be positive and assist in developing their businesses further. Cumulative impacts on the agriculture industry may be negative and in the long term impact on food production.

### 6.3.7 Residual impacts

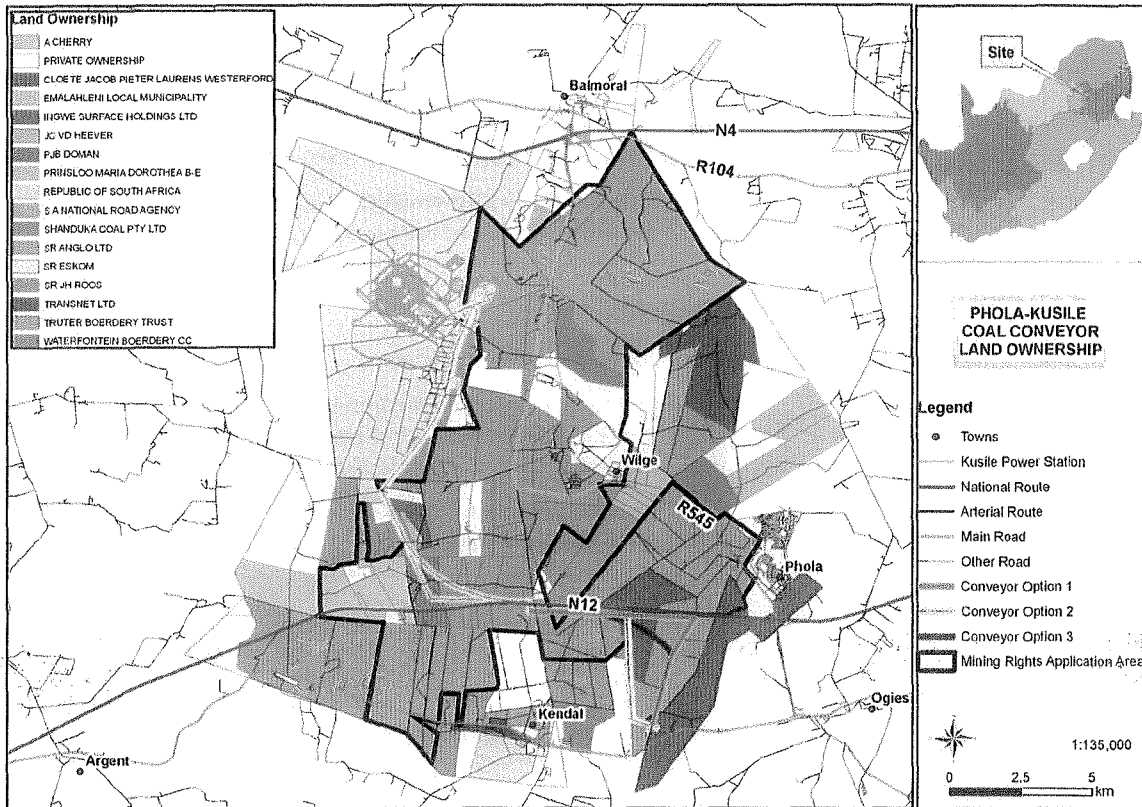
Residual impacts will be a positive impact on skills development and economic growth for small-scale entrepreneurs. There may be a negative impact on workers who were temporarily employed and lost their jobs, in that they might struggle to find new employment opportunities. There may also be a negative impact on industries if they lose resources of commercial value. There will be a long term negative impact on the agriculture industry and food production.



## 7 Analysis of alternatives

Three proposed alternative routes are proposed for the conveyor system. From a social perspective there is little difference between the three routes.

Figure 23: Land ownership on the proposed corridor with its alternatives



Conveyor option 2 runs along farm boundaries and will cause the least disturbance to daily living activities for the affected parties. Conveyor option 3 was proposed as it has the least impact on mining / prospecting areas and was agreed to by affected mining right holders (see EIA main report). There is very little difference between the alternatives.



## 8 Conclusions and recommendations

When considering the social impacts of the proposed conveyor system, 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. From a greater societal perspective the project will thus have a positive impact. It is worth noting concerns about the long term impact on food security due to cumulative loss of high potential agricultural land. The proposed project will take place in an area surrounded by industrial development, and many of the impacts are already taking place. Stakeholders are also familiar with potential impacts. A small number of stakeholders will bear the majority of impacts of a project that is in the interest of the country at large. These impacts can be mitigated and managed – long term management is crucial to enhance Anglo's social licence to operate and to minimise impacts on affected parties. The largest number of impacts will result from a change in land use. Although the proposed conveyor system has a limited lifespan, it will still affect stakeholders for all or a big portion of their economic active years.

Many social impacts occur as a result of bad communication processes, and positive relationships can go a long way in dealing with issues. The way in which issues is approach is a crucial aspect in the success with which it can be dealt with. The following general recommendations are made:

### Construction

- Compile and implement a community relations strategy
- Appoint a stakeholder relationship manager to assist with management of social impacts and dealing with community issues;
- Consult with the directly affected communities and note special concerns;
- Install proper grievance and communication systems;
- Involve the community in the process as far as possible – encourage co-operative decision-making and management and partnerships with local entrepreneurs;
- Be accessible and sensitive to community needs;
- Appoint security firm to patrol construction area;
- Implement access control system and make sure construction teams can be identified easily;
- Start discussions with commercial role players.

### Operation

- Appoint permanent stakeholder relationship manager to deal with communities and build relationships with affected communities;



- Ensure security of servitude via fire management programme and security firm;
- Make monitoring activities part of the Safety, Health and Environmental systems;
- Develop and implement community relations programme.

The need for the proposed project is undeniable in the current economic conditions. It is therefore recommended that the project proceed. The mitigation measures should be adhered to in order to ensure the proper management and mitigation of impacts.



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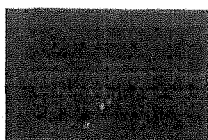
Department:  
Economic Development, Environment and Tourism  
MPUMALANGA PROVINCIAL GOVERNMENT

**Details of specialist and declaration of interest in respect  
of an  
application for authorisation in terms of the National Environmental  
Management Act, 1998 (Act No. 107 of 1998), as amended and the  
Environmental Impact Assessment Regulations, 2010**

**PROJECT TITLE**

Phola-Kusile Coal Conveyor

Specialist:	Ilse Aucamp		
Nature of specialist study compiled:	Social Impact Assessment		
Contact person:	Ilse Aucamp		
Postal address:	PO Box 915751 Faerie Glen		
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Qualifications & relevant experience:	BA(SW) M (Env. Man) 10 years		
Professional affiliation(s) (if any)	South African Council for Social Service Professionals		



## The specialist appointed in terms of the Regulations

I, Ibe Carin Aucamp declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

  
Signature of specialist:

Piersci  
Name of company:

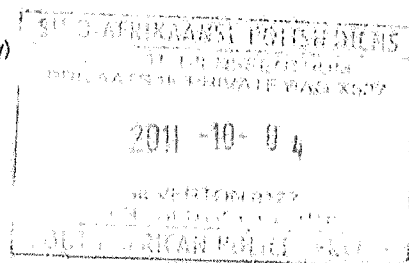
4 October 2011  
Date:

  
Signature of Commissioner of Oaths

2011-10-04  
Date:

CSJ  
Designation:

Official stamp (below)



**Appendix O:  
Economic Specialist Assessment**

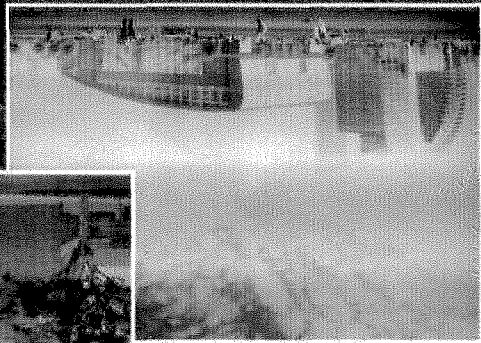


### Structuring of the Specialist Studies in terms of GNR 543 Section 32 Requirements

Legal and Regulatory Requirement	Cross Reference to Report Section
<b>GNR 543 Section 32</b>	
<b>Specialist reports and reports on specialized processes</b>	
1. An applicant or the EAP managing an application <u>may appoint a person to carry out a specialist study</u> or specialized process.	Appendices to the EIA main report
2. The person referred to in sub-regulation (1) must comply with the requirements of regulation 17 [declaration of independence]	Declaration of independence signed by specialists provided at back of each specialist report
3. A specialist report or a report on a specialized process prepared in terms of these Regulations must contain-	
(a) Details of- (i) <u>the person who prepared the report</u> ; and (ii) <u>the expertise of that person to carry out the specialist study</u> or specialized process;	Cover page  Hein du Toit– BTRP MSc Real Estate Certificate in Shopping Centre Management  David Dyason – MComm Economics
(b) <u>A declaration that the person is independent</u> in a form as may be specified by the competent authority;	Declaration of independence signed by specialists provided at back of each specialist report
(c) <u>An indication of the scope</u> of, and the purpose for which, the report was prepared;	Chapter 1, Section 1.2 – Project Brief
(d) A description of the <u>methodology</u> adopted in preparing the report or carrying out the specialized process;	Chapter 1, Section 1.3 – Research Framework
(e) A description of any <u>assumptions</u> made and any uncertainties or <u>gaps</u> in knowledge;	Not applicable
(f) A description of the <u>findings</u> and <u>potential implications</u> of such findings on the impact of the proposed activity, including identified alternatives, on the environment;	Chapter 3 – Economic Impact Assessment Chapter 4 – Quantitative Economic Impact Assessment
(g) <u>Recommendations</u> in respect of any <u>mitigation measures</u> that should be considered by the applicant and the competent authority;	Provided in each specialist report, where relevant Chapter 5 - Recommendations
(h) A <u>description of any consultation process</u> that was undertaken during the course of carrying out the study;	Consultation Process discussed in EIA main report
(i) A <u>summary and copies of any comments</u> that were received during any consultation process; and	All issues received to date included in Section 6 of the EIA main report
(j) Any other <u>information requested by the competent authority</u> .	Not applicable







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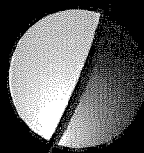
DEMACON Market Studies

September 2011

Economic Impact Assessment

Phola-Kusile Coal Conveyor

CON



Demacon is a member of

**SOUTH AFRICAN PROPERTY OWNERS ASSOCIATION (SAPOA)**



**SOUTH AFRICAN COUNCIL OF SHOPPING CENTRES (SACSC)**



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

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## EXECUTIVE SUMMARY

### ➤ MAIN FINDINGS

The report focuses on the economic impacts the Phola-Kusile Conveyor will have when built to supply coal to the Kusile Power Station development. The conveyor forms part of a value-chain that aims to increase the power supply in the national economy in order to facilitate economic growth. The development is located in the Mpumalanga province, while the local region is regarded as the powerhouse of the South African economy, producing approximately 80% of the country's electricity.

The area earmarked for the Phola-Kusile Conveyor is currently used for cultivation, grazing and some mining activity. A large number of properties that will be affected by this development are owned by either Anglo or Eskom, as the custodians of the project, while some private land will also be affected. The conveyor will have a 25 meter servitude and will be approximately 30km long from the Phola Washing Plant to Kusile. The conveyor will span across 70ha to 80ha of land of which cultivated agricultural land is the main land use being impacted.

The value of the lost production as a result of the conveyor development is estimated at R318 309 gross value added (GVA) per annum translating in a loss of 5 jobs. The conveyor investment of R1.4 billion will create and sustain 16 permanent workers, offsetting the loss in the employment of the local area. This investment is also 1 000 times more than the anticipated investment that will occur in the agriculture sector in the affected portion. The long term benefit of the project outweighs the short term losses in GVA and employment in the agriculture sector. With continual technological advances in crop production techniques the agriculture production is expected to increase over the short term (12 – 36 months) as a result of these improvements.

The conveyor development is an investment of R1.4 billion, and represent a small investment when compared to the New Largo Cola Mine and Kusile Power Station that will invest R90 billion in the local and national economy. All these projects are needed to ensure that electricity supply is increased to facilitate economic growth for the national economy.

### ➤ BACKGROUND

**Demacon Market Studies** were commissioned by **Synergistics Environmental Services (Pty) Ltd** to perform a comprehensive, specialist economic impact assessment to determine the anticipated economic impacts of the proposed **Phola-Kusile Conveyor** that forms part of the New Largo Open Cast Coal Mine development.

### ➤ AGRICULTURE IMPORTANCE

#### *Agriculture in the World Economy*

The following table illustrates the importance of agricultural areas within the world economy.

**Table 1: Worldwide Agriculture Trends**

	<b>Year 1961 – 1963 (Average)</b>	<b>Year 2002 – 2003 (Average)</b>
<b>Planted Area</b>	650 million ha	670 million ha
<b>Yield</b>	1.4 t/ha	3.2 t/ha
<b>Population</b>	3.1 billion people (1962)	6.3 billion people (2003)

Source: <http://www.itbf.info/aots2010e.html> (Trends of food supply and demand)

According to the table the total area planted has not increased over 40 years while the yields have increased three fold due to technological advances. The population has also doubled

over the 40 years. It is evident that the areas planted have been stable over the past 40 years, **indicating limited space and areas where cultivation can take place**. This is coupled with an increase in the worldwide population to over 6 billion people all in need of food supply. Technological advances did however ensure that supply could provide for the growth in demand.

Given the continuous **improvement in technology** applied to the agriculture sector, it is expected that with limited space **yields will increase over time** as new technology is applied. It is important to note that there is limited land available for agriculture production and as a result should be protected as far as possible in order to ensure stable and continued food supply.

#### **70% increase in food production needed in 2050**

The Food and Agriculture Organisation (FAO) said feeding a global population of 9.15 billion people in 2050 requires an increase in total food production of some 70 per cent (nearly 100% in the developing countries). Giving the alert, the organisation said in its "long-term Outlook for Global Agriculture", the demand for cereals is projected to rise about 50 per cent by 2050 (+1 billion tonnes), up from some 2.1 billion tonnes.

FAO said demand for other food products with higher income responsiveness such as livestock products or vegetable oils is projected to grow well above the rates predicted for cereals, while meat production, for instance, will rise by over 200 million tonnes to 470 million tonnes while soybean production will rise even faster from 215 million tonnes to 515 million tonnes by 2050. Not included in these estimates is a potentially significant increase in demand from the (bio) energy sector.

According to FAO, high energy prices and/or government policies (mandates/subsidies) could create considerable extra demand for agricultural products and ultimately for natural resources such as land, water or genetic resources. Agriculture nonetheless has a pivotal role in reducing hunger and poverty. More than 70% of the poor live in rural areas and many of them rely on agriculture for their livelihoods. The most recent increase in hunger is not the consequence of poor global harvests but is caused by the world economic crisis that has resulted in lower incomes and increased unemployment. This has reduced access to food by the poor, the UN agency said.

"A dangerous mix of the global economic slowdown combined with stubbornly high food prices in many countries has pushed some 100 million more people than last year into chronic hunger and poverty," said FAO Director-General Jacques Diouf. "The silent hunger crisis — affecting one sixth of all of humanity — poses a serious risk for world peace and security. We urgently need to forge a broad consensus on the total and rapid eradication of hunger in the world and to take the necessary actions." "The present situation of world food insecurity cannot leave us indifferent," he added.

Poor countries, Diouf stressed, "must be given the development, economic and policy tools required to boost their agricultural production and productivity. Investment in agriculture must be increased because for the majority of poor countries a healthy agricultural sector is essential to overcome poverty and hunger and is a pre-requisite for overall economic growth."

"Many of the world's poor and hungry are smallholder farmers in developing countries. Yet they have the potential not only to meet their own needs but to boost food security and catalyse broader economic growth. To unleash this potential and reduce the number of hungry people in the world, governments, supported by the international community, need to protect core investments in agriculture so that smallholder farmers have access not only to seeds and fertilisers but to tailored technologies, infrastructure, rural finance, and markets," said Kanayo F. Nwanze, President of the International Fund for Agricultural Development (IFAD).

Source: <http://thenationonlineng.net/web2/articles/50055/1/70--increase-in-food-production-needed-in-2050/>

In order to ensure sustainable economic growth, it is important to have sufficient food supply. Within South Africa, economic growth is aimed at 6% per annum (ASGISA), while this is coupled with an increase in the population, and will also need increased food supply. Agriculture is an important ingredient to economic growth as people need food.

➤ CONVEYOR IMPACT ASSESSMENT

A comprehensive agriculture impact assessment was conducted by Index on behalf of Synergistcs Environmental Services. As a result, this report will not go into detail regarding the monetary impact on this sector for the study area. The study area is mostly used for agriculture and as a result the economic impact assessment will have a strong focus on agriculture excluding the monetary value impact.

The impact on the agriculture sector for the conveyor development is as follows: An immediate impact in lost agriculture production will be felt as soon as construction of the conveyor starts. This negative impact on agriculture land is permanent, but limited to the affected route (approximately 80 ha with a 25 meter servitude).

Although the production of agriculture products is of the utmost importance the loss in agriculture output for the affected route is short term as **improvement in technology in this sector helps to increase yields** of cultivars. This does not mean that agricultural land can be used and rezoned for other uses, but only that over time, the small loss in agriculture production as a result of the conveyor development will be made up with technological advances.

The anticipated impact that the conveyor has on the affected property and farming activity is determined by:

- (1) The size of the farm

**Findings:** *In order to minimise the impact of the conveyor on all properties, it should be positioned on farm boundaries that are preferably bigger than 500 ha. In the study area, no farms are bigger than 500ha, and as a result the conveyor should as far possible be located on farm portions bigger than 150 ha for the lowest possible negative impact.*

- (2) Farm ownership

**Findings:** *The conveyor should as far possible be located on Anglo or Eskom property (the custodians of the project) in order to minimise the impact on private land ownership.*

- (3) Land use of the affected area

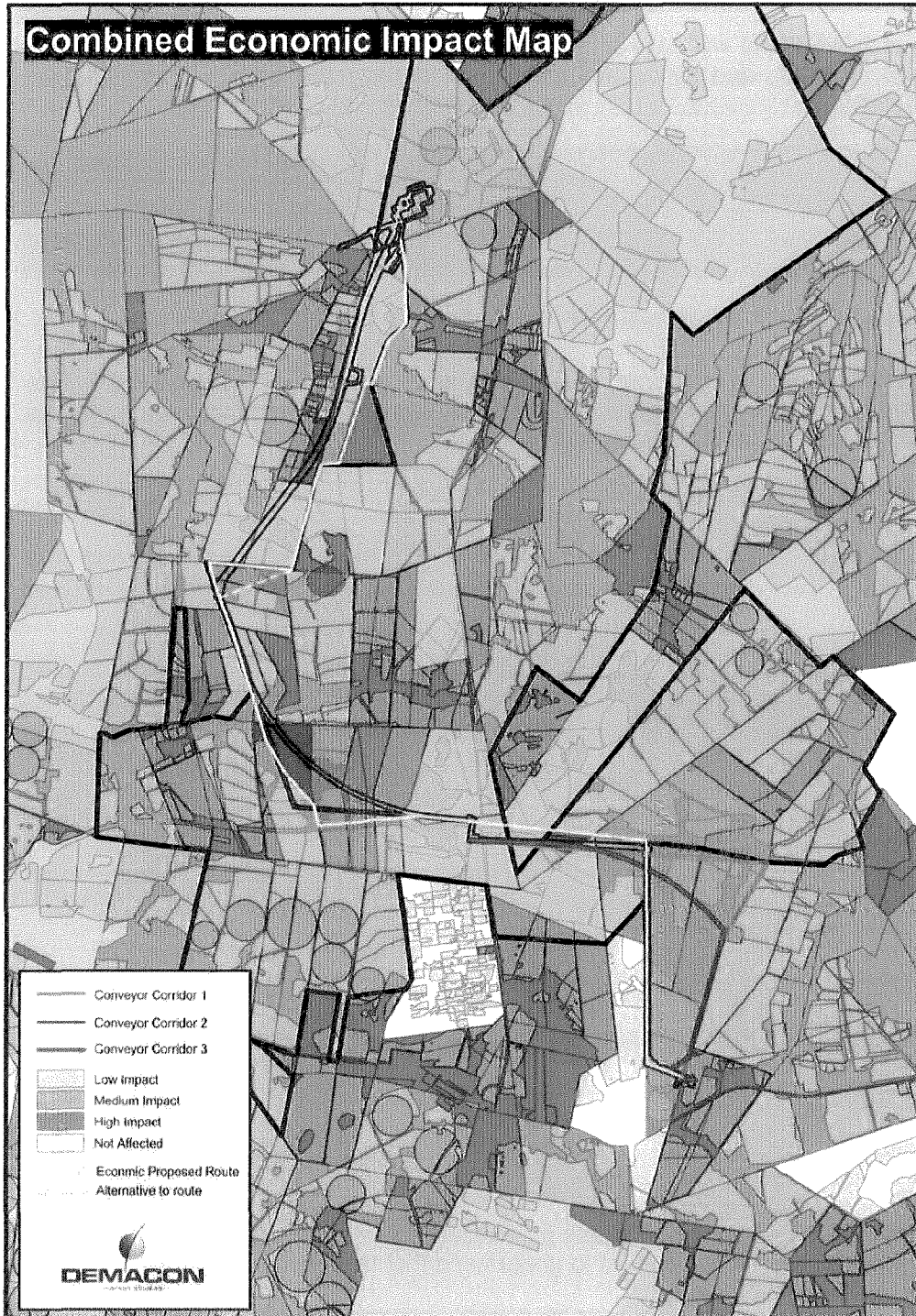
**Findings:** *The area affected by the proposed conveyor route is predominantly used for cultivation, natural vegetation and a small portion of mining. Areas with no indicated land use are predominantly used for natural grazing or are just natural vegetation and these areas would have the lowest negative economic impact of all land uses. As a result it is the preferred land use for the conveyor to cross. The anticipated impact of the conveyor on the affected land uses is low.*

- (4) The shape or configuration of the farm

**Findings:** *It is evident that the conveyor is mostly located on farm boundaries and this reduces the negative impact of the conveyor. All effort should be made to reduce the impact and locate the conveyor on the boundary of farms or alongside existing linear infrastructure (such as roads or railway lines) to minimise the impact of the conveyor cutting farm portions into smaller areas.*



Map 1: Combined Economic Impact Map with Alternatives



### ***Agriculture - crops***

According to the Agricultural Impact Assessment Report (Index, August 2011) the total loss in agriculture land that falls outside the mining area is roughly 30ha. It translates into a R183 000 loss in farming income per annum.

### ***Tourism / hunting***

No Tourism activity is located within the conveyor servitude area and as a result no impact is expected on tourism activity.

**Mining**

A small portion of mining land will have to be crossed by the conveyor. These mining areas has already been disturbed and mined and as a result no negative impact is expected on current mining activity.

*The preferred route from the three proposed routes is Option 2 (blue route).  
A new route (yellow) is proposed with the lowest negative economic impact. The proposed route mostly follows the existing route and then the mining rights boundary.*

➤ **QUANTITATIVE IMPACT ASSESSMENT**

The assessment illustrates the economic impact on a local regional and national level. This process highlights the positive influence on business sales and employment during the construction and operational phase of such a project.

➤ **Construction Phase Impacts**

Subsequent calculations assume the development of the full spectrum of existing and proposed rights. Note: New Business Sales (NBS), Gross Geographic Product (GGP) and Employment (Empl).

**Table 1: Economic Impacts of Capital Investment. NBS and GGP – Rand**

VARIABLE	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
Additional Business Sales	1 406 022 000	8 579 000	554 264 000	1 968 865 000
Additional GGP	785 279 000	3 688 000	85 073 000	874 040 000
Additional Employment	1 500	100	1 100	2 700

Source: Demacon Economic Impact Model, 2011



VARIABLE	CAPITAL EXPENDITURE	TOTAL IMPACT
Additional Business Sales	R1.406 billion	R1.968 billion
Additional GGP		R874 million
Additional Employment		2 700 jobs

Source: Demacon Economic Impact Model, 2011

The impact in terms of the construction phase is indicated in the table above and reflected in the subsequent figures. It is also important to understand that this impact refers to the **formal and informal sectors** of the economy.

- **New business sales:** During the construction phase of the proposed conveyor, business sales with reference to certain products and professional services will increase. It is evident that the capital investment of R1.4 billion will result in the creation of R1.4 billion direct additional business sales (within the local region), R 8.6 million indirect business sales (larger area and country), resulting in an induced impact of R 554 million business sales. Overall the total value of additional business sales leveraged by the capital investment amounts to R1.968 billion.



- **Additional GGP:** during the construction phase certain goods and services will be produced or provided within the specific geographic area. The capital investment of R1.4 billion will result in the creation of additional GGP – R785 million direct additional GGP, R 3.6 million indirect additional GGP and R85 million additional induced GGP. In total the capital investment will contribute to the leverage of R874 million additional GGP within the country.
- **Additional Employment:** the construction phase of the project will be relatively labour intensive, resulting in the creation of a number of temporarily employment opportunities – on site, within the district and larger region. The capital investment will result in the creation of 1 500 direct employment opportunities, 100 indirect and 1 100 induced employment opportunities. This results in a total of 2 700 temporarily additional employment opportunities.

➤ **Operational Phase Impacts**

The investment geared to improve electricity supply in South Africa would create economic opportunity such as additional employment and related downstream opportunities in the local and national economy. In this regard the conveyor on its own does not create huge economic benefits, although technical professionals would have to do periodic maintenance to the line, which could create some new jobs. The benefit is evident in the additional economic activities that would be generated from the conveyor development.

**Gross Value Added (GVA) & Employment**

According to the agriculture impact assessment (Index, 10 August 2011) the loss in net farming income (NFI) as a result of the conveyor development for the specific portion of the farm affected (i.e. not the entire farm but only a portion) is estimated at R2 440 per ha, this translates into a farming income loss of R183 000 per annum (for the entire route 2 – blue line of 75ha).

According to the national accounts the coefficient for net farm income (NFI) to GVA is 1.74. Therefore a loss of R183 000 NFI is estimated to be a R318 309 loss in gross value added (GVA) for the agriculture sector.

This translates in an employment loss of approximately 5 jobs. However this could be reduced by locating the conveyor on farm boundaries and away from cultivated land, thereby mitigating the negative impact on agriculture production.

The estimated permanent jobs created by the conveyor during the operational phase are 16. The long term benefit of the project outweighs the short term losses in GVA and employment in the agriculture sector with continual technological advances in crop production techniques. Agriculture production is expected to increase over the short term (12 – 36 months) as a result of these improvements.

**Fixed Capital Investment**

A total of R1.4 billion will be spent on the construction of the conveyor, representing new fixed capital investment in the local economy.

According to the national accounts the coefficient for GVA to Fixed Capital Investment is 3.77. Therefore a loss of R318 309 GVA per annum is estimated to be a R1.2 million loss per annum in fixed capital investment for the agriculture sector.

This investment in the conveyor development is 1 000 times more than the anticipated loss of investment in the agriculture sector for the affected farm portions. This highlights the net gain that this conveyor development adds as a value-chain development to the entire project.

## CHAPTER 1: INTRODUCTION

### 1.1 BACKGROUND

Chapter one provides an introduction and concise roadmap and background of the *Conveyor Economic Impact Assessment Study* as well a site description and report outline.

### 1.2 PROJECT BRIEF

**Demacon Market Studies** were commissioned by **Synergistics Environmental Services (Pty) Ltd** to perform a comprehensive, specialist economic impact assessment to determine the anticipated economic impacts of the proposed **Phola-Kusile Conveyor** that forms part of the New Largo Open Cast Coal Mine development.

*Aim of the project:*

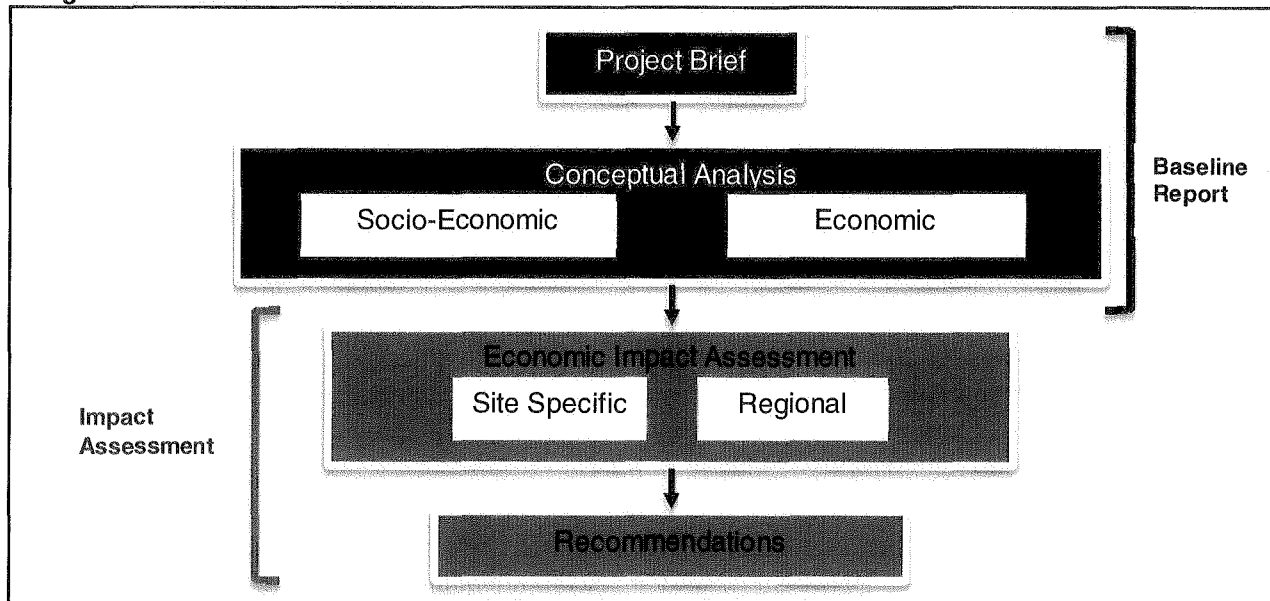
A specialist economic assessment is required to assess the project impact on surrounding economic activity in terms of, *inter alia*:

- Research the potential impact of the conveyor alternatives on land values and production
- Assess the likely impact of the conveyor options on the future development of each of the main sectors
- The economics specialist will also assess the cost-benefit of the different combinations of conveyor alternatives identified. These cost-benefit assessments will consider economic impacts predicted in the step above, to benefits gained by the regional and national economy arising from the conveyor development. Anglo will provide project cost estimates for the different conveyor options
- The location or identification of any areas that may be considered ‘no-go’ areas from an economic impact perspective

### 1.3 RESEARCH FRAMEWORK

Figure 1.1 illustrates the research framework that was followed in the study process. This framework illustrate the how the inputs from the baseline report are used in the economic impact assessment analysis.

Figure 1.1: Research Framework



*Project Brief:*

During this step the purpose and aim of the study is finalised.

*Demographic Analysis:*

The socio-economic analysis provides information pertaining to the number of people in the study area, their occupation profile, employment levels and their income levels. This information together with the economic analysis assists in the economic impact assessment.

*Economic Analysis*

The economic analysis illustrates the historic and current trends in the study area. Aspects that are analysed include economic growth, sectoral performance and main drivers in the economy. This is done by an economic analysis of the affected *local municipal* area.

The economic analysis highlights the sectors which would be affected the most by the mining, conveyor and road development, especially agriculture. The analysis illustrates the magnitude and importance of each sector.

*Impact Assessment*

The development of the mine, conveyor and road have a positive impact on the national economy as this basic infrastructure is needed to distribute electricity to ensure sustained economic growth in the national economy. This section focus more on the expected impact on a loss of economic activity due to the restrictions the development would bring to economic activity in the servitude areas as well as the impact on the real estate values of the affected area.

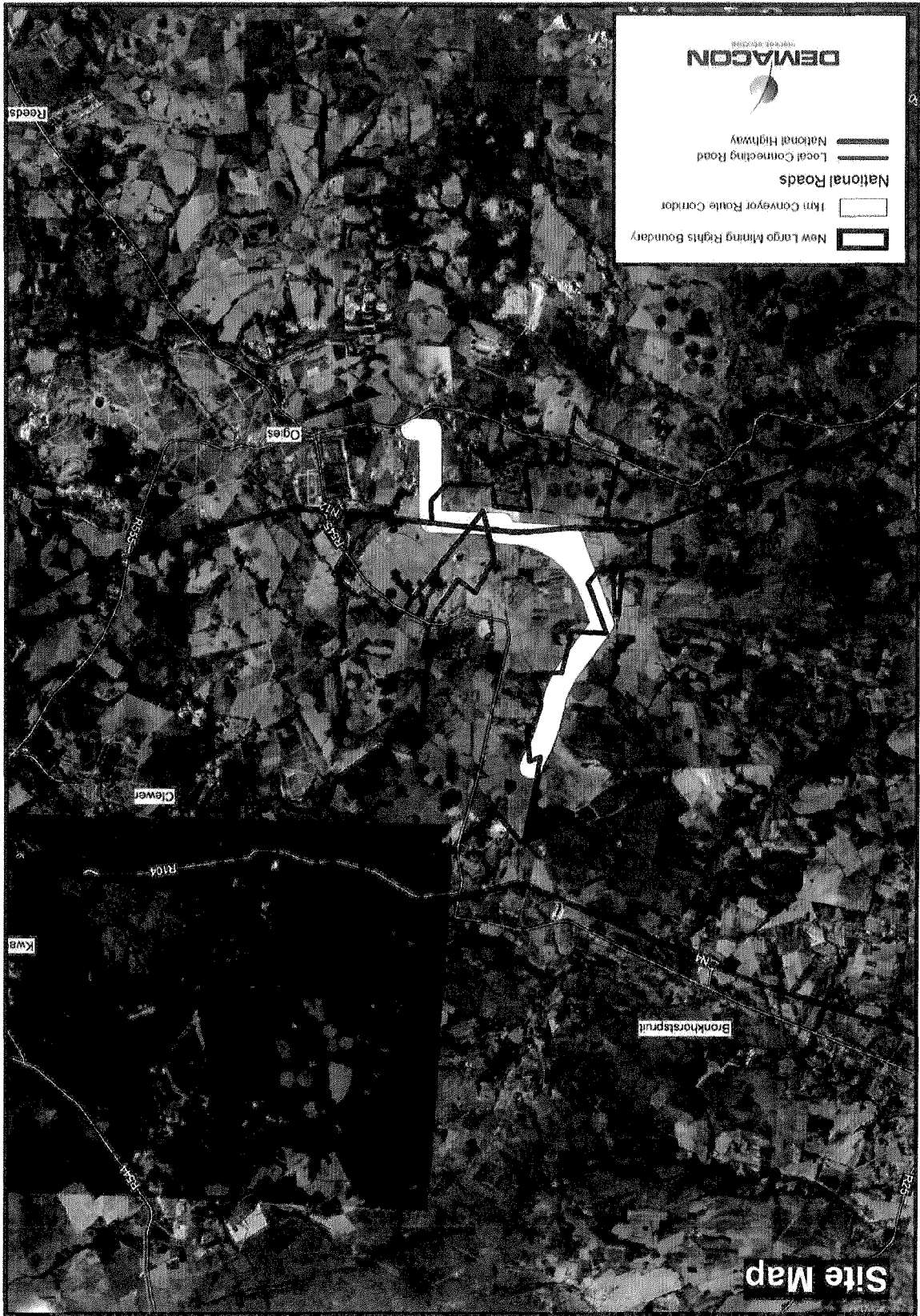
*Recommendations*

To provide recommendations in terms of the best possible route for the conveyor and new road as well as the mitigation for all three the project components.

## 1.4 BRIEF DESCRIPTION OF STUDY AREA

The conveyor is located between the N12 and N4 to the west of eMalahleni, near Phola and Wilge settlements.

Map 1.1: Location of Conveyor



## 1.5 REPORT OUTLINE

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

- Chapter 2: Baseline Overview
- Chapter 3: Economic Impact Assessment
- Chapter 4: Quantitative Impact Assessment
- Chapter 5: Recommendations

## CHAPTER 2: BASELINE OVERVIEW

### 2.1 ECONOMIC OVERVIEW

The proposed mine development with associated components is located on the border of two municipal areas namely Delmas and eMalahleni in the Mpumalanga province. The region is best known for the large amount of coal reserves and coal mining, with associated power stations. The area is the powerhouse of electricity production in South Africa, producing approximately 80% of the national power supply. Additionally the region is one of South Africa's major field crop production area which includes dry land and irrigated lands methods.

The **historical drivers of the local economy** are that of mining, agriculture and electricity. Mining occurs throughout the areas, with large sections of the area affected by undermining and/or mineral rights. Due to the rich coal reserves in local area, Eskom developed the Kendal, Kriel, Matla, Wilge and Duvha power stations during the 1970's and 1980's to provide future electricity needs. This has led to the establishment of towns such as Kriel, Thubelihle and Wilge. The non-urban areas consist mainly of farms and agricultural holdings. The agricultural holdings are found on the periphery of the urban settlements. In terms of agriculture, stock farming (sheep and cattle) and maize farming with some irrigated farming occur through the area and especially along the river drainage basins. Intensive and extensive agriculture activities are both present.

The economic profile of the study area (Delmas & eMalahleni) indicates the **importance of mining as a driver** in the local economy. This is supported by manufacturing activity in the local economies. Additionally the employment figures indicate that the majority of people either work in the trade sector or the mining sector. Table 5.1 provides a summary of the study area importance and the sectoral implications.

**Table 2.1: Study area economic profile and contribution, 2010**

	Economic contribution 2010	Employment contribution 2010
Agriculture	1.4%	4.2%
Mining	37.9%	21.4%
Manufacturing	18.8%	7.5%
Electricity & water	7.5%	2.4%
Construction	1.9%	5.8%
Wholesale & retail trade	7.6%	22.5%
Transport & communication	8.5%	4.5%
Finance and business services	7.0%	8.9%
Community & Social Services	3.6%	11.5%
Government services	5.8%	11.2%
Total	100%	100%

It is expected that an increase in mining activity would create additional employment in the study area, strengthening the sector and the local economy as a result of the importance of this sector to local economic growth.

### 2.2 SOCIO-ECONOMIC OVERVIEW

The study area delineated for this project is defined by a 50km radius from the mining area. There are a number of towns and villages that falls within the study area of which eMalahleni is the biggest node, supported by smaller nodes such as Bronkhorstspuit, Kriel, Delmas and Ogies.

An estimated total of **588 114 people and 171 039 households** are located within the study area in 2011. Population growth for this area is estimated at 1.6% per annum which translates into an annual increase of approximately 9 000 people per annum.

Employment correlated with the national average with a total of **75% being employed** and 25% unemployed. A high unemployment rate would affect the disposable income of households and as a result keep living standards low. Improvement in the employment rate would have the opposite effect and create wealth in the local economy.

Income earning households in the area receive an estimated monthly income of R6 508. This has increased from R4 659 in 2001.



### 2.3 ECONOMIC ACTIVITY IMPACTED BY THE DEVELOPMENT

The affected area for the mining development is characterised by agriculture, mining and some small-scale tourism and trade activities.

#### *Agriculture:*

The Mpumalanga Province is one of three provinces responsible for 85% of South Africa's maize production. The province **contributes approximately 22% out of the 85% of the production**. The area on which the mine is located is mainly used for dry land crop cultivation and poultry production.

The pressure that development places on agriculture combined with the increase in inflation, and rise of input costs influences the production of agricultural products directly. Although the affected area of the sub-station (approximately 13 000ha) in relation to the region is small, the effect that it could have on a property owners in the mining rights area would in all likelihood **cut production permanently** for the affected property.

#### *Mining:*

The development of another mine in the area would create additional employment and increase the importance of mining in the local economy. The **opportunity cost** between the proposed mining activity and the current land uses would be discussed in the economic impact assessment report.

#### *Manufacturing:*

No manufacturing activity is taking place within the study area. The increase in coal supplies from the mining development would have a positive impact in coal washing plants in near the mine as coal would have to be treated.

#### *Trade:*

A small number of shops are located adjacent the existing R545 which would have to close when the mine starts operating. These shops cater for convenience retail and are small, catering for the basic necessities of the surrounding communities.



*Tourism:*

The area is not regarded as a tourism node. There is however a limited/low key tourism facility located in the mining rights area.

The baseline report provides the basic input that will be used to determine the economic impact assessment for the development. The economic impact assessment is a detailed report indicating the affected sectors from the mining development and provides recommendations and mitigation for the development. It also focuses more on the expected impact on a loss of economic activity due to the restrictions the development would bring to economic activity in the servitude areas and the positive impact the mine would have on the local economy i.e. opportunity cost.

## CHAPTER 3: ECONOMIC IMPACT ASSESSMENT

### 3.1 INTRODUCTION

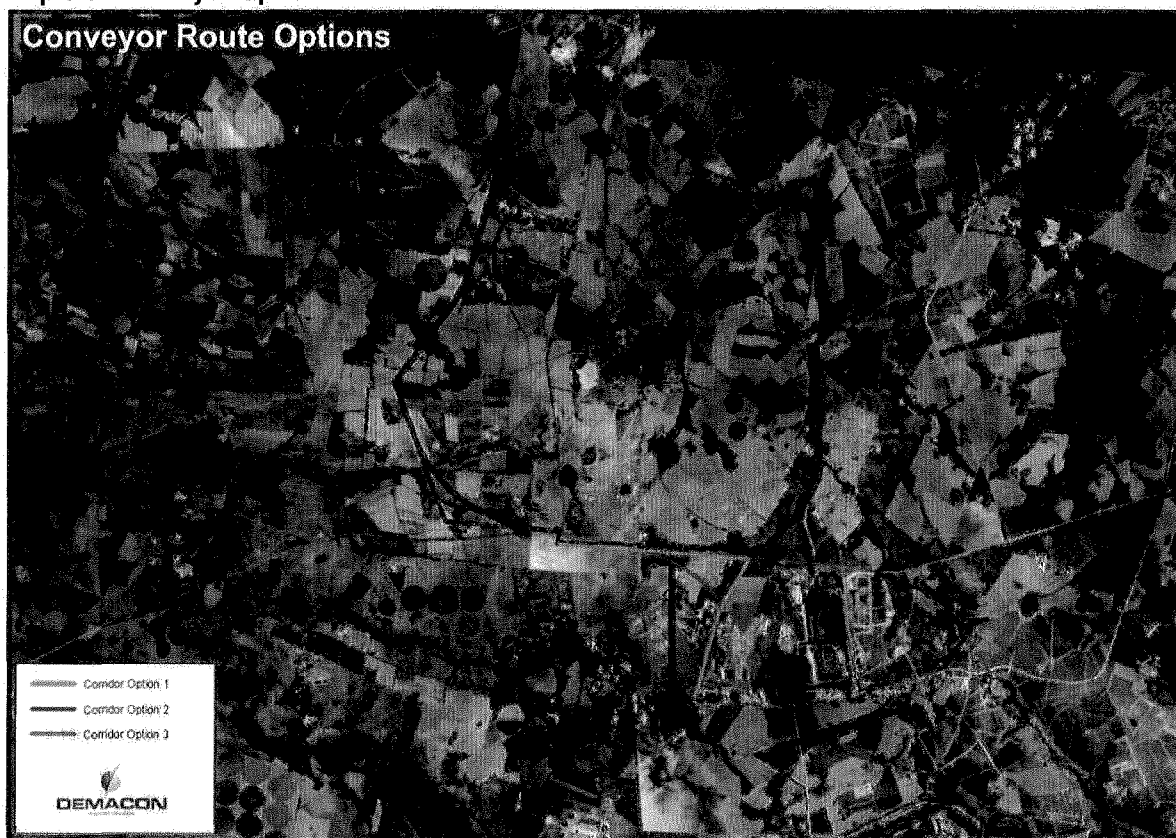
The purpose of this section is to provide an economic impact assessment that will focus on the conveyor belt associated with the mine development. The section is divided into the following sub-sections:

1. Conveyor alternatives in context
2. The importance of cultivated agricultural land in the study area
3. Conveyor impact assessment
4. Preferred and proposed development sites

### 3.2 SITE IN CONTEXT

The preferred route for the conveyor has been determined and is indicated in the map below. The conveyor forms part of a much larger value chain that will supply added electricity in the national economy.

Map 3.1: Conveyor Options



It is evident that within the proposed corridor a number of route options are available. The servitude for the conveyor is 25 meters and as such is regarded as linear infrastructure that will cross a number of properties. The length of the conveyor is between 30km and 33km, depending on the final route, and will transport coal from the Phola Coal Washing Plant to the new Kusile Power Station.

The conveyor will take up between 70ha and 80ha of land. The primary use for the area earmarked for the conveyor is dry land cultivation of which maize production is the most prominent while the secondary use is for grazing during the winter months. As a result in the loss in production for both the primary and secondary usage there is a monetary loss that will apply for the conveyor development.

### 3.2.1 Why cultivated agricultural land should be avoided as far possible

#### Agriculture in the World Economy

The following table illustrates the importance of agricultural areas within the world economy.

Table 3.1: Worldwide Agriculture Trends

	Year 1961 – 1963 (Average)	Year 2002 – 2003 (Average)
Planted Area	650 million ha	670 million ha
Yield	1.4 t/ha	3.2 t/ha
Population	3.1 billion people (1962)	6.3 billion people (2003)

Source: <http://www.itbf.info/aots2010e.html> (Trends of food supply and demand)

According to the table the total area planted has not increased over 40 years while the yields have increased three fold due to technological advances. The population has also doubled over the 40 years. It is evident that the areas planted have been stable over the 40 years, **indicating limited space and areas where cultivation can take place**. This is coupled with an increase in the worldwide population to over 6 billion people all in need of food supply. Technological advances did however ensure that supply could provide for the growth in demand.

Given the continuous **improvement in technology** applied to the agriculture sector, it is expected that with limited space **yields will increase over time** as new technology is applied.

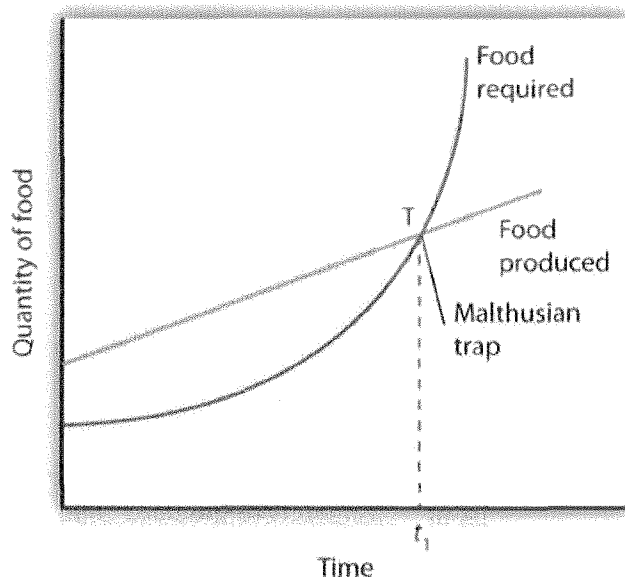
It is important to note that there is limited land available for agriculture production and as a result should be protected as far as possible in order to ensure stable and continued food supply.

The following articles refer to the importance of food security in the near future.

**The Malthusian Trap** illustrates the demand for food as population increases.

Food produced, according to Malthus, rises by a constant amount each period; its increase is shown by an upward-sloping straight line labeled "Food produced." Food required eventually exceeds food produced, and the Malthusian trap is reached at time  $t_1$ . The faster the rate of population growth, the sooner  $t_1$  is reached.

If population grows at a fixed exponential rate, the amount of food required will increase exponentially. But Malthus held that the output of food could increase only by a constant amount each period. Given these two different growth processes, food requirements would eventually catch up with food production. The population hits the subsistence level



of food production at the Malthusian trap, shown here at point T.

What happens at the Malthusian trap? Clearly, there is not enough food to support the population growth implied by the "Food required" curve.

Source: <http://www.flatworldknowledge.com/pub/1.0/principles-economics/31974>

#### **70% increase in food production needed in 2050**

The Food and Agriculture Organisation (FAO) said feeding a global population of 9.15 billion people in 2050 requires an increase in total food production of some 70 per cent (nearly 100% in the developing countries). Giving the alert, the organisation said in its "long-term Outlook for Global Agriculture", the demand for cereals is projected to rise about 50 per cent by 2050 (+1 billion tonnes), up from some 2.1 billion tonnes.

FAO said demand for other food products with higher income responsiveness such as livestock products or vegetable oils is projected to grow well above the rates predicted for cereals, while meat production, for instance, will rise by over 200 million tonnes to 470 million tonnes while soybean production will rise even faster from 215 million tonnes to 515 million tonnes by 2050. Not included in these estimates is a potentially significant increase in demand from the (bio) energy sector.

According to FAO, high energy prices and/or government policies (mandates/subsidies) could create considerable extra demand for agricultural products and ultimately for natural resources such as land, water or genetic resources. Agriculture nonetheless has a pivotal role in reducing hunger and poverty. More than 70% of the poor live in rural areas and many of them rely on agriculture for their livelihoods.

The most recent increase in hunger is not the consequence of poor global harvests but is caused by the world economic crisis that has resulted in lower incomes and increased unemployment. This has reduced access to food by the poor, the UN agency said.

"A dangerous mix of the global economic slowdown combined with stubbornly high food prices in many countries has pushed some 100 million more people than last year into chronic hunger and poverty," said FAO Director-General Jacques Diouf. "The silent hunger crisis — affecting one sixth of all of humanity — poses a serious risk for world peace and security. We urgently need to forge a broad consensus on the total and rapid eradication of hunger in the world and to take the necessary actions."

"The present situation of world food insecurity cannot leave us indifferent," he added.

Poor countries, Diouf stressed, "must be given the development, economic and policy tools required to boost their agricultural production and productivity. Investment in agriculture must be increased because for the majority of poor countries a healthy agricultural sector is essential to overcome poverty and hunger and is a pre-requisite for overall economic growth."

"Many of the world's poor and hungry are smallholder farmers in developing countries. Yet they have the potential not only to meet their own needs but to boost food security and catalyse broader economic growth. To unleash this potential and reduce the number of hungry people in the world, governments, supported by the international community, need to protect core investments in agriculture so that smallholder farmers have access not only to seeds and fertilisers but to tailored technologies, infrastructure, rural finance, and markets," said Kanayo F. Nwanze, President of the International Fund for Agricultural Development (IFAD).

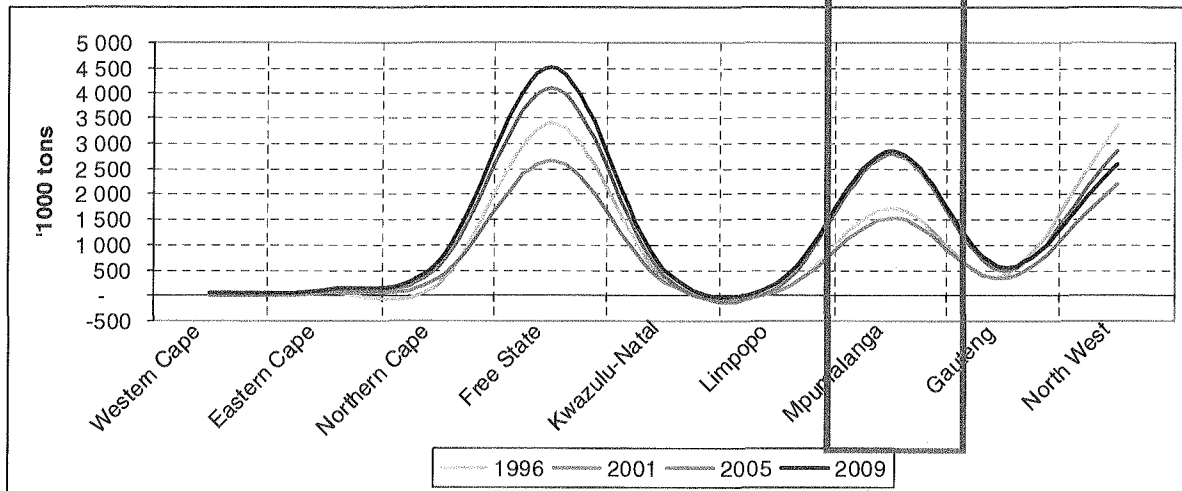
Source: <http://thenationonlineng.net/web2/articles/50055/1/70--increase-in-food-production-needed-in-2050/>

In order to ensure sustainable economic growth, it is important to have sufficient food supply. Within South Africa, economic growth is aimed at 6% per annum (ASGISA), while this is coupled with an increase in the population, and will also need increased food supply. Agriculture is an important ingredient to economic growth as people need food.

#### **Importance of agriculture in study area**

The Mpumalanga Province is regarded as one of the main areas within South Africa where maize production takes place. Together with the Free State and North West provinces, it provides for the bulk of maize production in the country. Figure 3.1 indicates the provincial distribution of maize production since 1996.

Figure 3.1: Provincial distribution of maize production, 1996 - 2009



Source: Department of Agriculture, 2010

The Mpumalanga Province contributes approximately 22% to the total maize production of South Africa (2009/2010). Maize is regarded as one of the staple food types within the country, especially within the poorer communities. As a result of the importance of maize, especially its role in the national economy as staple food to poor communities, these areas that provide maize should be protected as far possible.

The New Largo Mine and conveyor development fall within an area that is used for maize production, which will directly affect the volume of maize production in the area and the province. The conveyor has a footprint of 70ha – 80ha and although not all the land will be used for mining the largest amount of this will be lost to agriculture production.

**Food security**

Food security in the world has reached its lowest level in over 50 years. Huge demand for cleaner energy pulls important food sources like maize and soybeans into the production of bio-fuels. SA is only now experiencing what food security means, after decades of solving food problems with cheap imports. The figure illustrates the volume of production over the past 5 years with the red line indicating the production volume in the year 2000. It is evident that production is just above the volume it was in 2000, and that production volumes have not followed the increases in population growth (1.2% pa) in the national economy.

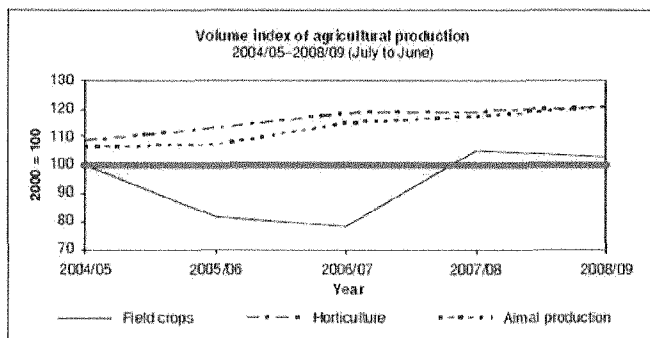
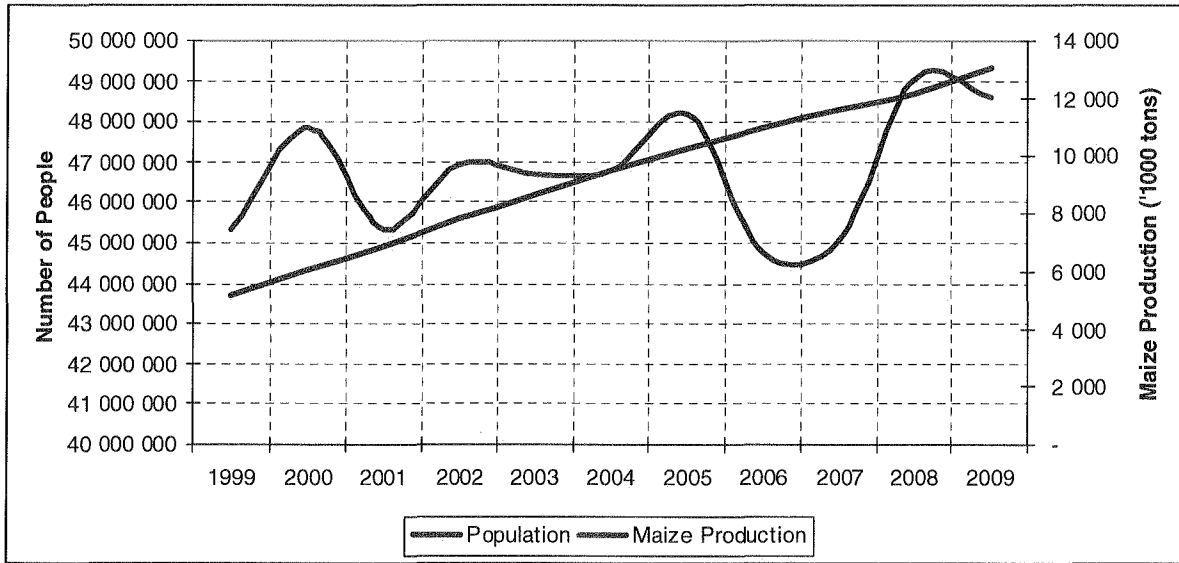


Figure 3.2: Population growth and maize production (1999 to 2009)



Source: Demacon & Stats SA, 2010

Figure 3.2 illustrates that maize production fluctuates every season and does not correlate with population growth. An increase in population does not necessarily mean an increase in maize production and more population would demand more maize as more people need more food. This applies to all types of food sources and not just maize.

One of the biggest threats to food security in the future will be the availability and affordability of water. SA is heading for water shortages that will put enormous pressure on agriculture, which will bear the brunt of these shortages. Any future agricultural development that depends on water from irrigation schemes, rivers or dams, should be discouraged.

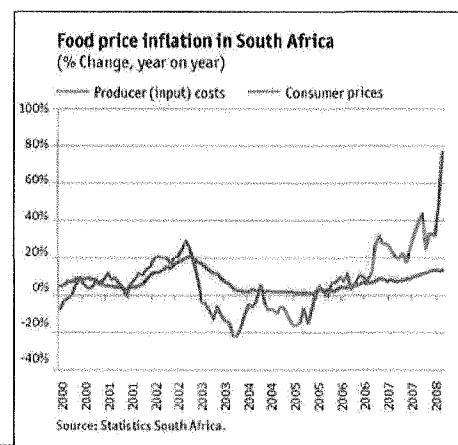
**Energy will also pose a serious threat** since the cost and availability of electricity, coal and fuel will become even more difficult. This however opens up a whole new opportunity in the production of renewable energy sources within agriculture like solar energy, methane gas and wind.

Fast developing Asian countries are creating a shortage in most of the staple foods, and especially rice. They also gobble up resources and put enormous pressure on energy supply.

*Verdict: Sustainable agriculture offers the government the best way to establish food security. Agriculture will therefore need bigger support from government in future to ensure enough food is provided for its citizens.*

**Food prices**

As the supply of staple foods comes under pressure and demands for more luxury food increase, so will prices keep escalating. Food is becoming a serious political issue around the world, with both availability and cost of production offering quite a challenge. Communities in SA are taking to the streets to protest against food prices. Price control by government, however unlikely now, might be a reality in future. The highest food inflation happens outside the farm gate and farmers do not necessarily enjoy the benefit thereof. These price hikes are mostly

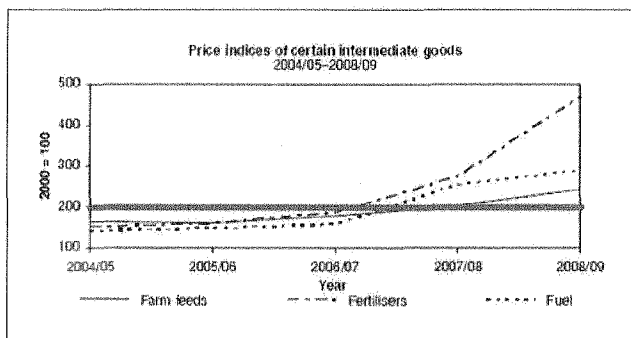


driven by international prices, rather than local supply and demand. The more the primary producers become involved higher up in the supply chain, the more profitable they become.

*Verdict: Good prices offer wonderful opportunity to producers as long as it does not force consumers to find alternatives to local farm produce. The relatively high global food prices (although unstable) offer good export opportunities. Farm operations should include basic processing where possible.*

### **Rise in input costs**

The main inputs that pose a threat to input costs are energy, fertiliser, machinery and high-tech equipment. High demand for energy and political unrest in oil producing countries leads to increased fuel cost that will stay high over the long term. Increased growth in countries such as China, India and Russia, leads to a shortage in the main fertiliser products, which in turn leads to price increases of between 100% and 500% in one year.



The figure illustrated the change in expenditure on some input costs compared to the year 2000. With the increase in the fuel price since March 2010 this is expected to increase input costs even more.

Higher inflation will lead to higher salaries. High interest rates make it difficult to access credit for normal production. The instability of the exchange rate puts pressure on any imported inputs.

The above mentioned points contribute to more than 60% of the production costs of agricultural products. The reality is that it is becoming increasingly important to produce at a high level of efficiency.

*Verdict: Any operation that demands high inputs (especially if imported), will offer a risk that has to be managed. Farmers should keep their finger on the pulse of world trends, not to be caught wanting if prices or availability changes quickly.*

### **Role of Africa**

Africa is the continent with the biggest food production potential in the world. Africa will be the focus of the world for the future production of food and green fuels. A new "scramble for Africa" by the world powers is predicted. This time not for colonies, but for a share in the food producing capacity of the continent and the resources that will make this possible. Africa is waking up to take its rightful place in the world economy with slow, but sure, growth in the unleashing of its own potential.

*Verdict: Africa has the potential of unprecedented growth in agriculture in the immediate future*

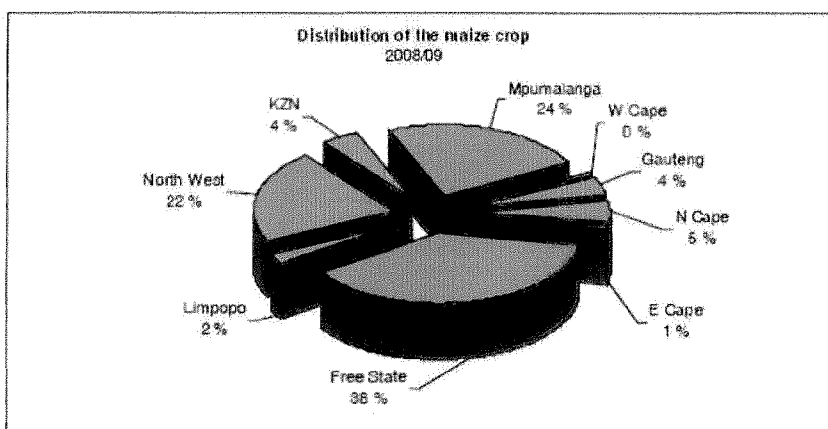
### **Challenges and opportunities in Africa**

Africa has turned the corner as far as political stability and the growth of democracy goes. The continent in recent years has opened itself up to huge growth in inter-continental trade as well as capital investments within Africa. There are former Zimbabwean and South African farmers in almost every African country where they mostly enjoy the extraordinary support of the local governments.

Africa offers not only production potential, but also a lucrative market. The growth in population and wealth, coupled with its remoteness from overseas competition, makes Africa a potential market for African producers that would rather sell locally within the continent, than to go through the hassle of exports overseas. Infrastructure, capital and the sustainable and constant availability of strategic inputs remain the biggest challenges.

### Importance of Maize<sup>1</sup>

Maize is the most important grain crop in South Africa, being both the major feed grain and the staple food of the majority of the South African population. About 60 % of maize produced in South Africa is white and the remaining 40 % is yellow maize. White maize is primarily used for human consumption, while yellow maize is mostly for animal feed production.



The contribution of the maize industry to the gross value of agricultural production declined during the 4 years up to the 2005/06 production season, mainly as a result of relatively low maize prices. During the next two seasons, however, limited carry-over stocks and high international prices, among other factors, contributed to an increase in the gross value of maize relative to that of total agricultural production.

The major areas of commercial maize production are situated in the Free State, North West and Mpumalanga provinces. White maize is generally produced in the western maize belt, while yellow maize is planted towards the eastern parts of the country. The contribution by provinces to maize production during the 2008/09 production season is depicted in the figure.

An estimated 6,3 % of the area planted to white maize is under irrigation and 93,7 % is on dryland, while the estimated contribution of yellow maize under irrigation is approximately 14,9 % and dryland 85,1 %.

### Area planted and production

The estimated area that South African commercial producers planted to maize during the 2008/09 season is 2,428 million ha. This is 13,3 % or 371 500 ha less than the 2,799 million ha planted the previous season and 3,7 % or 93 360 ha less than the 5-year average of 2 520 860 ha planted up to 2007/08. Overall, maize planting was done much later than usual. Commercial white and yellow maize plantings were 1 489 000 and 938 500 ha, respectively. This represents decreases of 14,3 and 11,6 %.

The commercial maize crop for the 2008/09 production season is estimated to be 11,684 million tons, with an estimated yield of 4,81 t/ha. The production represents a decrease of 8,0 % compared to the 2007/08 crop, which was estimated at 12,7 million tons—the largest crop since the 1980/81 season when 14,432 million tons were produced.

<sup>1</sup> Source: Department of Agriculture, Trends in the Agricultural Sector, 2009



### Consumption

The South African maize market has matured considerably since the deregulation of marketing. Producers, traders and other intermediaries interact freely in the marketing of maize. Most of the maize produced in South Africa is consumed locally; as a result, the domestic market is very important to the industry.

Considering the 2008/09 commercial maize crop of 11,684 million tons (6,771 million tons white and 4,913 million tons yellow), together with carry-over stocks of about 1,585 million tons (766 000 tons white and 819 000 tons yellow) from the previous season, the domestic supply of maize for the 2009/10 marketing season (May to April) is estimated at 13,269 million tons (7,537 million tons white and 5,732 million tons yellow).

The domestic demand for commercial maize is estimated at 9,818 million tons—5,180 million tons of white and 4,638 million tons of yellow maize. Projected exports amount to 1,920 million tons (1,720 million tons of white and 200 000 tons of yellow maize). South Africa therefore has sufficient maize stocks of 1,531 million tons—637 million tons white and 894 million tons yellow—available to meet the local demand. The surplus above pipeline requirements (45 days of commercial consumption) amounts to 424 000 tons of maize, consisting of 24 000 tons of white and 400 000 tons of yellow maize.

### 3.2.2 Agriculture & Conveyor

A comprehensive agriculture impact assessment was conducted by Index on behalf of Synergistics Environmental Services. As a result, this report will not go into detail regarding the monetary and production impact on this sector for the study area. However some key impacts will be mentioned.

The impact on the agriculture sector is as follows: An immediate impact in lost agriculture production will be felt as soon as construction of the conveyor starts. This negative impact on agriculture land is permanent, but limited to the affected route (approximately 80 ha with a 25 meter servitude).

On the other hand, the production of electricity (the main reason for the New Largo Mine and conveyor developments) is as important for economic growth in South Africa. Without electricity, economic growth would be negatively affected as was evident in 2008/2009 when large energy users were forced to minimise electricity usage. This has negative production impacts and as a result influences economic growth and stability.

Although the production of agriculture products is of the utmost importance the loss in agriculture output for the affected route is short term as **improvement in technology in this sector helps to increase yields** of cultivars. This does not mean that agricultural land can be used and rezoned for other uses, but only that over time, the small loss in agriculture production as a result of the conveyor development will be made up with technological advances.

The impact assessment of the conveyor associated with the mine development is discussed in the flowing section.

### 3.3 CONVEYOR IMPACT ASSESSMENT

The impact assessment will consider the current land use in the proposed servitude and the impact of the conveyor on these. The impact of the conveyor on affected properties will differ according to the configuration, size, property owner and land use of the area it affects.

### 3.3.1 Conveyor Configuration and Impact Principles

It is understood that the following configuration is proposed for the conveyor development:

1. Three options are available near the start of the route (see map 3.2)
2. The servitude for the conveyor is 25m

Map 3.2: Map of conveyor corridor options



As part of the route followed by the conveyor, a section of the route has three possible alternatives. The three alternatives are situated in close proximity to the Phola Wash Plant (at the start of the conveyor route as evident on the map to the right). The route along with the three alternatives will be assessed to determine the economic impact.



The anticipated impact that the conveyor has on the affected property and farming activity is determined by:

- (1) The size of the farm
- (2) Farm ownership
- (3) Land use of the affected area
- (4) The shape or configuration of the farm.

These principles are described below.

### 1. Configuration and Size

The size of the affected farm or portion will, to a large extent, determine the impact of such a development on the production capabilities of the farm. On a large farm with more than 500 ha of land the chances are greater to have a conveyor corridor where the impact is minimal on the activities. This is compared to a smaller farm less than 500 ha where a conveyor is more prominent and could decrease the available land for cultivation and other economic activities. Figure 3.3 illustrates the above rationale.

Figure 3.3: Land Size and Economic Impact

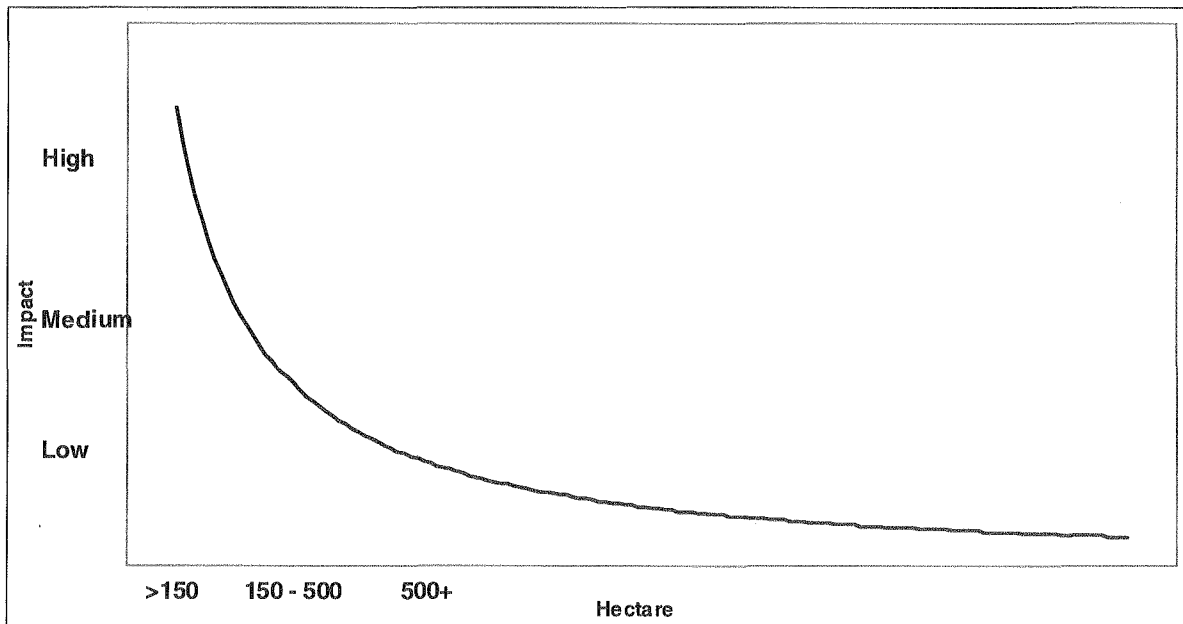


Figure 3.3 show that the bigger farms or farm portions will have a lower impact whereas the smaller farms or farm portions will be impacted on a larger scale. This is due to the loss in land from the conveyor development. Map 3.3 indicates the size of farms within the study area.

Map 3.3: Size of farm portions within the study area



The map illustrates that a large majority of the farm affected by the development is smaller than 150ha. No farm portion along the route is bigger than 500ha and as a result the impact of the conveyor would be medium to high on the affected properties.



**Findings:** In order to minimise the impact of the conveyor on all properties, it should be positioned on farm boundaries that are preferably bigger than 500 ha. In the study area, no farms are bigger than 500ha, and as a result the conveyor should as far as possible be located on portions bigger than 150 ha for the lowest possible negative impact.

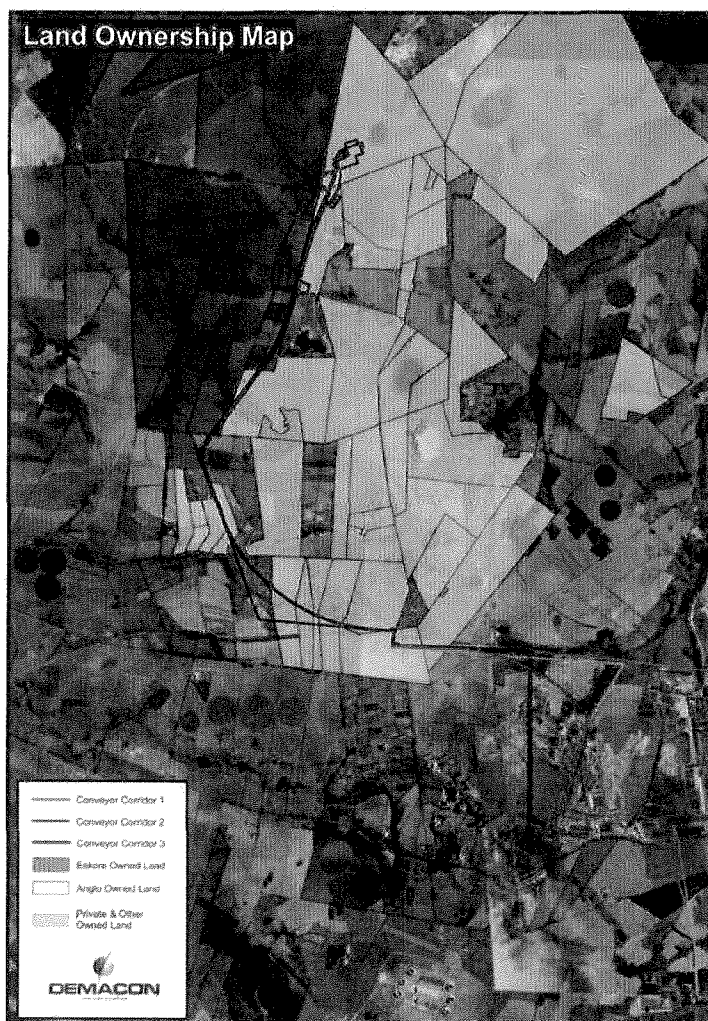
## 2. Farm Ownership

Given the location of the mine, the land ownership is an important indicator of economic impact. Currently, a large number of properties are owned by either Anglo or Eskom (both forming a part of the mine and power station development). Although Anglo and Eskom are not actively involved with the utilising of the land at this time, they are leasing it out to be used for cultivation and other activities.

*The impact is measured on the cost in loss of production caused for the property owner.*

Eskom and Anglo owned property have a **lower economic impact loss** compared to the private and other land owners of the affected area. For the owner of the land, in this instance Anglo and Eskom, it is a case of opportunity cost i.e. a loss in rent income but a gain in production of coal.

In the case of private land users the economic activity will either reduce or cease to exist, implying a loss in production for the land owner, implying a **higher economic loss impact**. The map on the right shows the properties owned by Eskom, Anglo and other land owners.

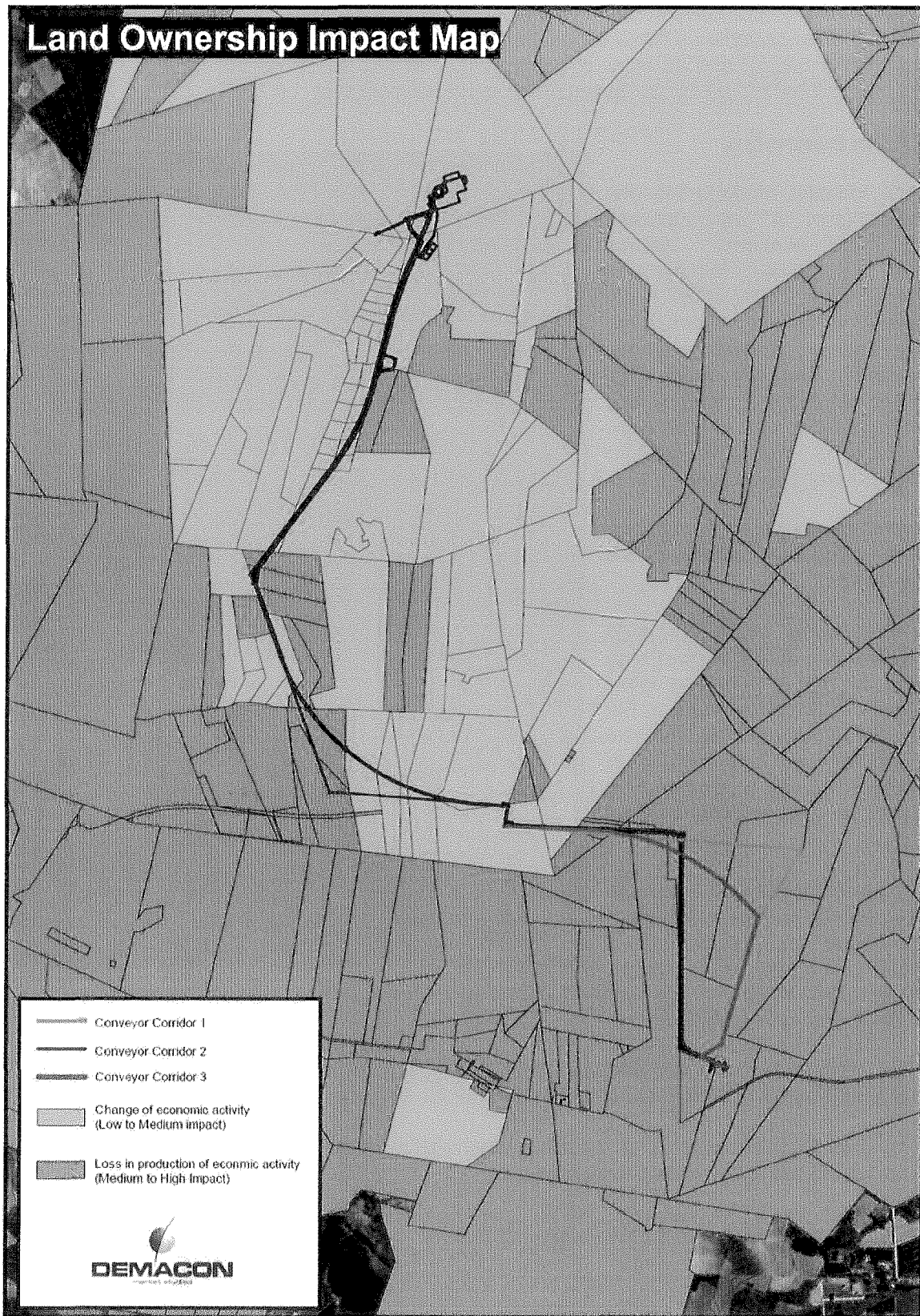


*Note: The **change in economic activity** refers to a change in income earned out of a different production method i.e. from rent to production of coal for the property owner.*

*Note: The **loss in production of an economic activity** refers to a permanent loss of a specific activity i.e. cultivation loss for the property owner.*

Map 3.4 shows the impact related to property ownership.

Map 3.4: Property Ownership Impact



**Findings:** The conveyor should as far possible be located on Anglo or Eskom property (the custodians of the project) in order to minimise the impact on private land ownership.

### 3. Configuration and land use

The conveyor is expected to have a different impact depending on the type of land use that takes place underneath or in close proximity it. Map 3.5 shows the current land uses that are found in and around the proposed conveyor route.

Land uses directly adjacent the route includes mining, natural vegetation and dry land cultivation. The following table illustrates the size of various land uses impacted by the conveyor. Note that the various alternatives are included in the table.

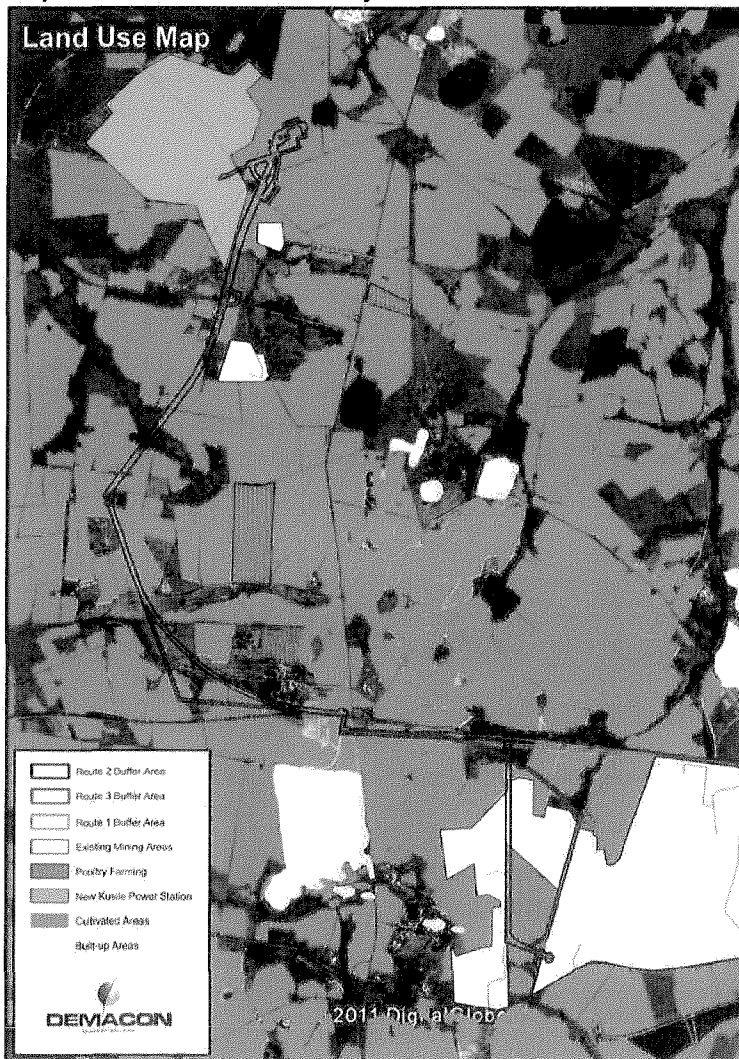
**Table 3.3: Land use impact per alternative route**

Site and Corridor	Cultivated Area (ha)	Natural Vegetation (ha)	Mining Area (ha)	Total Ha
Route 1-Blue & Orange	38	34	3	75
Route 2-Blue	38	31	6	75
Route 3-Blue & Pink	35	33	3	71

When the three corridors are compared, it is evident that Route 3 (Blue and Pink lines) is the shortest of the alternatives and most importantly cross the least amount of cultivated areas in the study area. From a land use perspective Route three is the most preferred.

Map 3.5 indicates the land uses affected by the conveyor development.

**Map 3.5: Land use in the study area**



The expected impact of the conveyor on various land uses are provided below.

Cultivation Areas

The value of properties is directly affected by the production that takes place on the land. As a result of the direct correlation it can broadly be stated that the impact of a conveyor development on the property value would impact on the production of the land. Table 3.4 shows the expected impact on property values and production on agriculture for the study area. The impact is only relevant on affected properties.

**Table 3.4: Impact on production and land value on agricultural property**

Type activity	Typical quantified impact on production	Typical impact on land value	Exceptions
Maize - dry land	0-3%	0-3%	Pivot Irrigation (3-5%)
Sunflower - dry land	0-3%	0-3%	Pivot Irrigation (3-5%)
Soya - dry land	0-3%	0-3%	Pivot Irrigation (3-5%)
Livestock	0-3%	0-3%	Pivot Irrigation (3-5%)
Drybeans - dry land	0-3%	0-3%	Pivot Irrigation (3-5%)
Groundnuts - dry land	0-3%	0-3%	Pivot Irrigation (3-5%)
Forestry	5-20%	5-20%	

The above table lists the main types of agricultural activities encountered within the study area. Although the type of cultivation differs from year to year depending on market prices, supply and demand and natural occurrences the activities listed in the table present the largest crop types.

The impacts are classified in five categories:

- Low - Where the impact is less than 0-3%
- Medium-Low - Where the impact is between 3-5%
- Medium - Where the impact is between 5 – 10%
- Medium-High - Where the impact is between 10-15%
- High - The impact is more than 15%

Mining Areas

The development of a conveyor will have no negative impact on mining activity when located in an area where the sediments have already been extracted. Given the location of the proposed conveyor the impact on mining activity is expected to be minimal.

Natural Vegetation

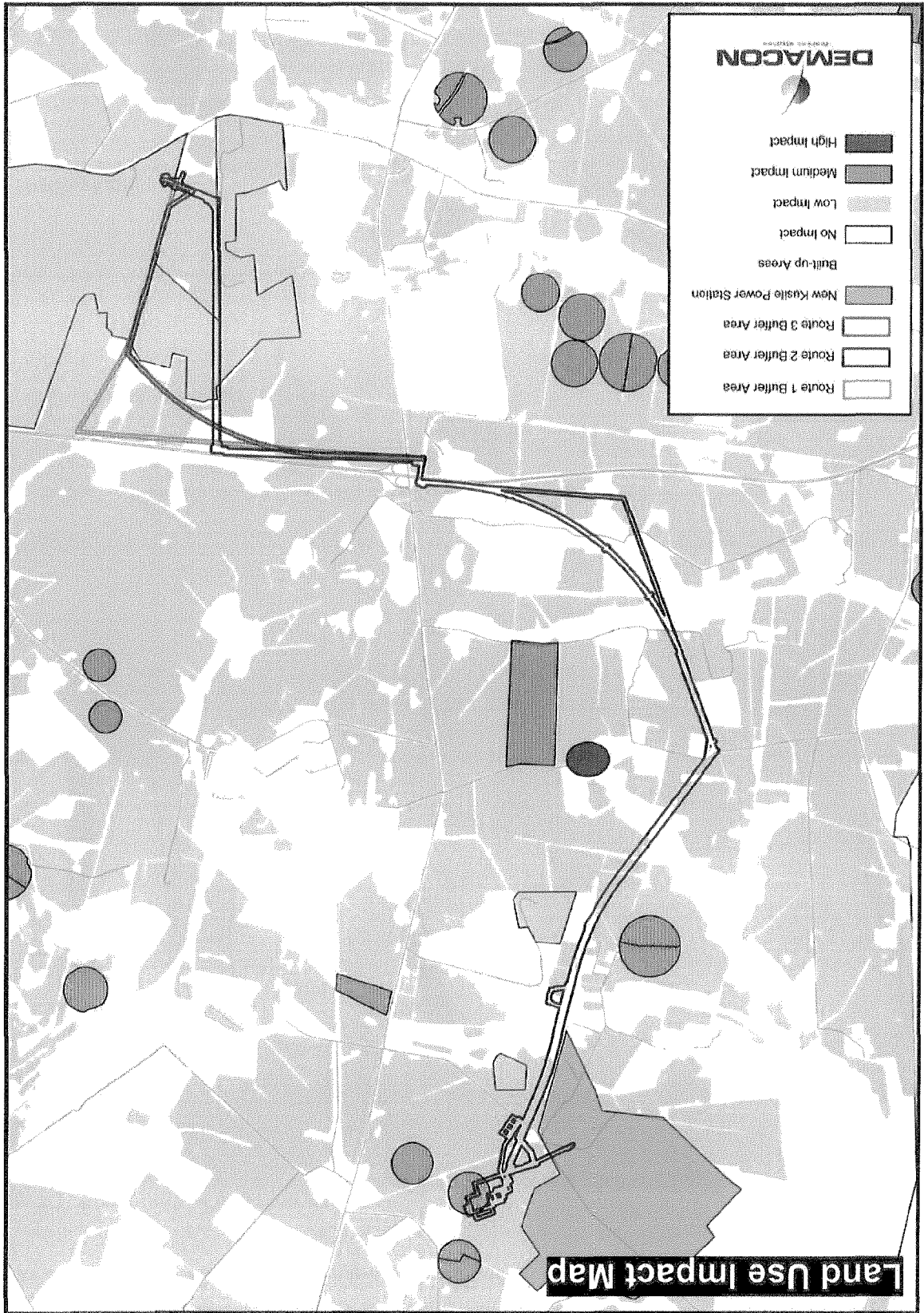
Natural vegetation in the study area has no to low economic value (this can use used as grazing areas). No economic impact is expected on natural vegetation.

Map 3.6 shows the economic impact associated with the land uses.

**Findings:** The area affected by the proposed conveyor route is predominantly used for cultivation, natural vegetation and a small portion of mining. Areas with no indicated land use are predominantly used for natural grazing or are just natural vegetation and these areas would have the lowest negative economic impact of all land uses. As a result it is the preferred land use for the conveyor to cross. The anticipated impact of the conveyor on the affected land uses is low.



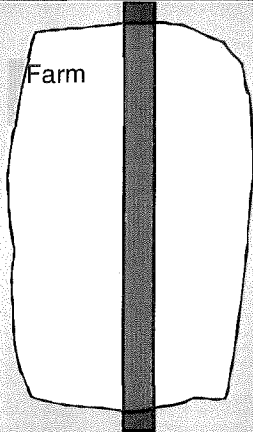
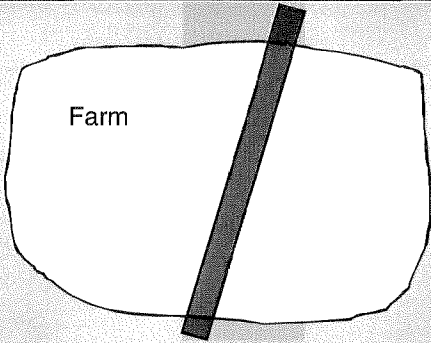
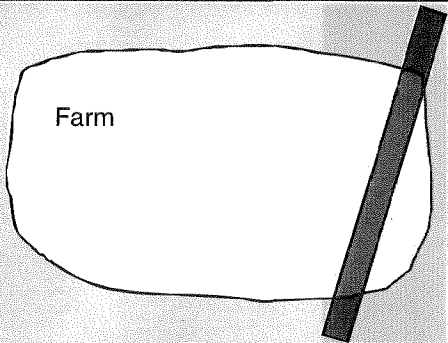
Map 3.6: Economic Impact per Land Use

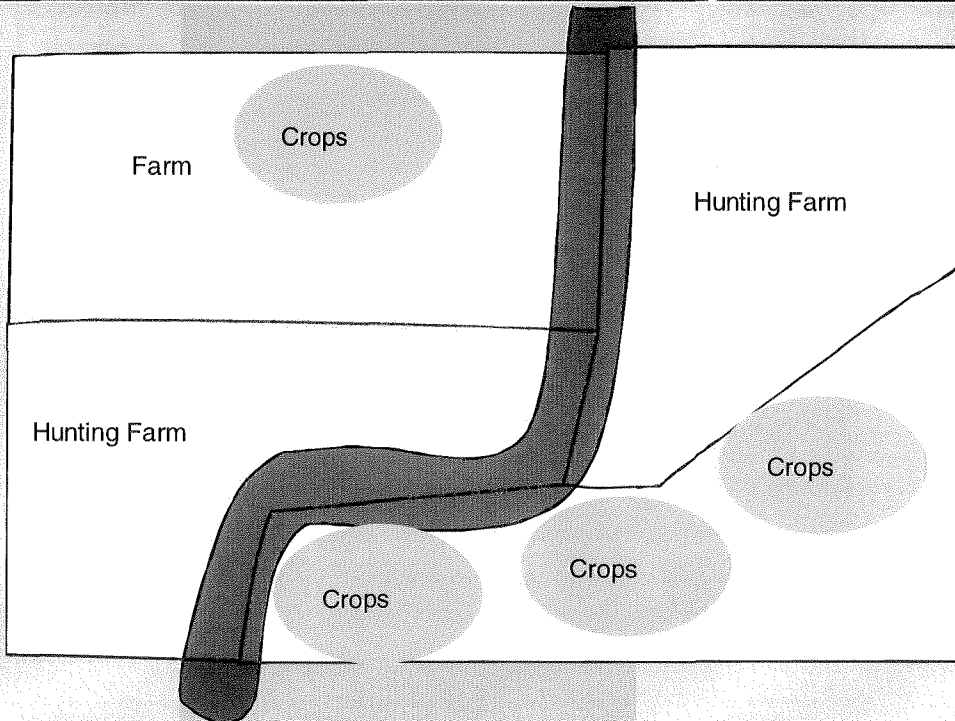


#### 4. Configuration and Farm shape

Diagram 3.1 illustrates how the placement of the conveyor can minimise impact on economic activity.

Diagram 3.1: Configuration and farm shape

Highest Impact	Medium Impact	Lowest Impact
Line crossing a farm in the length of the farm	Line crossing through the middle of the farm	Line crossing the farm on the boundary away from crops / animals
		
The impact is highest if a line crosses a farm in the length of the farm.	The impact is lower if a line crosses a farm in the breadth through the middle, rather than in the length in the middle.	The impact on the farm is lowest if it crosses at the border or adjacent already existing linear infrastructure, allowing economic activity to continue on the farm without obstructions.
Preferred location of the corridor through farm land		



Map 3.7: Configuration & Farm Shape Impact Map



The route will have a lower negative impact on economic activity if it crosses farms on the boundary. The impact would be higher when it crosses a farm in the length rather than the breadth (A line that cross a farm in the length 'cuts' the farm in 2 small long portions)

**Findings:** *It is evident from Map 3.7 that the conveyor is mostly located on farm boundaries and this reduces the negative impact of the conveyor. All effort should be made to reduce the impact and locate the conveyor on the boundary of farms or alongside existing linear infrastructure (such as roads or railway lines) to minimise the impact of the conveyor cutting farm portions into smaller areas.*

### 3.3.2 Conveyor Configuration Synthesis

- ✓ To minimise the negative economic impact of the conveyor it should preferably be located and **follow farm boundaries** and areas on farms where no economic activity takes place. The best route option should take this and other specialist inputs into consideration (interaction with farmers is important to determine the best possible route across affected farms)
- ✓ The **additional effect** of constructing a conveyor line adjacent an existing linear infrastructure, such as a road, will have a **diminishing** impact i.e. the adding of an additional linear infrastructure to an existing infrastructure corridor has a lesser effect on an already affected farm than the introduction of the same new conveyor would have on a newly affected farm
- ✓ Due to continual technological advances in crop production techniques, the negative impact is expected to realise only in the short term (12 to 24 months)

### 3.4 PREFERRED ALTERNATIVE

This section provides an analysis of the preferred alternative for the conveyor development. An analysis illustrating the best possible route for the conveyor development needs a multi-dimensional approach, as one single aspect alone would not be able to provide the best solution.

Some of the aspects that have been identified that would assist identifying the corridor and configuration include:

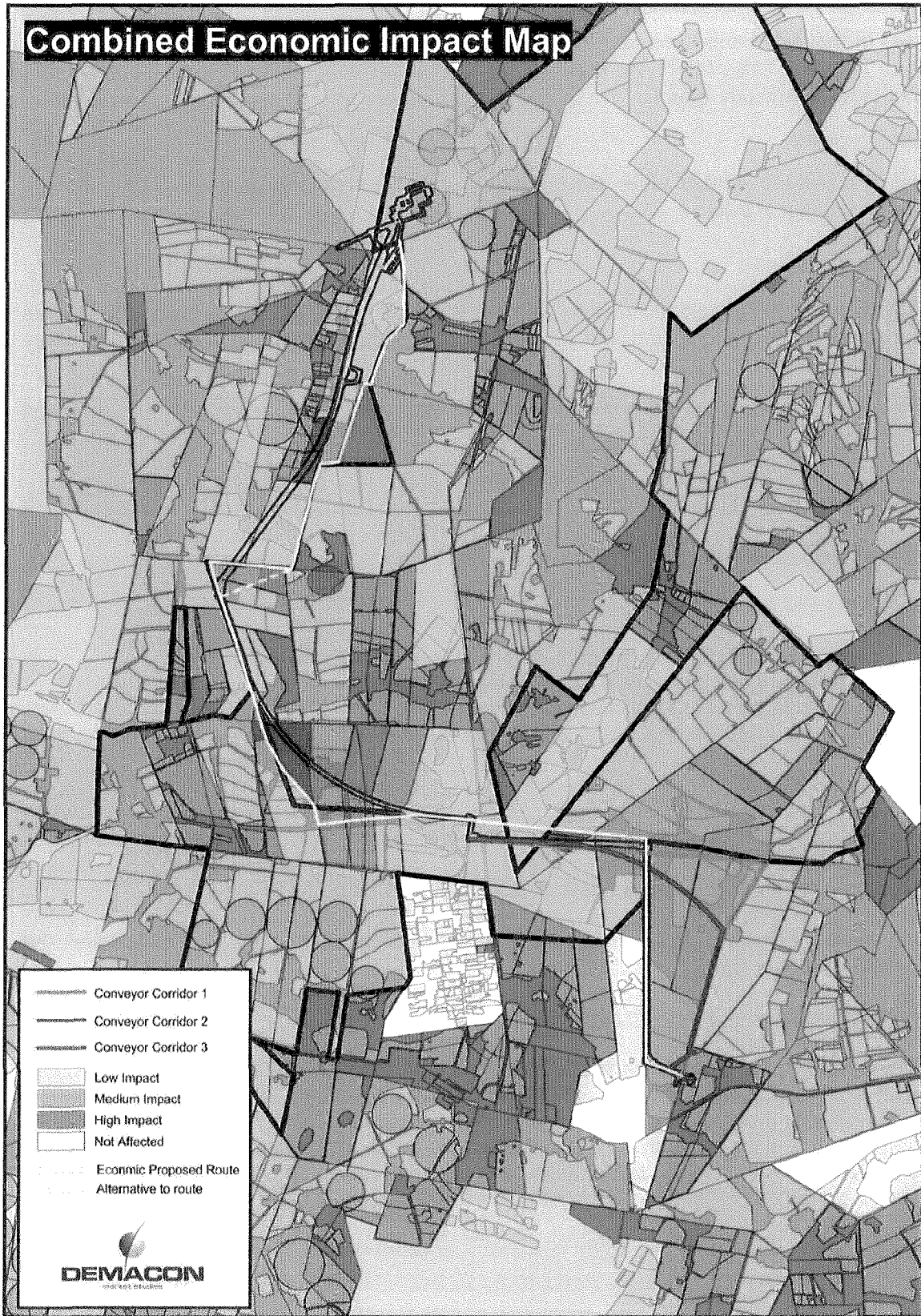
- The size of each farm in the corridors
- The configuration of such a farm in the corridors
- The type of economic activity that takes place on the farm
- The impact of a conveyor development on the activity
- The value of the activity to be affected

Map 3.8 is a combination of Maps 3.3 to 3.7. This map combines all the various aspects of the economic impact assessment. The map also shows the preferred alternative for the conveyor development.

An **additional deviation (yellow)** has been included in the analysis. This deviation takes the various impact aspects into consideration as mentioned above (land use, size and farm shape) and is **proposed as the preferred conveyor route** from an economic impact analysis.



Map 3.8: Combined Economic Impact Map with Alternatives



### ***Agriculture - crops***

According to the Agricultural Impact Assessment Report (Index, August 2011) the total loss in agriculture land that falls outside the mining area is roughly 30ha. It translates into a R183 000 loss in farming income per annum.

### ***Tourism / hunting***

No Tourism activity is located within the conveyor servitude area and as a result no impact is expected on tourism activity.

### ***Mining***

A small portion of mining land will have to be crossed by the conveyor. These mining areas has already been disturbed and mined and as a result no negative impact is expected on current mining activity.

*The preferred route from the three proposed routes is Option 2 (blue route).*

*A new route (yellow) is proposed with the lowest negative economic impact. The proposed route mostly follows the existing route and then the mining rights boundary.*

### **Conveyor Mitigation Measures**

#### *Mitigation measures for crop farming*

- ✓ The conveyor should preferably be constructed on open grassland areas
- ✓ Along the border of a farm where no crop activity takes place
- ✓ Interaction with farmer to discuss best alignment across farm
- ✓ Pivot irrigation and high intensity crop farming (GPS enabled) needs to be protected

#### *Mitigation measures for livestock farming*

- ✓ The conveyor should be constructed on the border of farms to limit the movement of livestock across/underneath the line
- ✓ Interaction with farmers to discuss best alignment across farm

Mitigation measures should reduce the impact on each of the land uses, and as a result the impact would not be as high.

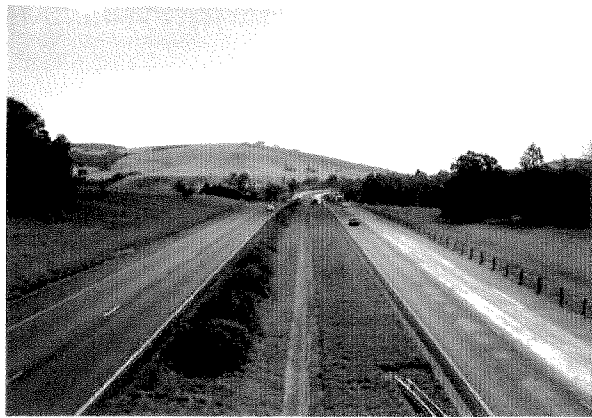
### **Impact Fundamentals - Linear Infrastructure**

Linear infrastructure is a necessary obstacle that protrudes in various natural and urban environments. Although criticized from various role players over time, this infrastructure forms a vital component that creates growth, job opportunities and service delivery in the modern era. As such these are critical elements that support the national economy and associated quality of life, hence the absolute necessity of the infrastructure elements, although regarded as negative by some. Some examples of these linear infrastructures in urban and rural areas are shown.

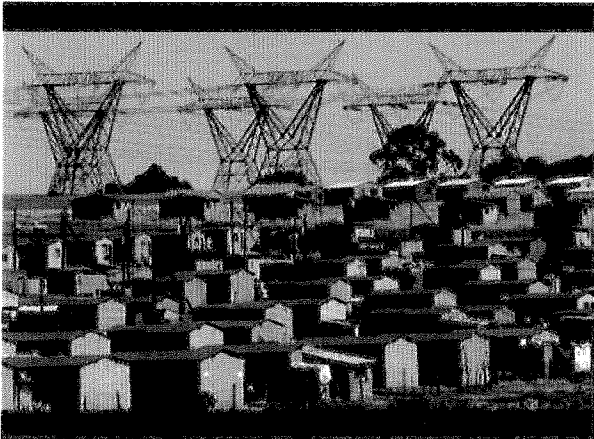
Highway in an urban environment



Highway in rural area



Power lines in urban areas



Power lines in rural area



Sewage pipe in urban area



Sewage pipe in rural area



These infrastructures create added economic value to production and service operations i.e. significant net benefit in the economy.



## CHAPTER 4: QUANTITATIVE ECONOMIC IMPACT ASSESSMENT

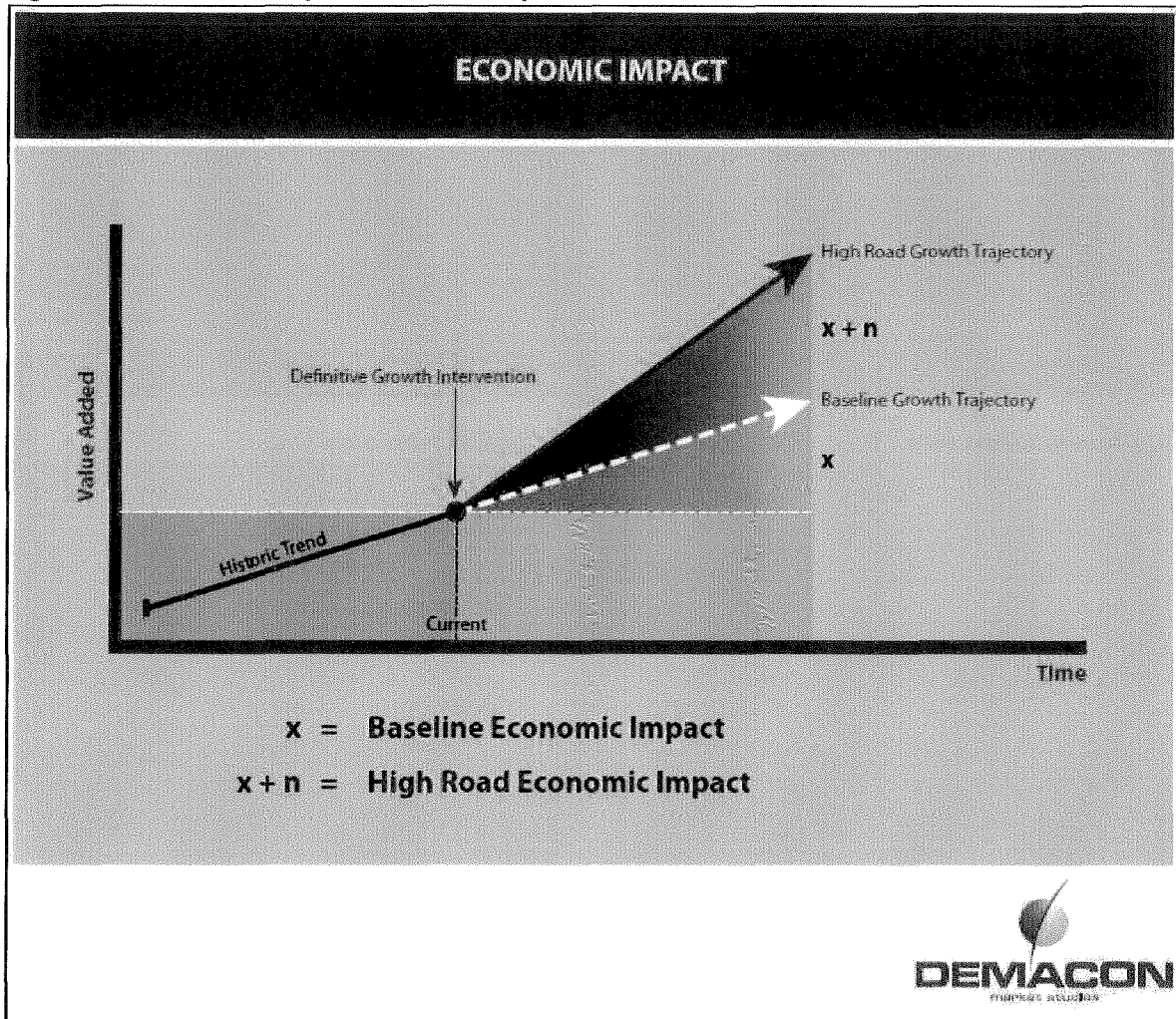
### 4.1 INTRODUCTION

The purpose of this section is to provide an economic impact assessment. The assessment illustrates the economic impact on a local, regional and national level. This process highlights the positive influence on business sales and employment during the construction and operational phase of such a project.

### 4.2 ECONOMIC IMPACT ASSESSMENT

The following figure conceptually illustrates the economic impact that the proposed development could have on the local economy in terms of additional GDP.

Figure 4.1: Economic impact of the development



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



Impacts are measured in terms of the following:

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

Diagram 4.1: Schematic Presentation of the Input-Output Table

	Intermediate Outputs	Final Demand	Total Production
<b>Intermediate Inputs</b>	<b>Quadrant I</b>	<b>Quadrant II</b>	
	X <sub>11</sub> X <sub>12</sub> .....	C <sub>1</sub> G <sub>1</sub> I <sub>1</sub> IC <sub>1</sub> E <sub>1</sub>	X <sub>1</sub>
	X <sub>21</sub> X <sub>22</sub> .....	C <sub>2</sub> G <sub>2</sub> I <sub>2</sub> IC <sub>2</sub> E <sub>2</sub>	X <sub>2</sub>
	X <sub>n1</sub> X <sub>n2</sub> .....	C <sub>n</sub> G <sub>n</sub> I <sub>n</sub> IC <sub>n</sub> E <sub>n</sub>	X <sub>n</sub>
	M <sub>11</sub> M <sub>12</sub> .....	M <sub>c</sub> M <sub>g</sub> .....	M <sub>n</sub>
<b>Primary Inputs</b>	<b>Quadrant III</b>	<b>Quadrant IV</b>	
	A <sub>1</sub> A <sub>2</sub> .....		A
	B <sub>1</sub> B <sub>2</sub> .....	V <sub>c</sub> V <sub>g</sub> V <sub>i</sub> V <sub>vic</sub> V <sub>e</sub>	B
	T <sub>1</sub> T <sub>2</sub> .....		T
<b>Total Production</b>	X <sub>1</sub> X <sub>2</sub> .....	C G I IC E	Z

Final demand (Y) can be presented by the following formula:

**Y = C + I + G + (X - Z) where:**

C: Private consumption expenditure  
 I: Gross domestic fixed investment  
 G: Government consumption expenditure  
 X: Exports  
 Z: Imports

Both the intermediate inputs as well as intermediate outputs for the different production sectors are shown in **Quadrant I**. This quadrant is usually referred to as the transaction table or transaction matrix and is an indication of the transfer of goods and services between the industrial sectors for production purposes.

The different final demand components as applied in the input-output table are shown in **Quadrant II**. Components of final demand are private consumption expenditure (C), government consumption expenditure (G), gross domestic fixed investment (I), change in inventories (IC) and total exports (E).

**Quadrant III** represents the demand for primary inputs by industrial sector. The elements of primary input, which are referred to are remuneration of employees (A), the gross operating surplus (B) as well as net indirect taxes (T).

**Quadrant IV** is that portion of primary input, which is part of final demand.

The linkage effects between the various sectors in the transaction matrix can be presented by  $x_{ij}$ , which shows the flow of goods from sector *i* to sector *j*. Subsequent paragraphs summarise results of the impact modeling performed for the construction and operational phases of the proposed project.

#### 4.2.1 Construction Phase Impacts

Table 4.1 indicates the capital expenditure underlining the development of the conveyor line.

**Table 4.1: Capital Expenditure**

Variable	Cost (R)
Capital Expenditure (CAPEX)	R1.4 billion

Source: Anglo, 2011

These figures will represent the base inputs for the impact modelling exercise: CAPEX to estimate the once-off impact of the construction phase of the project.

The subsequent paragraph indicates the anticipated economic impacts (direct, indirect and induced) that will result from the construction phase of the power lines project. It is important to note that these impacts are once off and not sustained annual impacts. The impacts will fade away after the construction of the conveyor.

Table 4.2 summarises the findings of the impacts of the construction phase of the power lines.

Subsequent calculations assume the development of the full spectrum of existing and proposed rights. Note: New Business Sales (NBS), Gross Geographic Product (GGP) and Employment (Empl).

**Table 4.2: Economic Impacts of Capital Investment. NBS and GGP – Rand**

VARIABLE	DIRECT IMPACT	INDIRECT IMPACT	INDUCED IMPACT	TOTAL IMPACT
Additional Business Sales	1 406 022 000	8 579 000	554 264 000	1 968 865 000
Additional GGP	785 279 000	3 688 000	85 073 000	874 040 000
Additional Employment	1 500	100	1 100	2 700

Source: Demacon Economic Impact Model, 2011

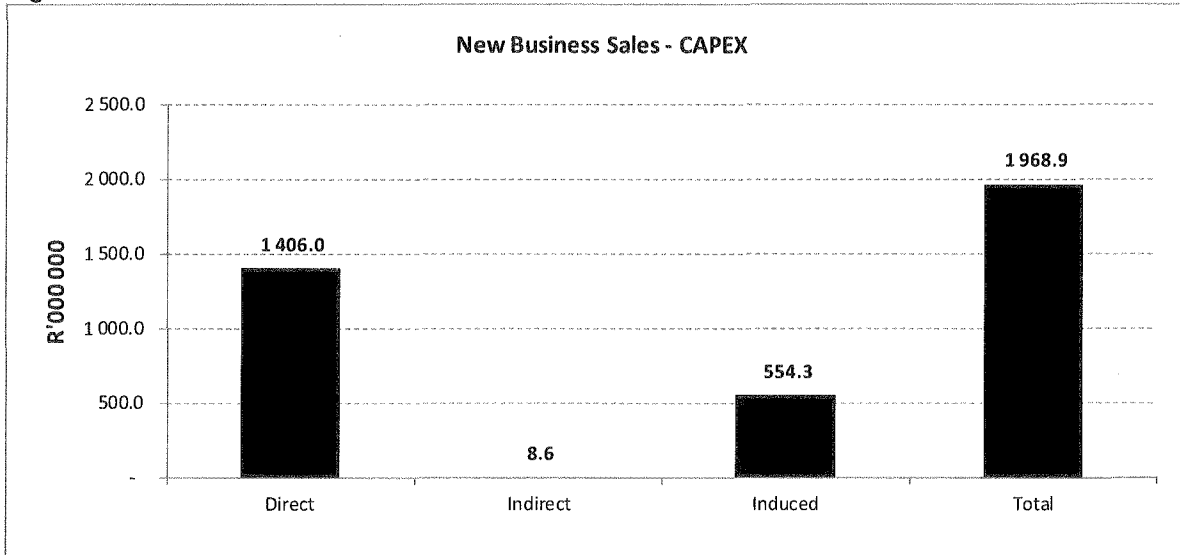


VARIABLE	CAPITAL EXPENDITURE	TOTAL IMPACT
Additional Business Sales		R1.968 billion
Additional GGP	R1.406 billion	R874 million
Additional Employment		2 700 jobs

Source: Demacon Economic Impact Model, 2011

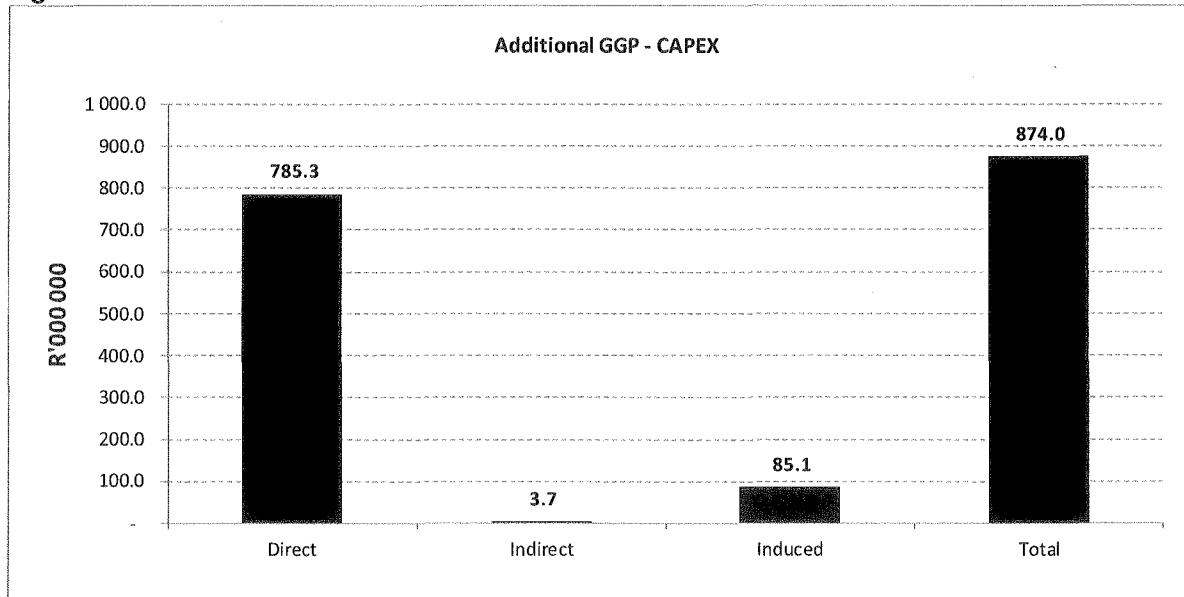
The impact in terms of the construction phase is indicated in the table above and reflected in the subsequent figures. It is also important to understand that this impact refers to the **formal and informal sectors** of the economy.

Figure 4.2: New Business Sales – CAPEX



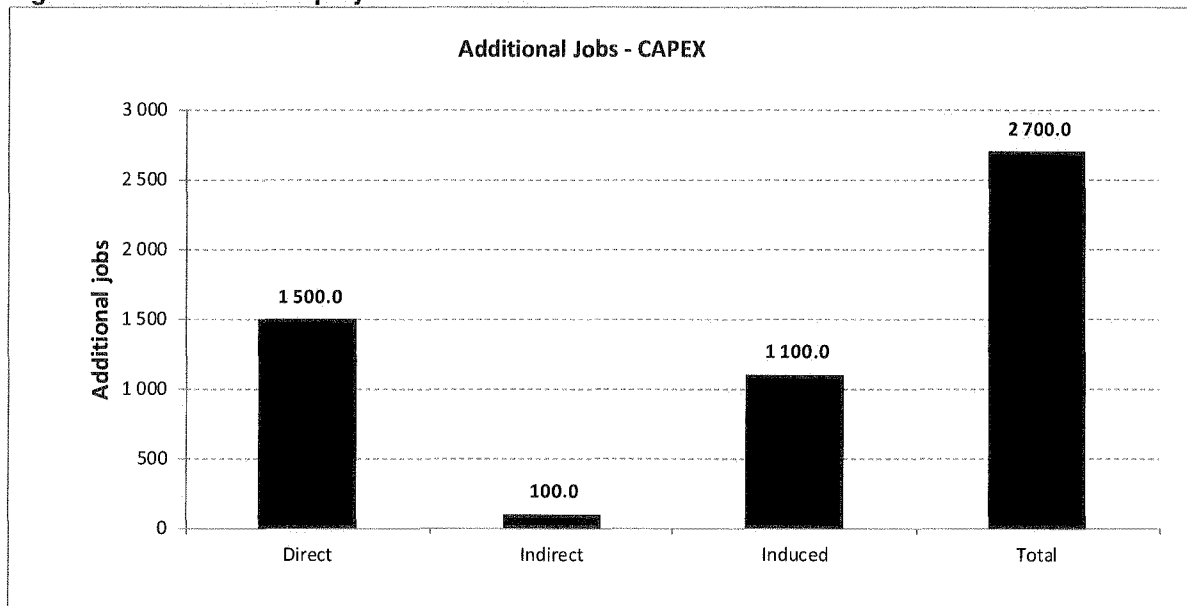
Demacon Economic Impact Model, 2011

Figure 4.3: Additional GGP – CAPEX



Demacon Economic Impact Model, 2011

Figure 4.4: Additional Employment – CAPEX



Demacon Economic Impact Model, 2011

**Findings:**

- **New business sales:** During the construction phase of the proposed conveyor, business sales with reference to certain products and professional services will increase. It is evident that the capital investment of R1.4 billion will result in the creation of R1.4 billion direct additional business sales (within the local region), R 8.6 million indirect business sales (larger area and country), resulting in an induced impact of R 554 million business sales. Overall the total value of additional business sales leveraged by the capital investment amounts to R1.968 billion.
- **Additional GGP:** during the construction phase certain goods and services will be produced or provided within the specific geographic area. The capital investment of R1.4 billion will result in the creation of additional GGP – R785 million direct additional GGP, R 3.6 million indirect additional GGP and R85 million additional induced GGP. In total the capital investment will contribute to the leverage of R874 million additional GGP within the country.
- **Additional Employment:** the construction phase of the project will be relatively labour intensive, resulting in the creation of a number of temporarily employment opportunities – on site, within the district and larger region. The capital investment will result in the creation of 1 500 direct employment opportunities, 100 indirect and 1 100 induced employment opportunities. This results in a total of 2 700 temporarily additional employment opportunities.

**4.2.2 Operational Phase Impacts**

The investment geared to improve electricity supply in South Africa would create economic opportunity such as additional employment and related downstream opportunities in the local and national economy. In this regard the conveyor in its own does not create huge economic benefits, although technical professionals would have to do periodic maintenance to the line, which could create some new jobs. The benefit is evident in the additional economic activities that would be generated from the conveyor development.

### **Gross Value Added (GVA) & Employment**

According to the agriculture impact assessment (Index, 10 August 2011) the loss in net farming income (NFI) as a result of the conveyor development for the specific portion of the farm affected (i.e. not the entire farm but only a portion) is estimated at R2 440 per ha, this translates into a farming income loss of R183 000 per annum (for the entire route 2 – blue line of 75ha).

According to the national accounts the coefficient for net farm income (NFI) to GVA is 1.74. Therefore a loss of R183 000 NFI is estimated to be a R318 309 loss in gross value added (GVA) for the agriculture sector.

This translates in an employment loss of approximately 5 jobs. However this could be reduced by locating the conveyor on farm boundaries and away from cultivated land, thereby mitigating the negative impact on agriculture production.

The estimated permanent jobs created by the conveyor during the operational phase are 16. The long term benefit of the project outweighs the short term losses in GVA and employment in the agriculture sector with continual technological advances in crop production techniques. Agriculture production is expected to increase over the short term (12 – 36 months) as a result of these improvements.

### **Fixed Capital Investment**

A total of R1.4 billion will be spent on the construction of the conveyor, representing new fixed capital investment in the local economy.

According to the national accounts the coefficient for GVA to Fixed Capital Investment is 3.77. Therefore a loss of R318 309 GVA is estimated to be a R1.2 million loss per annum in fixed capital investment for the agriculture sector.

This investment in the conveyor development is 1 000 times more than the anticipated investment in the agriculture sector for the affected farm portions. This highlights the net gain that this conveyor development adds as a value-chain development to the entire project.

This project forms part of a much larger value chain for electricity production in South Africa. The conveyor development is an investment of R1.4 billion, and represent a small investment when compared to the New Largo Cola Mine and Kusile Power Station that will invest R90 billion in the local and national economy. All these projects are needed to ensure that electricity supply is increased to facilitate economic growth for the national economy.

## **4.3 SYNTHESIS**

The industry sectors (including manufacturing and mining) are the largest consumers of electricity. The continued supply of electricity is important for an economy to produce long term growth. The planned conveyor development would ensure inputs are provided to generate electricity and contribute towards the sustained supply of electricity needed for economic growth and development.

Asgisa targets has been put at 6% growth for the South African economy meaning that growth in the utilities sector is non-negotiable in order to sustain economic growth within the national economy.

The long term benefit would off-set the small decrease in the available arable land for agriculture production in the study area.

## CHAPTER 5: RECOMMENDATIONS

### 5.1 INTRODUCTION

The purpose of the study was to perform a comprehensive, specialist economic impact assessment to determine the anticipated economic net benefits and losses of the proposed conveyor development to the affected region.

The growth of the national economy has prompted an increase in electricity production in order to cater for the growing national economy. This growth in electricity demand therefore creates a scenario where the trade-off or opportunity cost between industry, agricultural land and the environment is a fundamental part of development.

### 5.2 ECONOMIC IMPACT ASSESSMENT & RECOMMENDATIONS

This section provides a summary of the findings of the preferred alternative for the conveyor development.

An analysis illustrating the best possible route for the conveyor development needs a multi-dimensional approach, as one single aspect alone would not be able to provide the best solution. Some of the aspects that have been identified that would assist identifying the corridor and configuration include:

- The size of each farm in the corridors
- The configuration of such a farm in the corridors
- The type of economic activity that takes place on the farm
- The impact of a conveyor development on the activity
- The value of the activity to be affected

Map 5.1 combines all the various aspects of the economic impact assessment. The map also shows the preferred alternative for the conveyor development.

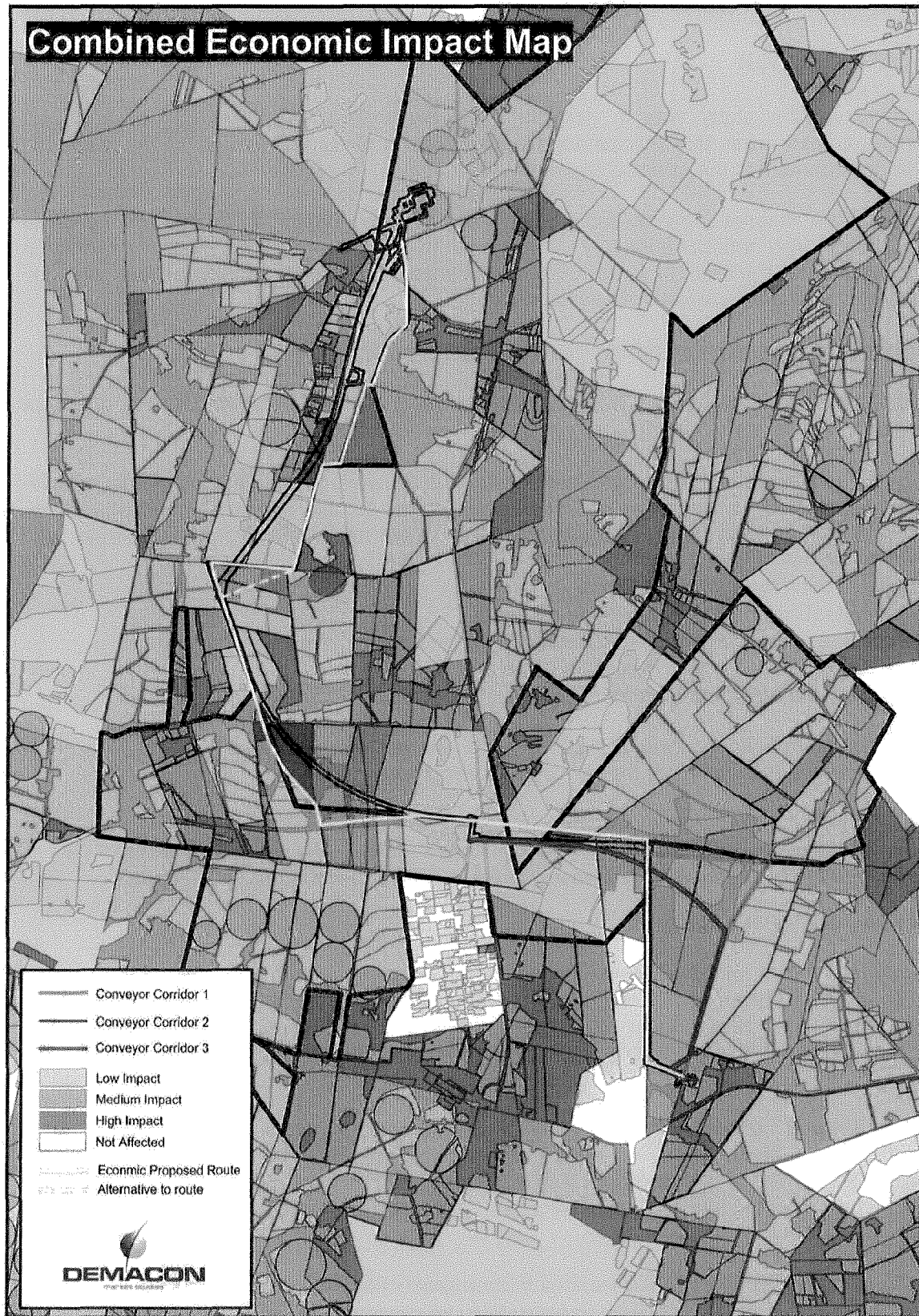
An **additional deviation (yellow)** has been included in the analysis. This deviation takes the various impact aspects into consideration as mentioned above (land use, size and farm shape) and is **proposed as the preferred conveyor route** from an economic impact analysis.

#### 5.2.1 Route Recommendations

- ✓ To minimise the negative economic impact of the conveyor it should preferably be located and **follow farm boundaries** and areas on farms where no economic activity takes place. The best route option should take this and other specialist inputs into consideration (interaction with farmers is important to determine the best possible route across affected farms).
- ✓ The **additional effect** of constructing a conveyor line adjacent an existing linear infrastructure, such as a road, will have a **diminishing** impact i.e. the adding of an additional linear infrastructure to an existing infrastructure corridor has a lesser effect on an already affected farm than the introduction of the same new conveyor would have on a newly affected farm
- ✓ Due to continual technological advances in crop production techniques, the negative impact is expected to realise only in the short term (12 to 24 months)



Map 5.1: Combined Economic Impact Map with Alternatives





### ***Agriculture - crops***

According to the Agricultural Impact Assessment Report (Index, August 2011) the total loss in agriculture land that falls outside the mining area is roughly 30ha. It translates into a R183 000 loss in Farming income per annum.

### ***Tourism / hunting***

No Tourism activity is located within the conveyor servitude area and as a result no impact is expected on tourism activity.

### ***Mining***

A small portion of mining land will have to be crossed by the conveyor. These mining areas have already been disturbed and mined and as a result no negative impact is expected on current mining activity.

*The preferred route from the three proposed routes is Option 2 (blue route).*

*A new route (yellow) is proposed with the lowest negative economic impact. The proposed route mostly follows the existing route and then the mining rights boundary.*

### **Impact Fundamentals**

Linear infrastructure is a necessary obstacle that protrudes in various natural and urban environments. Although criticized from various role players over time, this infrastructure forms a vital component that creates growth, job opportunities and service delivery in the modern era. As such these are critical elements that support the national economy and associated quality of life, hence the absolute necessity of the infrastructure elements, although regarded as negative by some.





the **dedet**

Department:  
Economic Development, Environment and Tourism  
MPUMALANGA PROVINCIAL GOVERNMENT

**Details of specialist and declaration of interest in respect of an application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010**

**PROJECT TITLE**

Phola-Kusile Coal Conveyor

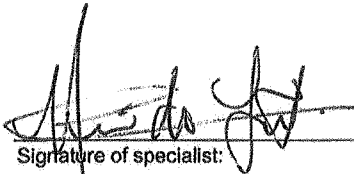
<b>Specialist:</b>	Hein du Toit		
<b>Nature of specialist study compiled:</b>	Economic Impact Assessment		
<b>Contact person:</b>	Hein du Toit		
<b>Postal address:</b>	PO Box 95530, Waterkloof, Pretoria		
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<b>Qualifications &amp; relevant experience:</b>	17 years field related experience - MSc Real Estate; BTRP; Certificate in Shopping Centre Management		
<b>Professional affiliation(s) (if any)</b>	SAPI; SAPOA; SACSC		

## The specialist appointed in terms of the Regulations

I, Hein du Toit declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.




Signature of specialist:

Demacon Market Studies

Name of company:

27.9.2011

Date:



Signature of Commissioner of Oaths

27/9/2011

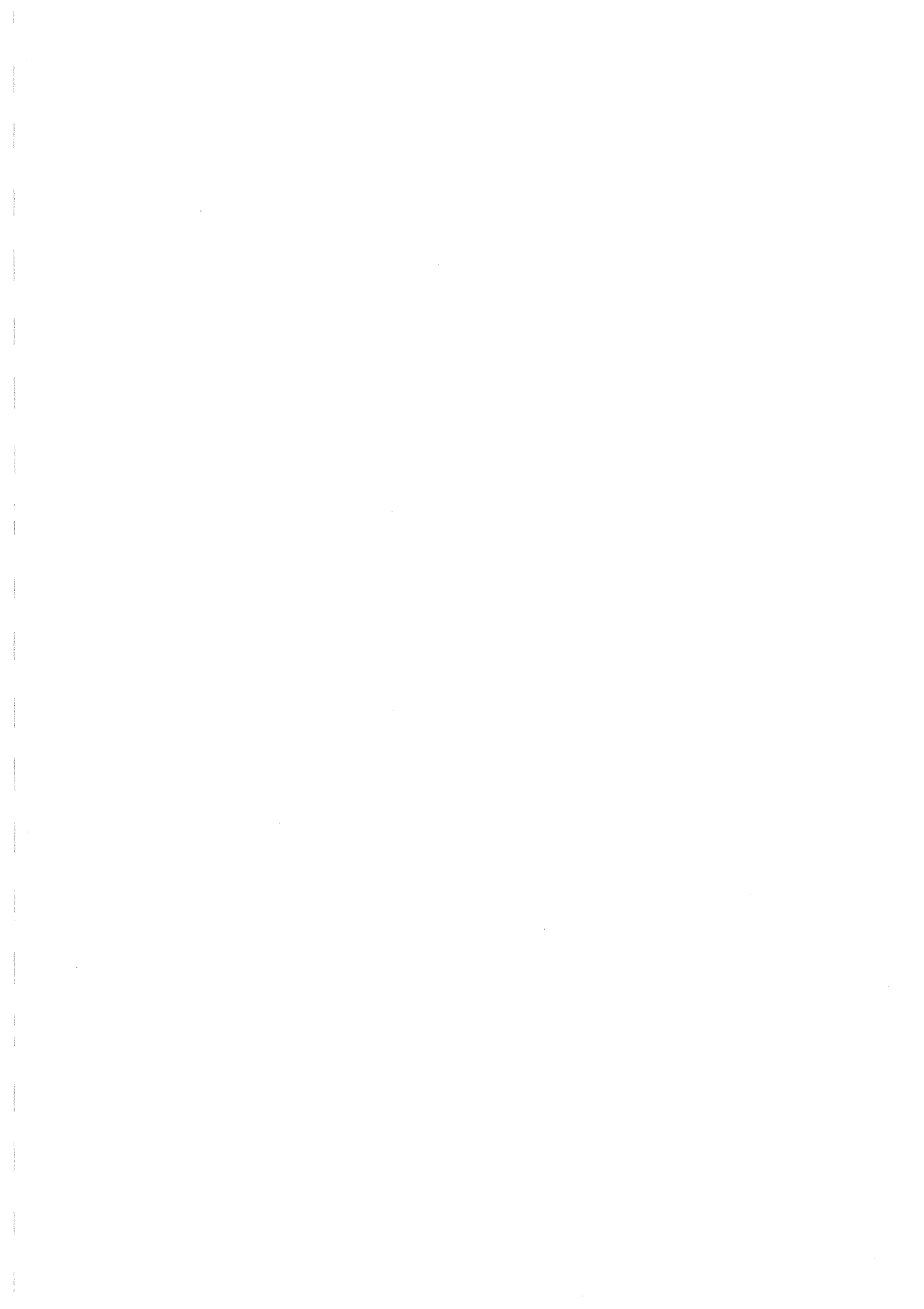
Date:

Designation:

Official stamp (below)

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**Appendix P:  
Agricultural and Land Use Potential  
Specialist Assessment**



### Structuring of the Specialist Studies in terms of GNR 543 Section 32 Requirements

Legal and Regulatory Requirement	Cross Reference to Report Section
<b>GNR 543 Section 32</b>	
<b>Specialist reports and reports on specialized processes</b>	
1. An applicant or the <u>EAP</u> managing an application <u>may appoint a person to carry out a specialist study</u> or specialized process.	Appendices to the EIA main report
2. The person referred to in sub-regulation (1) must comply with the requirements of regulation 17 [declaration of independence]	Declaration of independence signed by specialists provided at back of each specialist report
3. A specialist report or a report on a specialized process prepared in terms of these Regulations must contain-	
(a) Details of- (i) the <u>person who prepared the report</u> ; and (ii) the <u>expertise of that person to carry out the specialist study</u> or specialized process;	Attached as annexure
(b) A <u>declaration that the person is independent</u> in a form as may be specified by the competent authority;	Declaration of independence signed by specialists provided at back of each specialist report
(c) An <u>indication of the scope</u> of, and the purpose for which, the report was prepared;	Paragraph 1: Background
(d) A description of the <u>methodology</u> adopted in preparing the report or carrying out the specialized process;	Paragraph 1: Background
(e) A description of any <u>assumptions</u> made and any uncertainties or <u>gaps</u> in knowledge;	Paragraph 1: Sources of information
(f) A description of the <u>findings</u> and <u>potential implications of such findings</u> on the impact of the proposed activity, including identified alternatives, on the environment;	Paragraph 7: Recommendations
(g) <u>Recommendations</u> in respect of any <u>mitigation measures</u> that should be considered by the applicant and the competent authority;	Provided in each specialist report, where relevant
(h) A <u>description of any consultation process</u> that was undertaken during the course of carrying out the study;	Consultation Process discussed in EIA main report
(i) A <u>summary and copies of any comments</u> that were received during any consultation process; and	All issues received to date included in Section 6 of the EIA main report
(j) Any other <u>information requested by the competent authority</u> .	Not applicable





# NEW LARGO PROJECT

Agricultural Economic Study (ARC) for the New Largo Project  
and the Phola-Kusile Coal Conveyor

SYNERGISTICS ENVIRONMENTAL SERVICES (PTY) LTD

August 10, 2011

Authored by: INDEX

EIA REFERENCE: S0403-PK&NLC-ARC-01- Agricultural-Economic-Study)

# NEW LARGO PROJECT

## Agricultural Economic Study (ARC) for the New Largo Project and the Phola-Kusile Coal Conveyor

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# Agricultural Economic Study (ARC) for the New Largo Project and the Phola-Kusile Coal Conveyor

## 2 Background

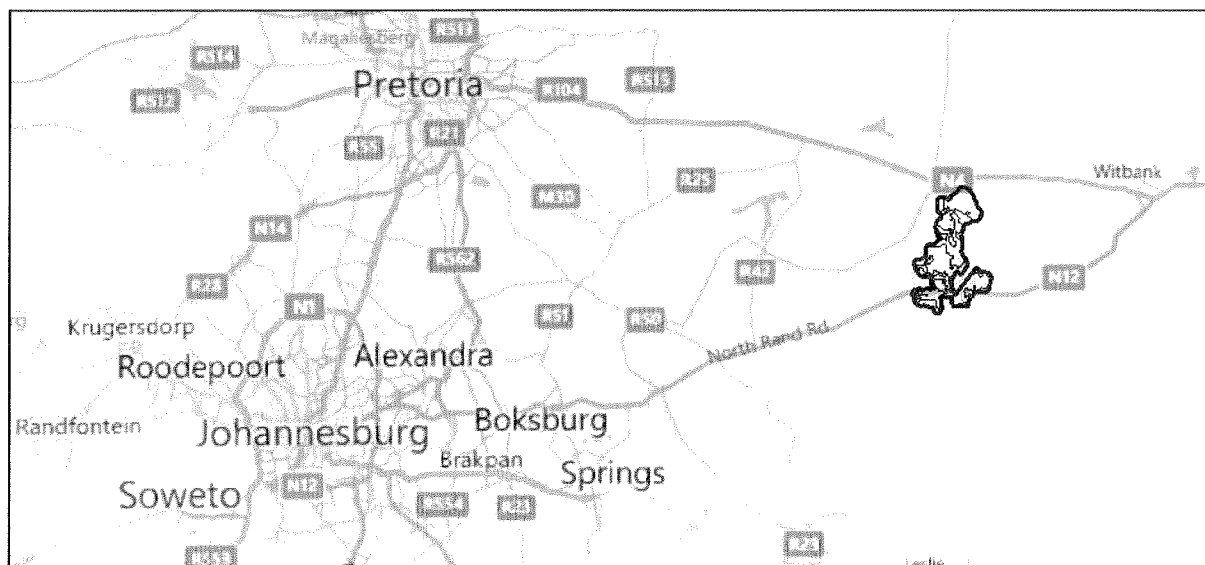
Index was appointed by Synergistics Environmental Services to do an economic study regarding the farming enterprises of land proposed for coal mining.

The output of the report is as follows:

- Discussion of the natural resources that influences agricultural potential;
- Discuss trends in farming and the potential for different enterprises;
- Indicate the potential income from main enterprises; and,
- Indicate the financial impact of the development on the farmers.

The proposed mining site straddles the link road between Balmoral and Ogies in the western part of Mpumalanga Province. The investigated area is about 12 079 hectares.

FIGURE 1: LOCALITY



## 3 Sources of information

Extensive use was made of the following documents:

- Appendix 2 – New Largo Soils study Report;
- Appendix 5 – New Largo Surface Water Study;
- Enterprise budgets, Computus Management Information (Pty) Ltd. 2010;
- Trends in the Agricultural Sector 2010, Department of Agriculture Forestry and Fisheries

Detail on the present land use is currently lacking, and for that reason liberal use was made of satellite imagery. The implication is that enterprises like hydroponics, poultry and pork production could not be picked up and was therefore not included in the financial impact. More detail on land use will be worked into the final report. Further, the duration of the mining action and rehabilitation until the land is again returned fully productive was assumed as 10 years after mining ceased.

## 4 Present land use

The extent and distribution of the present use of land for farming was made from a reconnaissance site visit followed by detailed interpretation of satellite images. The data was then captured on GIS and mapped to find land use patterns. More detail on land use, collected by Synergistics, will be worked into the final report.

The vast majority of land is under rainfed crop production. Livestock is incorporated and utilise stover and other fodder during the post harvest period. Crops produced are, among others, maize, dry beans, sunflower groundnuts and potatoes. It appears that some of the land previously cultivated, especially in the northern parts, has been left fallow or have recently been planted to pastures. Irrigated farming occurs more concentrated in the southern portion of the site where water is pumped to centre pivot irrigation systems from the Vandykspruit and other tributaries of the Elands River.

There are a number of poultry units in the central portion of the area.

FIGURE 2: LAND USE PATTERNS

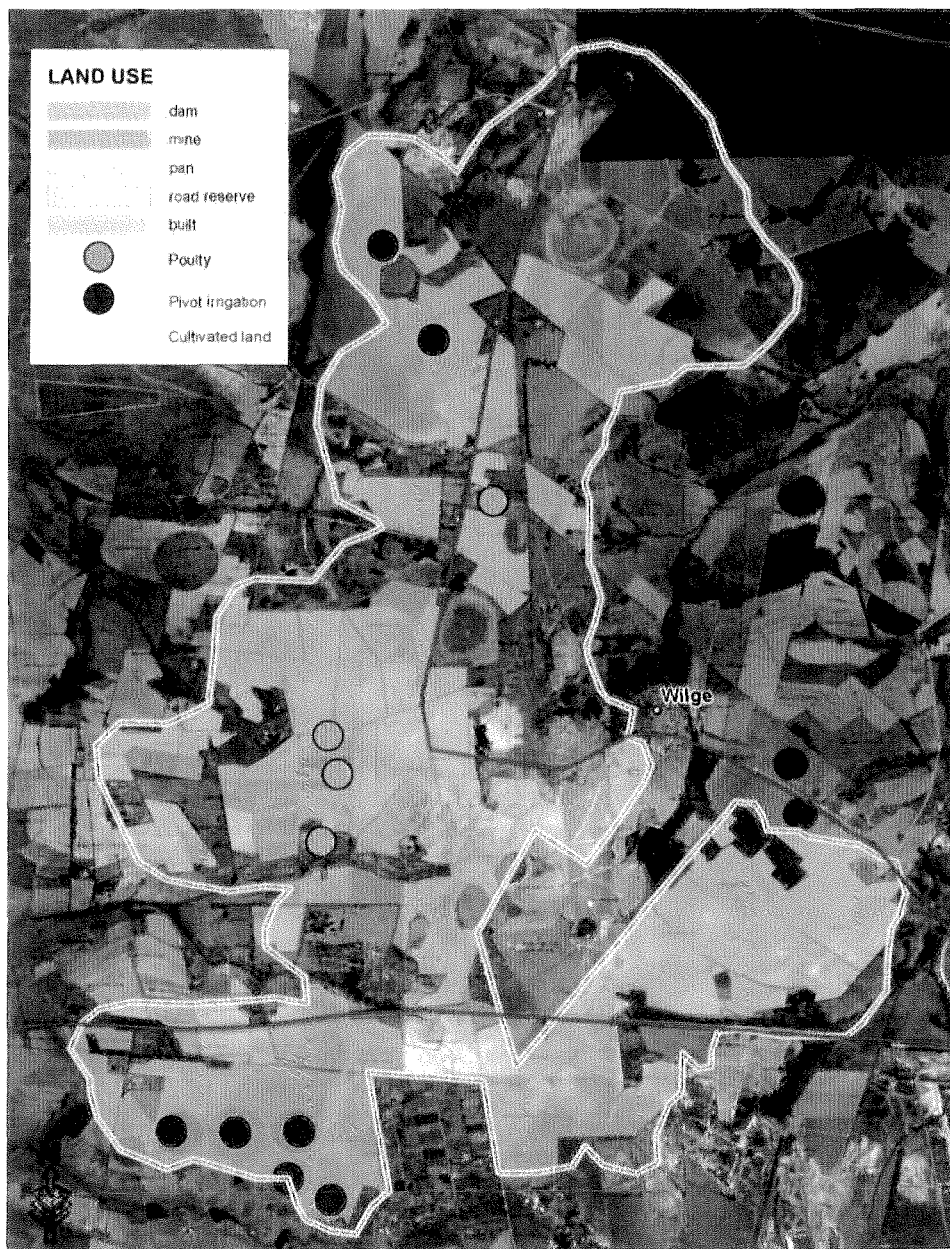


TABLE 1. LAND USE TABLE

Land use	Description	Area (hectare)
Total cultivated land	This includes cultivated land and pastures. The boundaries were delineated from Google satellite images.	6 815
Irrigated land	Data was obtained from the Surface Water Study. The figure may be inflated but it is the only value documented. Crops produced are potatoes and maize (grain and green mielies).	917
Rainfed crops	Major crops produced include maize, groundnuts, and beans.	5 898
Veld grazing	Includes pastures and veld.	2 766
Poultry	Poultry on commercial scale.	50
Non farming	Pans, watercourses, mines and road reserves. This land is not available for farming.	799
<b>TOTAL FARMING</b>		<b>9 631</b>
<b>TOTAL</b>		<b>10 430</b>

## 5 Natural resources – baseline condition

### 5.1 Climate

#### 5.1.1 Regional overview

- The site falls in the summer rainfall region of South Africa;
- Frost can be expected for 88 to 110 days of the year, somewhat higher than to the north of the site. The southern portion is more prone to frost and can expect 40 to 50 occurrences of frost per year compared to 30 to 40 in the north;
- The assured rainfall increases towards the east from about 525 mm in the growing season of summer crops to 575 mm at Ogies and Clewer; and,
- Hail is a common occurrence.

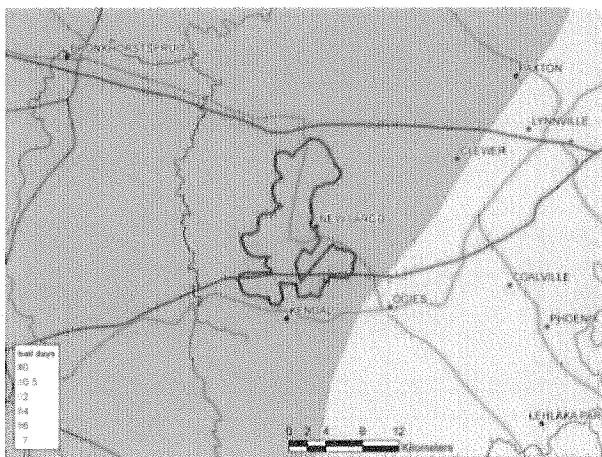


FIGURE 3. HAIL DAYS

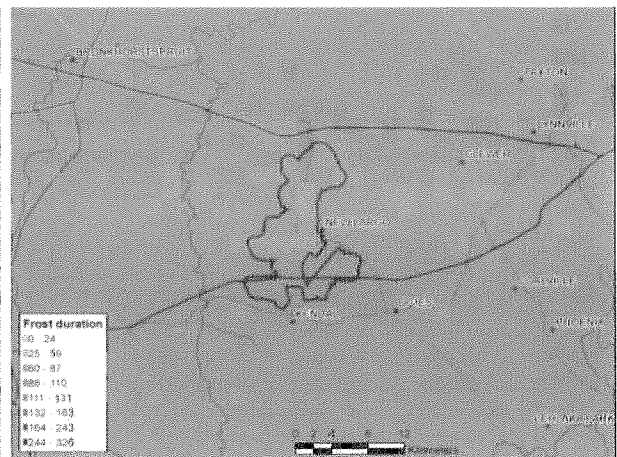


FIGURE 4. PERIOD IN WHICH FROST CAN BE EXPECTED

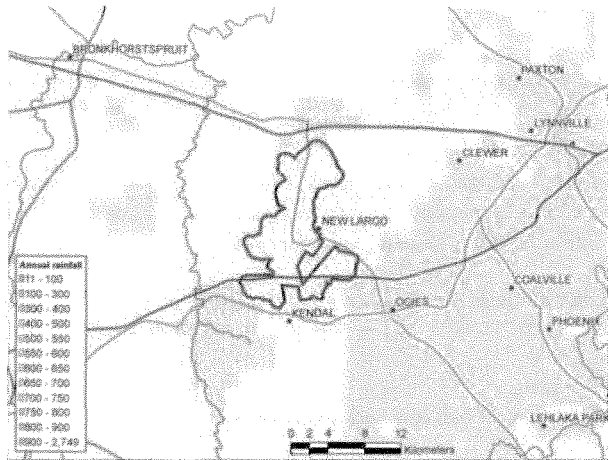


FIGURE 5. ANNUAL RAINFALL

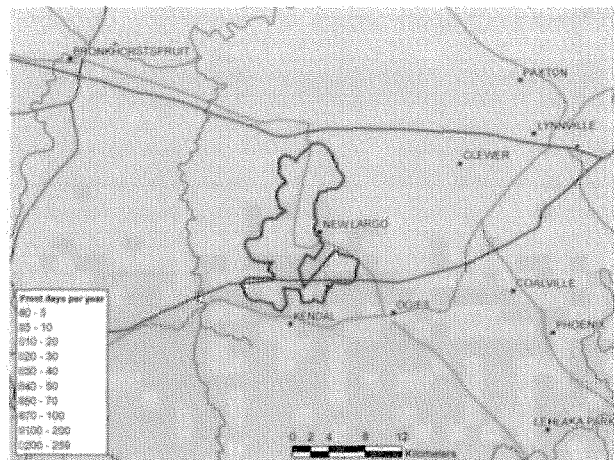


FIGURE 6. NUMBER OF DAYS WITH FROST

### 5.1.2 Rainfall

The average annual rainfall is around 700 mm that falls in a typical summer rainfall pattern that commences in October, peaks in January and lasts till April (see Figure 7).

TABLE 2. AVERAGE ANNUAL RAINFALL

Station Name	Distance (Km)	Years Recorded	Latitude	Longitude	Map(mm)	Altitude (m)
Wilgerivier (SAR)	10.5	94	25 49	28 51	697	1 380
Blesbokfontein	12.1	35	25 57	28 48	722	1 479
Kleinwater	18.0	39	25 48	29 02	654	1 480
Bronkhorstspuit (Mun)	21.0	92	25 48	28 44	644	1 408
Ogies (Pol)	22.9	92	26 03	29 03	745	1 584
Clewer (SAR)	25.2	54	25 54	29 08	724	1 525

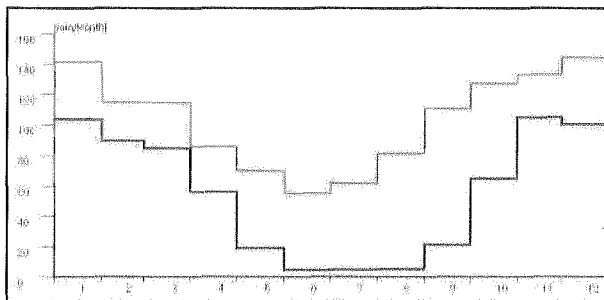


FIGURE 7. MONTHLY RAINFALL DISTRIBUTION

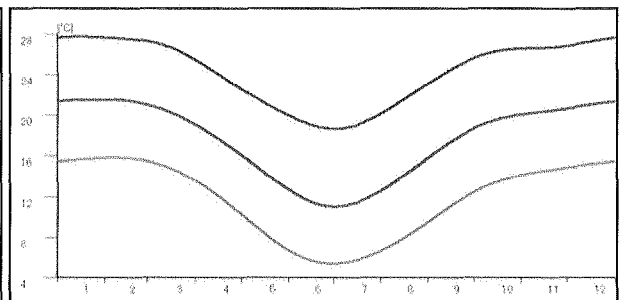


FIGURE 8. MONTHLY MAXIMUM, AVERAGE AND MINIMUM TEMPERATURES

### 5.1.3 Temperature

The site is located on the central northern Highveld that experiences moderate summer temperatures and cold winters. Average highest temperatures are in December and January when 28°C is reached. This gradually diminishes to around 7°C in mid-winter.



Frost is common in winter and can occur from as early as April to as late as September. Flash colds later are also possible and can cause crop damage.

The predominant wind direction is from the west-north-west and less frequently from the south. Daytime has wind predominantly from the north-west while at night the winds blow from the east. Night time conditions also reflect a decrease in wind speeds and an increase in calm conditions.

The average wind speed increases from August and reaches its peak in October. Autumn is relatively free of wind still.

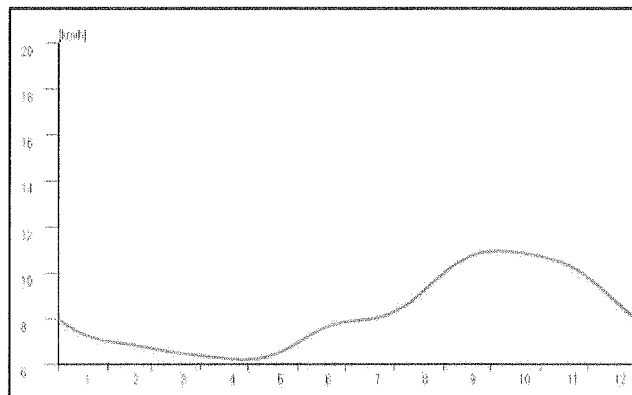


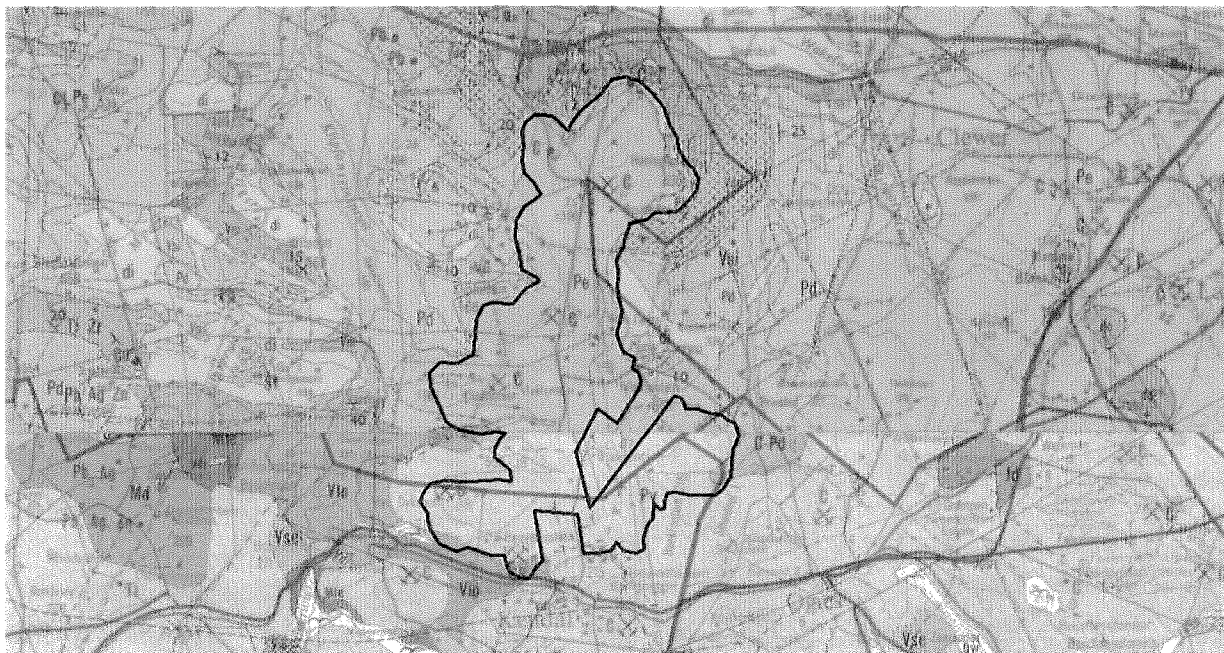
FIGURE 9. AVERAGE DAILY WIND SPEED (KM/H)

## 5.2 Geology

The study area is part of the Witbank Coalfield that is underlain by pre-Karoo rocks, mainly Bushveld Complex and Pretoria Group volcanics. Glaciation events resulted in the deposition of tillite (Dwyka Formation) on the basement rocks over most of the area. Within the Karoo Sedimentary Sequence, the Eccca Group rests on top of the Dwyka Formation. The Dwyka Formation consists of fillite, siltstone and sometimes a thin shale development. The Eccca Group consists predominantly of sandstone, siltstone, shale and coal (Source: Synergistics Environmental Services Baseline Studies).

Arenite is the dominant rock of the study area, it consists of clean sandstone that is well-sorted, contains little or no matrix material, and has a relatively simple mineralogy of nearly pure, chemically cemented sandstone. This has had the effect that much of the area is rich in minable sand suitable for the construction industry. It also is low in clay, which leaves a relatively infertile soil that is only productive when well and frequently fertilised.

FIGURE 10: GEOLOGY (COUNCIL FOR GEOSCIENCES)



## 5.3 Soil

Earth Science Solutions (Pty) Ltd (referred to as ESS) did a comprehensive soil survey that will form the basis of further analysis. Their report will not be repeated in this one; some of their findings that may impact on the economic use of the land will, however, be highlighted.

The soil derived from weathered arenite, which generally produced sandy soils of varying depth.

ESS's rather complex soil map was simplified by grouping soils with similar attributes, particularly one's that will have the same land use potential (indicated in Fig. 11).

According to ESS approximately 4 838 hectares is arable and 4 966 suitable as grazing land. Their findings are as follows:

### 5.3.1 Arable Land

Land capable of sustaining arable crop production is generally found on deeper (>750mm) well drained, red (Hutton) and yellow-brown (Clovelly and Griffin) soils on the midslope and upper midslope positions in the landscape. Areas with deeper hydromorphic soilforms (soil that developed in the presence of excess water) ( Katspruit, Kroonstad, Rensburg), and deep plinthic soils (Glencoe Westleigh Pinedene and Avalon), are found, are also capable of sustaining agricultural crop production if good management practices are employed. The more structured and shallow hydromorphic soils are not considered to be arable soils.

Figure 11 describes the different soil units found on the site. In this map all the green and yellow shaded areas contains soils deeper than 600 mm and are of arable soil forms that is generally considered as arable.

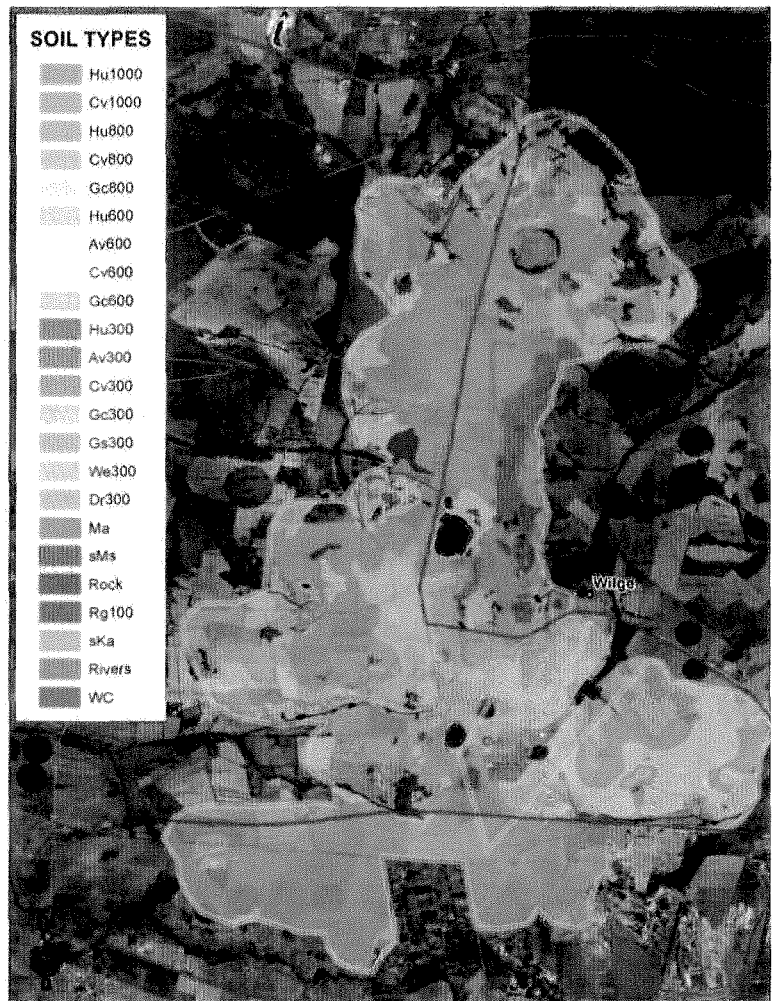


FIGURE 11. SOIL MAP

### 5.3.2 Grazing Land

Grazing land is generally confined to areas with shallower soils. These soils are darker and are hydromorphic. They can be moderately to well drained, but are not always free draining to a depth of 750 mm. These soils are capable of sustaining palatable plant species on a sustainable basis, especially since only the sub-soils (at a depth of 500 mm) are periodically water saturated.

Grazing land will include ESS's group referred to as *Wilderness Land*, which is classified as shallower and rockier soils and are not suitable for agriculture. Although ESS excludes them from grazing land, they are generally used as grazing, albeit, that the grazing capacity is lower.



### 5.3.3 Land use potential<sup>1</sup>

Approximately 47% or 4 838 hectares of the land is classified as arable according to ESS's survey.

TABLE 3. LAND USE POTENTIAL

Land Capability	Area (ha)	Percentage (%)
Wetlands	399	4%
Grazing	4 966	48%
Arable	4 838	47%
Other	125	1%
<b>TOTAL</b>	<b>10 327</b>	<b>100%</b>

The land capability describes the potential of land for different land uses. It does not evaluate the existing infrastructure or access to land; it merely deals with the soil properties, slope and rock outcrops.

- High potential arable land

This class consists of deep well-drained soils with no limitations to farming.

- Moderate potential arable land

It consists of moderately deep soils with some restrictions on soil depth and internal drainage that is suitable for all farming activities but will require monitoring if poor quality water is used for irrigation.

- Low potential arable land

This class consists of moderately deep sandy, to sandy loam soils. It is moderately suitable for agriculture. For the purposes of this study, this class considered as grazing land.

- Grazing land

Moderate potential grazing land consists of shallow soils that are occasionally waterlogged. It is not suitable for crop production and is only moderately suitable for other agricultural uses. They are mostly Avalon, Glenrosa and Mispah soil forms.

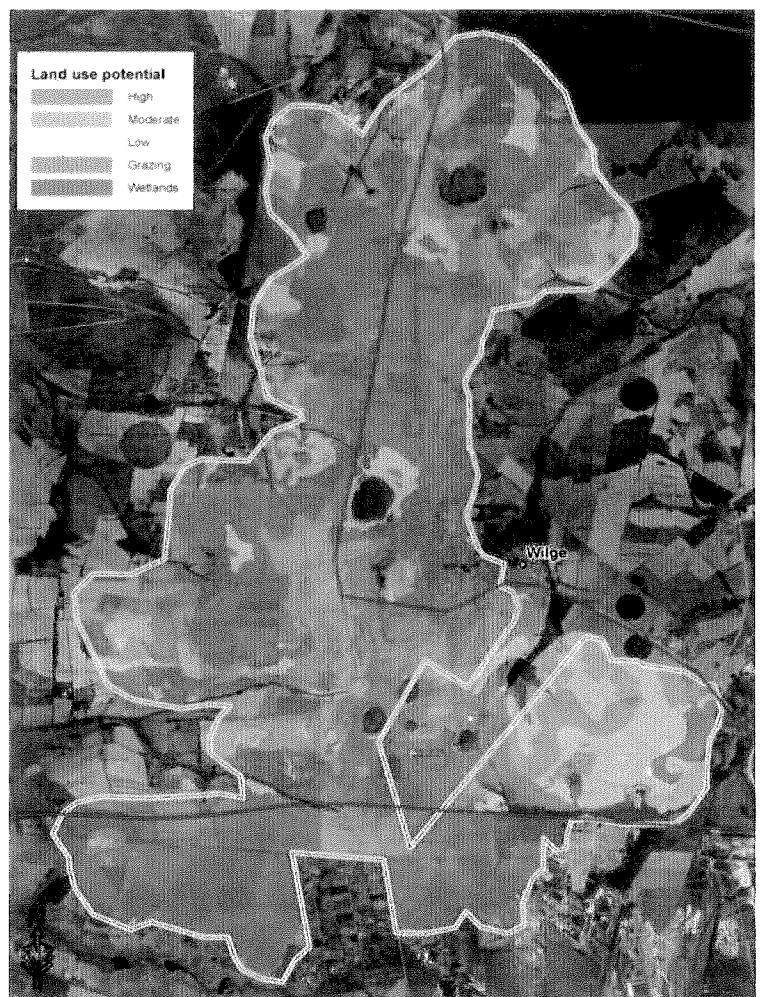


FIGURE 12. LAND USE POTENTIAL

<sup>1</sup> Guidelines of based on those of the Department of Agriculture, Working group of Department of Development Aid and the South African Development Trust Corporation.

### 5.3.4 Analysis of land for different land uses

Land use patterns more often than not, follows the situation experienced on the farm rather than land use potential. Shallow and moderate potential land that is not economically viable for cash crop production is sometimes cultivated and planted to maize or other crops because of the contribution it can make in the total fodder flow of the farming unit. In addition, where irrigation water is available, it changes marginal land to high potential.

Land use recommendations are just that, a recommendation. It is presumptuous of a planner to prescribe any particular land use. The potential of a specific crop can also change with market price fluctuations. With the abolishment of price control for the commodities, enterprise choice has become even more difficult (and risky) for the farmer.

This report, will therefore, assume some recommendations that will form the basis for further analysis.

The following analysis is done for various enterprises from a natural resource perspective, in other words, purely based the climate, soil properties and water availability.

TABLE 4. ENTERPRISE EVALUATION

Enterprise	Discussion	Potential rating
<b>Field crops</b>		
Maize	Yield is influenced by sandy nature of soil and fluctuating producer price influences viability. Is usually essential in fodder flow plan for winter and early summer.	High/moderate
Groundnuts	Suitable on soil with high calcium status. Is sensitive to low pH.	High/moderate
Grain sorghum	Yield is influenced by sandy nature of soil and fluctuating producer price influences viability.	High/moderate
Field beans	Suitable on soil with high calcium status. Is sensitive to low pH.	High/moderate
Potatoes	Is normally only produced under irrigation in order to defray very high production costs.	High/moderate
<b>Horticulture</b>		
Vegetables	Is only produced under irrigation.	Moderate
Fruit	Requires supplementary irrigation.	High
Hydroponics	Requires irrigation water. Area has many coal suppliers that could reduce tunnel heating cost during winter. The capital costs and very high, managerial requirement adds risk.	High
<b>Animals</b>		
Beef and Dairy	Suitable. Normally produced in conjunction with crops and fodder production to overcome harsh winters.	High
Poultry	High potential, also because of the proximity of coal that is required for heating the poultry houses.	High
Pork	High, but management requirement is high.	High

## 5.4 Water

Surface water-use information was obtained from the New Largo Surface Water Study. The report states that it is still incomplete and that some information still needs verification. For the purposes of this study however, the extent of irrigated agriculture will take its figure from that report.

It was stated that around 917 hectares are irrigated. Most of the land occurs on Heuvelfontein in the southern part of the site with its large number of centre pivots.

One must further assume that the irrigated land is licensed with the Department of Water affairs and Forestry.

Some of the more pertinent statements from this report are as follows:

- Surface water is used primarily for agricultural and livestock watering purposes. There is also a commercial chicken farm (Kendal Poultry), a brick making plant (TOR Bricks) and some informal mines.
- Gaps in the water use table are due to lacking response from certain land owners.
- During the determination of water usage, concerns were raised by farmers with respect to the potential impact of the mine on the availability and quality of water.
- The water authority is the Department of Water Affairs and Forestry, Mpumalanga Region.

The surface water users are as follows (source: Synergistics):

Table 2.5(a): Surface water users

Name of owner	Farm Name	Water Source	Usage			
			Crops	Livestock	Human Consumption	Recreational Use
Albert Hertzog	Doornbuit	River Dam Borehole	Type: animal feed Area: 30ha Type of irrigation: canon sprayer Months used: 6 months	Type: milk cattle (500)		
Albertus Truter	Vlakfontein, Roodepoortjie, Bankfontein	River Dam Borehole	Type: melies and corn Area: 40ha + 30ha Type of irrigation: sprinkler Months used: all year	Type: cattle (1000)	Borehole: domestic use, drinking water, laundry, bathing and garden	None
AM van Rooyen	Hartbeesfontein	Dam Borehole	Type: melies Area: 90ha Type of irrigation: centre pivot Months used: October to February	Type: cattle (100)	Borehole	Dam
Andre Cherry Phoned: 412005, 94011/97, 104011/97 Bary Doman	Klipfontein	Dam Borehole	Type: grass only Area: 60ha	Type: cattle (100)	Borehole: all household and gardening	Dam: fishing and swimming
Bary Engelbrecht	Klipfontein	Dam Borehole	Type: animal feed Area: 70Ha Type of irrigation: sprinklers Months used: winter	Type: Cattle (70)	Borehole: Drinking water Laundry washing	Dam: fishing
Bruno Res	Klipfontein, Heuwelfontein	Dam Borehole	Type: melies Area: 400ha Type of irrigation: rain Months used: summer	Type: Cattle (350) Sheep (100) Pigs (100)	Borehole: domestic use	Borehole: swimming pool
Christina Louw (LPU Louw)	Klipfontein	Dam Fountain		Type: Cattle (10) Buck (30) Pigs (30) Horses (2) Peacocks (30+)	Fountain: drinking water and domestic consumption	Dam: fishing, swimming and row boating
David Owen	Valley View Farm	Spring Surface water	none	Type: Cattle (300) Sheep (250)	Spring: all household consumption (20 000L/week)	none
Frederick Vivier	Klipfontein	River Dam Borehole Mine water	Type: beans, corn, maize Area: 120ha Type of irrigation: centre pivot	Type: Cows (120) Sheep (200)	Borehole	River

Name of owner	Farm Name	Water Source	Usage			
			Crops	Livestock	Human Consumption	Recreational Use
Barthand deJager	Edonput	Dam Borehole Fountain	Type animal feed vegetables Area: 6ha Type of irrigation: sprinklers Months used: Summer	Type: cattle and sheep 100	Dam: borehole, fountain, drinking water, household use (eg.) Washing and cooking	Dam: fountain swimming
Dert van Dyk	Plot 54 Kendaal	Borehole	Type: vegetables Type of irrigation: sprinklers	Type: cattle (10) Chicken (300)	Borehole	
Hester Burger (Wyn)		Dam Borehole		Type: Cattle (4) Chickens Geese	Borehole drinking, laundry, garden	Dam: swimming
Jan Coetsee 6 10 06 emailed forwarded to Anie deJager at Kendaal Power Station						
Jan Hendrick Kros Phone number does not work						
Jan van Huysen	Benzaanheid	Borehole		Type: Cattle and sheep (50) Chickens (50)	Borehole: 18 people	None
JH Visser (Jan Visser Trust)	Hartebeesfontein	Dam Borehole Other		Type: Cattle Number: 2400	Borehole and other domestic consumption	
Johan J Coetzee	Benzaanheid, Balmoral	Dam River Borehole Fountain	Type: Green maize and vegetables Area: 20ha Type of irrigation: pipe sprinkling Months used: both summer and winter	Type: Dairy cows, pigs, dogs and chickens Number: Cattle: 400 Pigs: 50 Geese: 50 Chickens: 100	Drinking water Domestic use from borehole (51 people) Daily hygiene (72 people)	Swimming (dam and fountain)
Johan Nel	Dwaalip - Klefontein	Borehole Fountain		Type: Cattle (500) Horses (20)	Borehole domestic use (32 people)	
John Lattila	24 Benzaanheid	River Dam		Type: Cattle (20-30), sheep & goats (10 - 15)		
John Stock Emailed, phone number does not exist Karel Zowetsky	-Boringkrans	Dam Borehole Fountain	10ha	Type: Cattle (1500)	Borehole drinking water, washlets	

Name of owner	Farm Name	Water Source	Usage			
			Crops	Livestock	Human Consumption	Recreational Use
Louw Boschhoff	Dooming	River Dam Borehole Fountain	Type animal feed Area: 75ha Type of irrigation: sprinklers Months used: 6 months	Type: Simbra (115)	River and dam: domestic consumption Borehole drinking water	River and dam swimming
Nico Prinsloo Email: 172606 Callee: 121206 030107 Simon Marchi Called many times no answer						
Ingrid Kropspuit Dolly (Dinwader Peverelle)	Bankfontein 210 IR	Dam Borehole	Type: maize Area: 470ha	Cattle (400)	No record	No record
Willede Beer	Heuwelfontein				Dam and borehole water is pumped from reservoir to Kendaal Power Station	
TOR Bricks		Borehole - brick making Quarry - dust suppression			Borehole domestic consumption for 50 people in hostel, 80 people in the village and 350 people in the factory	

### 5.4.1 Surface Water Quality

Table 5 indicates the general water quality of the most recent sampling undertaken.

TABLE 5. WATER QUALITY OF SURFACE WATER IN JUNE 2011

	pH	EC	TDS	T-alk	Cl	SO <sub>4</sub>	Ca	Mg	Na
Minimum	4.7	5.6	33.0	8.3	1.4	2.7	2.8	1.7	3.8
Average	7.3	31.8	174.8	56.5	9.3	74.0	26.3	13.1	13.7
Maximum	8.2	100.9	587.0	147.3	23.6	393.3	104.0	30.6	34.0

From the specialist report the following conclusions can be made:

- pH values for the sampling sites generally ranged between 6.3 and 8.6 which falls within the SA target water quality range of 6 to 9, for pH in water for domestic use;
- The total dissolved solid content (TDS) is relatively low in most samples but the maximum is high for irrigation. It is however, within limits for animal watering;
- The maximum pH is some concern, it indicates very high sodium. This however, is not reflected in the analysis.

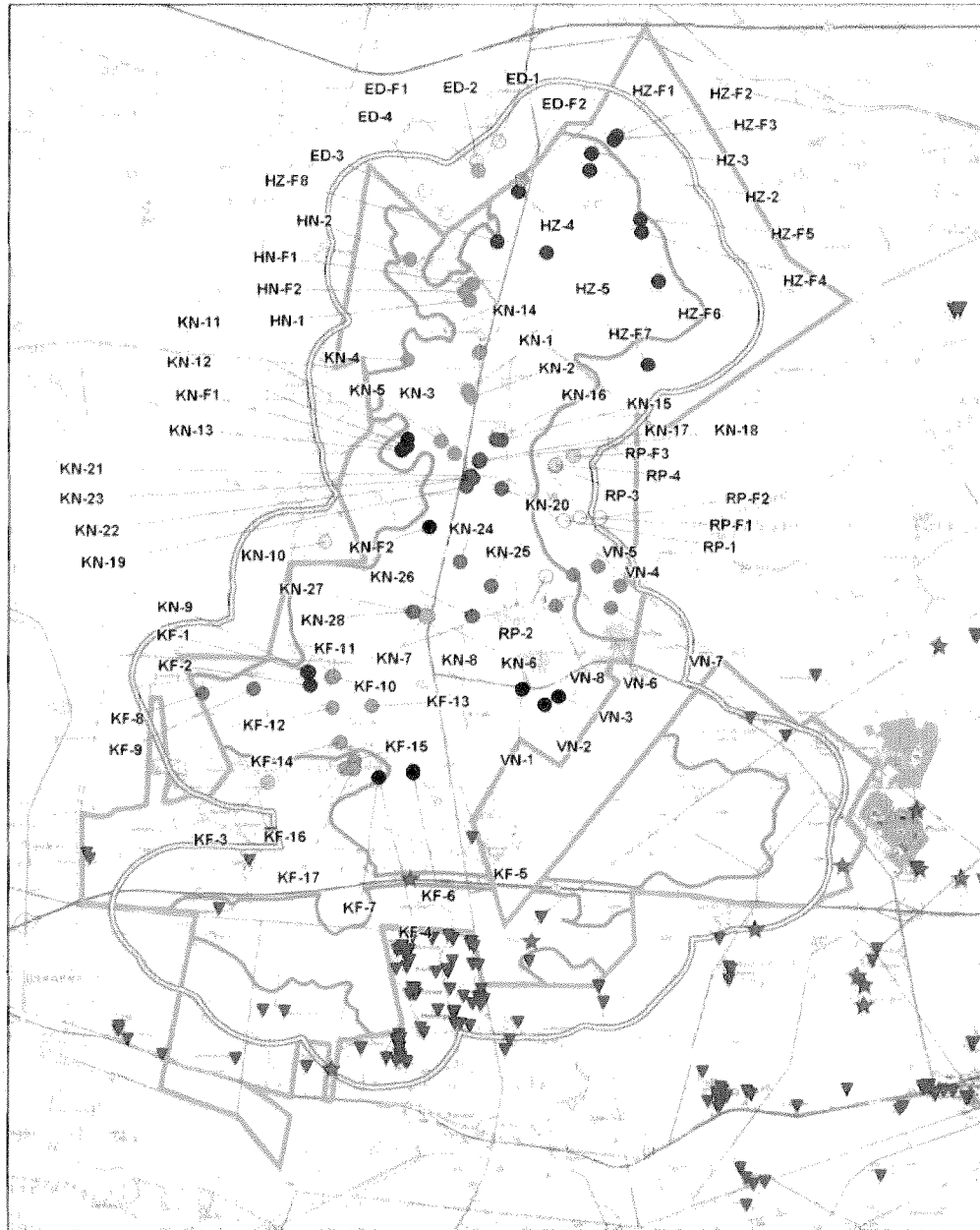
In general the conclusion is that the water quality is poor at some sampling points due to point source pollution. The survey indicates some points where the quality is a concern. More detailed analysis is still required to evaluate the real dangers that salinisation of the surface water can pose to farming, and in particular to irrigated cropping. The investment in infrastructure is enormous and any serious deterioration in the water quality can severely impact on the financial feasibility of the farmer.

## **5.4.2 Groundwater**

### **5.4.2.1 Groundwater yield**

Groundwater is the major source of water for human and animal consumption. The arenite is not a particularly good aquifer for water, which is indicated by the average borehole yield of less than 2 lt per second. This yield is not sufficient for any large scale abstraction that is normally required for irrigated agriculture.

The borehole positions of the affected farmers are indicated in Figure 13 borehole positions of affected farmers.



- |                              |                           |                   |
|------------------------------|---------------------------|-------------------|
| ● A M VAN ROOYEN (9)         | ● WOODSPRING POULTRY (9)  | ● K ZOWITSKY (13) |
| ● J&J PROPERTY (3)           | ● OLD NEW LARGO MINE (5)  | ○ E J STRICK (4)  |
| ● J H VAN DER MERWE (1)      | ● N BIERMAN (2)           | ● J H ROOS (3)    |
| ○ SMARTRYK BEZUIDENHOUT (1)  | ● P J B DOMAN (1)         | ○ D F J BOTES (2) |
| ● C L DE KOCK (4)            | ● A CHERRY (2)            | ○ TOR BRICKS (2)  |
| ● A P JANSE VAN RENSBURG (1) | ● FAIRACRES POULTRY (8)   | ● J H BOSHOFF (2) |
| ● ANGLO OPERATIONS LTD (8)   | ● WILGE SLIMES DAM (5)    |                   |
| ▼ EUB (2004 HYDRO-CENSUS)    | ★ EUF (2004 HYDRO-CENSUS) |                   |

FIGURE 13. BOREHOLE POSITIONS OF AFFECTED FARMERS

#### 5.4.2.2 Water quality of borehole water

The water quality of the groundwater in most instances is suitable for household use. Although the TDS, as expected is somewhat higher than that of the surface water, though, even the maximum is safe for animals.

TABLE 6. WATER QUALITY OF BOREHOLES

Maximum	6,53	47,50	234	23,0	19,3	31,9	16,8	21,4	125	41
Average	6,46	45,45	228	22,3	17,5	30,6	14,5	20,0	116	26
Minimum	6,39	43,40	222	21,7	15,7	29,4	12,2	18,7	107	11

## 5.5 Vegetation

Only small portions of the original veld remains; most of the land is under cultivation.

According to published guidelines of the Department of Agriculture, the grazing capacity of the natural veld is around 3,0 hectares per large livestock unit (LSU). With the addition of stover and fodder that is produced in summer for the dry winter months, the carrying capacity is up from the 3,0 to approximately 1,8 hectares per LSU.

According to the specialist study on surface water, the present livestock numbers are as follows:

TABLE 7. ANIMAL NUMBERS ON THE SITE IN 2008

Type	Number	LSUs
Cattle	5 219	4 436
Dairy	800	680
Sheep	110	16
Pigs	180	-
Chickens	460	-
<b>TOTAL</b>	<b>6 769</b>	<b>5 132</b>

## 5.6 Growing season

The growing season commences in early October when precipitation exceeds 50% of transpiration. The winter period is dry with little or no vegetative growth. This confirms the necessity to produce feed for the winter months.

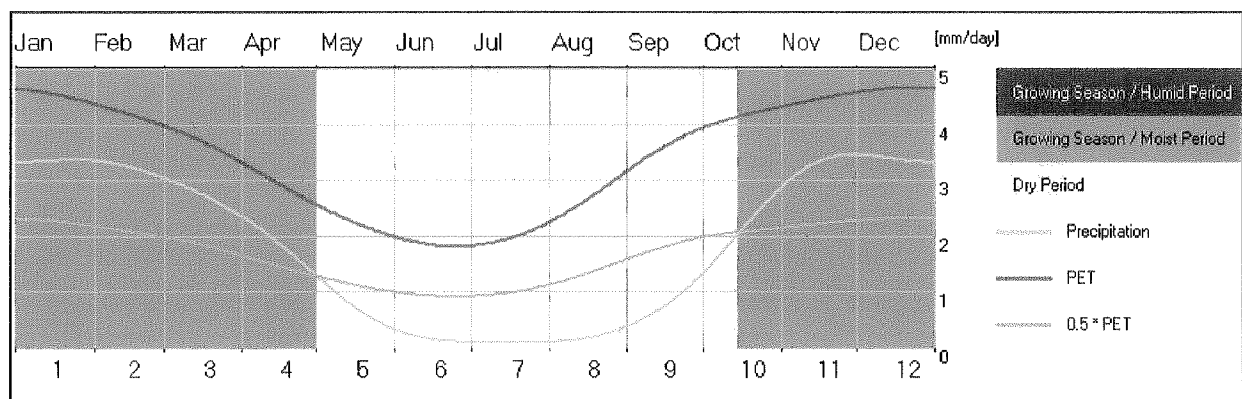


FIGURE 14. GROWING SEASON FOR NATURAL VEGETATION

## 6 Farming potential

### 6.1 Trends in agriculture

#### 6.1.1 General

- Volume produced

The estimated volume of agricultural production in 2009/10 had a slightly upward trend from the previous year. The volume of field-crop production increased by 3,1% as a result of an improvement in the production of summer grains. Horticultural production decreased by 1,6% mainly because of a drop in the production of citrus and subtropical fruit, while animal production rose by 8,8% as a result of an increase in fresh milk production and the numbers of stock slaughtered.

- Producer prices of agricultural products

In real terms, producer prices of agricultural products decreased on average by 2,2% from 2009/10. The weighted average price of field crops decreased by 14,4%. Prices decreased by 26,4% for winter grain, by 23,1% for summer grain, by 17,8% for cotton, by 17,7% for oilseeds and by 7,0% for dry beans, while prices for tobacco, sugar cane and hay increased by 16,9%, 15,8% and 0,6% respectively.

Producer prices of horticultural products rose by 7,0% from 2008/09. Prices of vegetables and fruit increased by 12,9% and 3,5% respectively, while prices of viticulture products decreased by 0,8%.

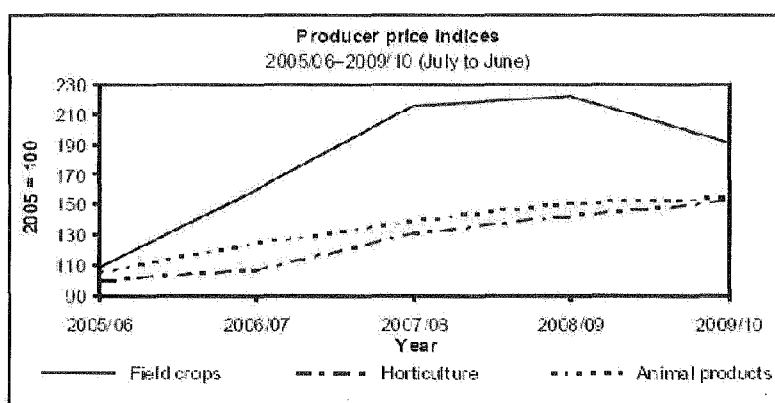


FIGURE 15. PRODUCER PRICES OF MAIN ENTERPRISES

Prices of animal products rose by 1,9%. The average price of pastoral products, dairy products and poultry increased by 22,1%, 4,1% and 1,2% respectively, while the average price of slaughtered stock decreased slightly by 0,1%.

#### 6.1.2 Trends for specific enterprises in the study area

##### 6.1.2.1 Maize

Maize is the most important grain crop in South Africa, being both the major feed grain and the staple food of the majority of the South African population. About 60% of maize produced in South Africa is white and the remaining 40% is yellow maize. White maize is primarily used for human consumption, while yellow maize is mostly for animal feed production.

Plantings, production and yields of commercial maize from 2005/06 to 2009/10 were as follows:

Season	2005/06	2006/07	2007/08	2008/09	2009/10
Plantings (ha)	1 600 200	2 551 800	2 799 000	2 427 500	2 742 400
Production (t)	6 618 000	7 125 000	12 700 000	12 050 000	13 043 000
Yield (t/ha)	4,14	2,79	4,54	4,96	4,76



- Prices

Since the deregulation of the South African agricultural market in 1996, the maize market has essentially been an open one in which a number of basic factors play a role in determining prices. These factors include:

- International maize prices
- Exchange rates
- Local production (influenced by weather conditions and area planted)
- Local consumption
- Production levels in the Southern African Development Community region (South Africa is usually the main source of white maize for these countries in times of shortage)
- Stock levels (both domestic and international)

Based on domestic stock levels, the domestic prices of maize fluctuate within a band that is determined by world prices, the exchange rate and local maize production. Because of the erratic weather conditions in the country, substantial variations in local production occur.

During periods of shortages, the rand price of maize is expected to increase towards import parity, which is the international maize price plus transport and other costs, multiplied by the exchange rate.

The average producer price of maize decreased by 24,0%, from R1 305,10/ton in 2008/09 to R992,58/ton in 2009/10. The decrease was caused by a combination of factors, such as lower world prices as a result of high world stocks, a surplus supply of local maize, the impact of the international recession and exchange rates. Significantly, though, is that the prices fluctuate widely and is open to speculation.

The average producer prices of maize from 2005/06 to 2009/10 are as follows:

Season	2005/06	2006/07	2007/08	2008/09	2009/10
	R/ton				
Producer price	1 060,98	1 450,20	1 665,61	1 305,10	992,58

- Prospects

The area to be planted to maize is influenced by a combination of factors such as relatively low producer price levels, the size of the crop harvested during the past seasons, stock levels and relatively high production costs.

Farmers already planted 30% less maize the past season owing to the huge surplus of maize experienced in the country. Because of the surplus, maize prices dropped, leaving farmers with excess maize that they could not sell at a reasonable price.

This trend of uncertainty is bound to continue.

#### 6.1.2.2 Groundnuts

The contribution of groundnuts to the value of field crops is approximately 2,6%. The average annual gross value of groundnuts for the five years up to 2009/10 is approximately R536 million.

Plantings, production and the yield of groundnuts from 2005/06 to 2009/10 were as follows:

Season	2005/06	2006/07	2007/08	2008/09	2009/10
Plantings (ha)	48 550	40 770	54 200	54 550	57 450
Production (t)	74 000	58 000	88 800	99 500	87 880
Yield (t/ha)	1,52	1,42	1,64	1,82	1,53

Indications prior to planning, producers' intentions was that the present season will see groundnut plantings increase by approximately 4,1%, which can be attributed mainly to better price expectations. Producers are encouraged to enter into contracts with buyers before planting.

Groundnuts are traditionally an export commodity and local prices are determined mainly by export parity. The average producer prices of groundnuts from 2005/06 to 2009/10 were as follows:

Season	2005/06	2006/07	2007/08	2008/09	2009/10*
	R/ton				
Producer price	2 849	5 514	6 122	6 361	7 549

The average producer price for groundnuts shows an increase of 18,7%, from R6 361/ton for the past season to R7 549/ton. This is a result of a decline in international stock levels and in the world production in 2009/10.

- International overview

The world production of groundnuts decreased by 4,4%, from 34,5 million tons in 2008/09 to 33,0 million tons in 2009/10. Preliminary figures published in October 2010 by the USDA show that the drop can be attributed mainly to a 22,2% decrease in the production of India.

### 6.1.2.3 Dry beans

During the past season, an estimated 44 100 ha were planted to dry beans for commercial markets. This is 0,7% more than the area planted in 2008/09. The average yield for 2009/10 was approximately 1,2 t/ha – a decrease of 20% from the previous season. The decrease in production can be ascribed largely to unfavourable weather conditions, especially the heavy rains during harvesting time.

The Mpumalanga and Free State provinces are estimated to have produced 50,6% of the commercial crop. The remaining 49,4% was produced in the other provinces.

Present cultivars that can yield up to 1,4 t/ha, as against 0,6 t/ha some 20 years ago. These cultivars are suited to most soil types, have greater resistance to diseases and can be grown successfully in different areas. The average yield for dryland production during the five years up to 2009/10 is 1,1 t/ha.

Marketing season	2005/06	2006/07	2007/08	2008/09	2009/10
	Tons				
Production (including developing agriculture)	74 052	43 500	64 873	73 733	48 910
Imports	68 453	84 113	73 993	83 000	76 000
Consumption	122 226	129 953	119 403	128 090	124 910

- Producer prices

The average prices received by producers for dry beans from 2005/06 to 2009/10 were as follows:

Production season	2005/06	2006/07	2007/08	2008/09	2009/10
	R/ton				
Producer price	4 400	6 165	7 375	6 981	6 383

#### 6.1.2.4 Deciduous fruit

The main deciduous-fruit-producing areas of South Africa are located in the Western and Eastern Cape provinces, mainly in areas where warm, dry summers and cold winters prevail. According to the Deciduous Fruit Producers' Trust Tree Census of 2009, the area under production during the 2009 season is estimated at 74 757 ha.

- Production

Although some producers grow fruit both for canning and fresh consumption, it is estimated that in South Africa there are about 2 250 producers of fruit for fresh consumption – 1 180 producers of stone fruit, 1 200 producers of dry and table grapes and 700 producers of pome fruit.

The production per fruit type over the past five seasons compares as follows:

Fruit type	2005/06	2006/07	2007/08	2008/09	2009/10
	Tons				
Apples	623 539	708 952	748 418	796 866	775 041
Pears	316 273	337 145	336 399	340 306	354 904
Table grapes	290 953	284 835	269 910	270 094	278 810
Peaches and nectarines	168 169	168 852	174 391	152 374	145 616
Apricots	76 165	36 442	55 616	43 428	48 402
Plums	38 741	54 444	62 632	59 870	54 306
<b>Total</b>	<b>1 513 840</b>	<b>1 590 670</b>	<b>1 647 366</b>	<b>1 662 938</b>	<b>1 657 079</b>

The production of deciduous fruit decreased by 0,4% from 1,663 million tons in 2008/09 to 1,657 million tons in 2009/10. Apricots showed the biggest increase at 11,5%, followed by pears with 4,3% and table grapes with 3,4%. The production of plums, peaches and nectarines, and apples show decreases of 9,3%, 4,4% and 2,7% respectively.

During 2009/10, deciduous fruit contributed approximately 23,7% to the gross value of horticultural products. Approximately 358 099 tons of deciduous fruit were sold locally on the major fresh produce markets and other markets and directly to retailers, representing an increase of 6,5% on the 336 161 tons sold during the 2008/09 season.

The average prices realised for deciduous fruit on the major fresh produce markets during the period 2005/06 to 2009/10 were as follows:

Fruit type	2005/06	2006/07	2007/08	2008/09	2009/10
	R/ton				
Apples	3 035	3 293	4 257	4 197	4 301
Pears	2 657	3 078	3 727	3 988	4 008
Table grapes	4 587	5 117	5 719	6 680	7 110
Peaches and nectarines	5 943	5 491	6 158	7 485	7 114
Apricots	3 609	4 499	4 653	6 138	6 094
Plums	3 973	3 548	3 614	4 622	4 614

Exporting of deciduous fruit is a major earner of foreign exchange for South Africa. During the 2009/10 season (October to September), about 48,7% of deciduous fruit produced was exported and approximately 76,9% of the gross value from deciduous fruit came from foreign exchange export earnings. Total exports amounted to 806 979 tons. This represents an increase of 1,2% compared to the 797 259 tons exported during 2008/09.

- Prospects

It is expected that the upward trend in plantings of deciduous fruit during the last two years (except for apricots) will flatten out in 2011 owing to relatively low profitability levels as well as the current crisis in the canning industry. Profitability levels will remain under pressure as a result of the strong rand against the currencies of the major export destinations.

The local market volumes are expected to increase, which could cause local market prices to increase.

### 6.1.2.5 Potatoes

There are 16 distinct potato production regions in South Africa, which are spread throughout the country. The main regions are situated in the Free State, Western Cape, Limpopo and Mpumalanga provinces.

Potatoes are planted at different times because of climatic differences in the production areas, resulting in fresh potatoes being available throughout the year. In the early 1990s there was a major shift in production from dryland to irrigation and currently almost 80% of plantings are under irrigation.

- Prices

Between 2005 and 2009, potato prices realised on the major fresh produce markets increased significantly by an average of 14,7% per annum, from R1 744 per ton in 2005 to R3 354 per ton in 2009.

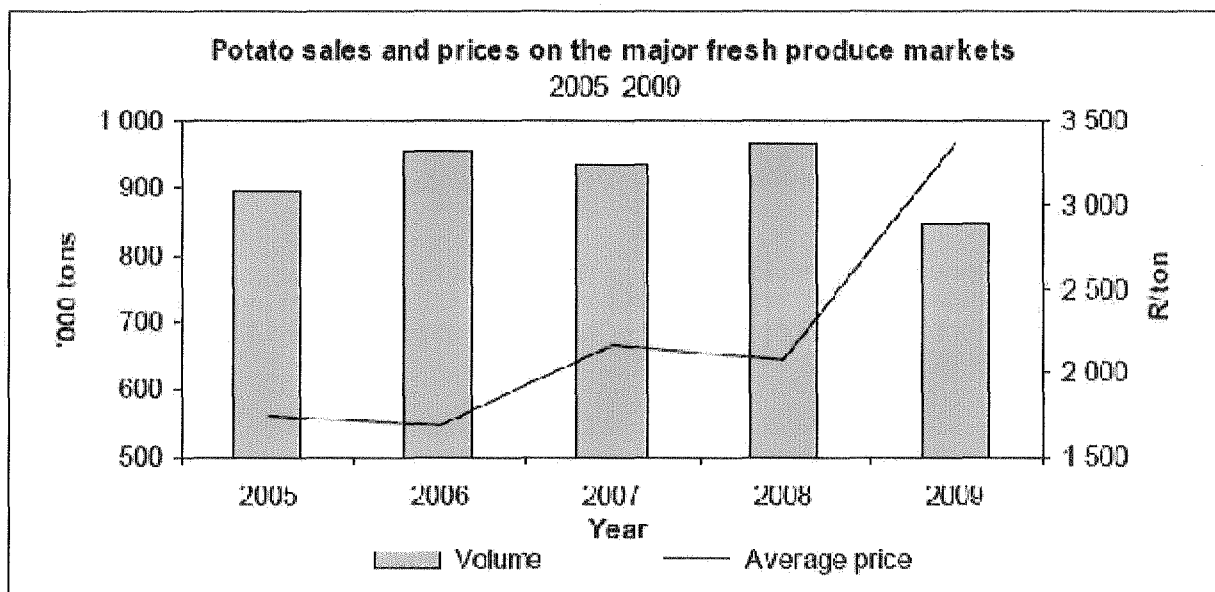


FIGURE 16. PRODUCTION AND PRICES OF POTATOES

- Prospects

During 2010, potato imports (mostly French fries) rose because of an increase in demand in South Africa.

Unfavourable weather conditions, particularly heavy rains in the early part of 2010 and black frost in June and July 2010, caused countrywide shortages in supply and adversely affected the quality of potatoes. The intake of potatoes by processing factories is expected to increase by an average of 10% to 12% in 2011. To meet the consumer demand in 2011, an increase in imports from other regions is expected.

Given the adverse weather conditions in the countries supplying potatoes to the international market, an increase in the price is expected.

With the upward trend of prices, potatoes will remain an important crop for the study area.

#### **6.1.2.6 Livestock**

- Livestock numbers

Approximately 80% of the agricultural land in South Africa is suitable mainly for extensive livestock farming. However, livestock is also found in areas where the animals are kept in combination with other farming enterprises. As rainfall plays a major role in the availability of fodder and grazing, it is logical that a good correlation would exist between rainfall and the size of the national herd, particularly cattle.

- Cattle

Cattle are found throughout the country, but mainly in the Eastern Cape, KwaZulu-Natal, Free State and North West provinces. Herd sizes vary according to type of farming. In the case of dairy cattle, it varies between less than 50 and 300 (average approximately 110). Beef cattle farms range from fairly small (less than 20 head of cattle) to large farms and feedlots (more than 1 000). The production of weaners for the feedlot industry is the most frequent form of cattle farming in South Africa. Feedlots account for approximately 75% of all beef produced in the country.

The total number of cattle in South Africa at the end of August 2010 is estimated at 13,78 million, comprising various international dairy and beef cattle breeds as well as indigenous breeds such as the Afrikaner and the Nguni. The number is approximately 0,1% higher than the estimate of 13,76 million as at the end of August 2009. Beef cattle contribute approximately 80% of the total number of cattle in the country, while dairy cattle make up the remaining 20%.

- Sheep

Although sheep farms are found in all provinces, they are concentrated in the more arid parts of the country.

The total number of sheep in South Africa at the end of August 2010 is estimated at 24,75 million – 1,0% lower than the estimated 24,99 million as at the end of August 2009. For August 2010, the largest numbers of sheep were estimated to be in the Eastern Cape (29,4%), Northern Cape (25,1%), Free State (19,6%) and Western Cape (11,3%) provinces.

- Pigs

Pigs are found predominantly in the Limpopo, North West and Western Cape provinces. There are approximately 400 commercial pork producers and 19 stud breeders in South Africa. It is estimated that pig numbers decreased by 0,2% from 1,613 million in August 2009 to 1,599 million in August 2010.

#### **6.1.2.7 Slaughterings**

It is estimated that the total number of cattle slaughtered decreased by 1,5%, while the number of sheep (including lambs) and pigs slaughtered increased by 7,6% and 2,6% respectively from 2008/09 to 2009/10.

Commercial slaughterings of red-meat-producing livestock types over the past five years were as follows:

Year	2005/06	2006/07	2007/08	2008/09	2009/10
Cattle	2 266 932	2 368 084	2 086 733	2 222 803	2 189 315
Sheep and lambs	4 195 070	4 608 815	4 404 843	4 795 704	5 157 761
Pigs	2 115 234	2 321 114	2 249 841	2 266 841	2 326 454

The average producer price of beef for 2009/10 amounted to R22,17/kg (average for all classes on all auction markets), which represents a slight increase of 0,1% from the average price of R22,15/kg for 2008/09.

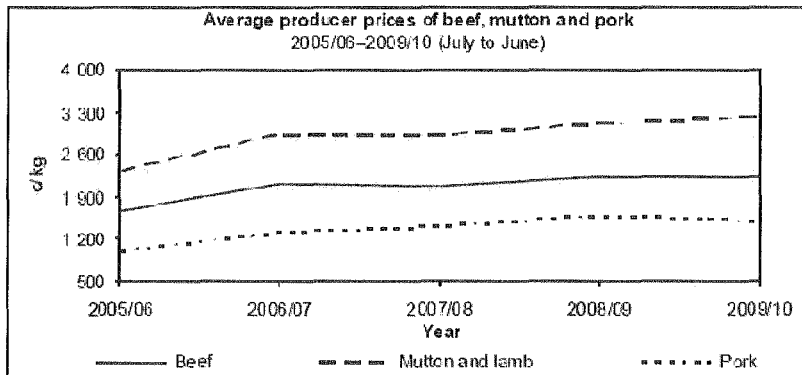


FIGURE 17. AVERAGE PRODUCER PRICES FOR RED MEAT

In view of the ever-strong influence of international trade on the local mutton industry, both the cyclical and the seasonal price patterns for mutton were influenced by imports. The average producer price for mutton and lamb increased by 3,9% to R32,28/kg during 2009/10, compared to R31,06/kg for 2008/09. The average producer price for pork decreased by 5,6% from R15,85/kg in 2008/09 to R14,97/kg in 2009/10.

#### 6.1.2.8 Poultry

The poultry industry consists of three distinct, separate branches, namely the day-old chick supply industry, the broiler industry and the egg industry. The Southern African Poultry Association (SAPA) represents both commercial and developing poultry farmers within these three branches.

This article focuses on the broiler industry and the egg industry, as the chick supply industry makes an input into both.

- Broiler industry

The broiler industry continues to dominate the agricultural sector in South Africa as the main supplier of animal protein. About 13 large producers supply more than 70% of the total broiler production in South Africa, while many small production units and the informal sector are responsible for the remaining 30%.

According to SAPA, the provincial distribution of broilers in South Africa was as follows in 2009: 25% in the North West Province, 22% in the Western Cape Province, 18% in Mpumalanga, 16% in KwaZulu-Natal, 7% in the Eastern Cape and 5% each in Gauteng and the Free State. The Limpopo and Northern Cape provinces account for the remaining 2%.

The average weighted price received by producers of broilers decreased by 3,4% from R16,91/kg in 2009 to R16,33/kg in the first nine months of 2010.

Producer prices of broilers from 2006 to 2010 were as follows:

Year	2006	2007	2008	2009	2010*
	c/kg				
Price of broilers	1 218	1 379	1 495	1 691	1 633

### Prospects

The opportunity for growth in the industry still exists, not only because of expected growth in demand for poultry meat, but also as imports make up a sizeable percentage of consumption.

Feed costs have always been a significant issue in the poultry industry and remain so, even though prices of maize and soya as well as the main raw materials in broiler feed have showed marked decreases since 2009. Feed prices, however, did not show similar decreases. The profit margins of the broiler industry are expected to remain tight.

The broiler industry is also experiencing pressure because of the downturn in consumer spending. High imports remain a threat in the event of a weakening in local demand.

- Egg industry

Based on a census of members of SAPA during 2009, the distribution of layers per province was as follows: 24% in Gauteng, 19% in the Western Cape, 13% in KwaZulu-Natal, 17% in the Free State, 9% in North West, 6% in Mpumalanga, 5% each in the Eastern Cape and Limpopo provinces, and 2% in the Northern Cape Province.

The number of layers decreased from an average of 23,1 million in 2008 to 22,2 million in 2009. This represents a decrease of 3,9%. The average size of the national flock is expected to increase by 4,1% during 2010 to reach around 23,1 million layers.

The average price received by egg producers during the first nine months of 2010 was 5,1% less than the average price received during 2009.

The average producer prices of eggs from 2006 to 2010 are as follows:

Year	2006	2007	2008	2009	2010*
	c/doz				
Price of eggs	632	708	813	945	897

- Prospects

The biggest challenge for the egg industry will be to continue to produce a competitive product in an environment of increasing costs. Based on pullet placements, it is evident that egg production will increase further during the second half of 2010.

## 6.2 Present farming base

There is a clear difference between the present land that is cultivated and the soils identified by ESS as suitable for cultivation. According to the land use information compiled by Index, it was found that approximately 1 000 hectares more is cultivated than the arable land potential reported by ESS. This may influence the baseline calculations.



FIGURE 18: PRESENT FARM USE VERSUS POTENTIAL



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It must be noted that land not cultivated may not be brought into cultivation without approval by the Minister of Agriculture. The present farming income will be calculated from the present land use, regardless of the potential found by ESS.



TABLE 8. PRESENT LAND USE ASSUMPTIONS

Land use	Area (hectare)
<b>Rainfed crops</b>	<b>5 898</b>
Maize	4 718
Groundnuts	590
Beans	590
<b>Irrigated land</b>	<b>917</b>
Maize	467
Pastures	100
Green mielies	100
Potatoes	250
<b>Animals and other</b>	<b>Numbers</b>
Red meat (beef and mutton)	5 132 LSU
Poultry	Uncertain
Other	Uncertain

### 6.3 Enterprise analysis

Enterprise choice is made by the land owner in his particular circumstances. Expansion and or intensification of the enterprise composition is determined, among others, by land use potential, market trends, regional infrastructure, and more specifically by the availability of development capital. The economic base of the area hinges broadly on livestock production and on dryland cropping, which are the predominant sectors. Most, if not all the farmers, have mixed farms containing both animals and cash crops.

#### 6.3.1 Crop margins

Crop margins are at best an estimation of the income that an enterprise can achieve. It is the direct income before any overhead costs and capital redemption. The figures in Table 9 show the yield, the market price and expected gross margin for the major farming activities in the region.

TABLE 9. GROSS MARGINS OF SOME ENTERPRISES

Enterprise	Yield	Price	Unit	Income	Expenses	Gross margin
Dairy cattle	15 lt/day	R3,50/lt	Cow	R17 550	R8 112	R9 438
Beef cattle	Weaner	R3 450 each	LSU	R3 450	R2 214	R1 237
Mutton/wool	Weaner	R640 each	SSU	R660	R382	R279
Potatoes	4,5 t/ha	R20 000/t	ha	R90 000	R69 219	R20 781
Dry beans	1,8 t/ha	R4 500/t	ha	R9 720	R9 450	R270
Maize (dryland)	4,2 t/ha	R1,200/t	ha	R5 040	R4 615	R435
Maize (irrigated)	8,0 t/ha	R1 200/t	ha	R9 600	R8 462	R1 138
Sunflower	1,8 t/ha	R2 700/t	ha	R4 860	R3 387	R1 473
Groundnuts	1,3 t/ha	R4 359/t	ha	R5 655	R5 490	R165
Peaches (average/y)	18 t/ha	R7 114/t	ha	R128 052	R74 343	R53 709

#### 6.3.2 Income potential – present situation

Without doing a detailed survey it is impossible to provide very accurate figures. From the aerial photographs it is evident that there are a number of poultry producers as well as hydroponics. The numbers and composition of these could not be ascertained from any baseline studies and it was not within the scope of this study to do detailed land use and enterprise surveys. The figures provided below are therefore an estimate based on the assumptions in Table 10.

TABLE 10. ESTIMATED FARMING INCOME

<b>Rainfed crops</b>	<b>5 898</b>		
Maize	4 718	270	1 273 860
Groundnuts	590	165	97 350
Beans	590	270	159 300
<b>Irrigated land</b>	<b>917</b>		
Maize	467	1 138	531 446
Pastures	100		
Green mielies	100	4 300	430 000
Potatoes	250	20 781	5 195 250
<b>Animals and other</b>	<b>Numbers</b>		
Beef	5 132	1 237	6 348 284
Milk	1 000	9 438	9 438 000
Poultry	Uncertain		
Other	Uncertain		
<b>TOTAL</b>			<b>23 473 490</b>

The following can be concluded:

- This does not include poultry, hydroponics and production for household food security.
- The estimated gross income for farming is R23,5 million per year.
- Assuming overhead costs of 30% of income, then the net farming income is estimated at R16,45 million for the area affected. This is an acceptable return of f R1 577 per hectare per year.

## 7 Direct Impact of development

### 7.1 Mining land

The portion to be mined is 10 430 hectares of which 6 815 is cultivated. Direct financial impact is as follows:

- The total farming income is R23,5 million per year;
- Assuming that the mining and rehabilitation will take place over 10 years and that approximately 530 hectares will be withdrawn from farming per year, then 5 300 hectares will be affected in some way. The expected land use of a specific portion of land will then be:
  - Mining and rehabilitation for 4 years
  - Plant to pastures for 3 years – for use by cattle
  - 50 % of yield of field crops attained for 3 years
  - 100% of yield from Year 10
- The total loss of income is increases linearly to R11,2 million per year in Year 10. This is when the rehabilitated area that is given back to farmers matches that which is withdrawn from mining.
- The above assumes the land use pattern indicated in Table 10. The impact on each farmer may vary and can be more drastic, especially where the land parcel is small or where the intensity of operation is higher than the average.

TABLE 11. FINANCIAL IMPACT

1	9 963	6 132	5 898	917	23 473 490	0
2	9 433	5 806	5 584	868	22 224 775	1 248 715
3	8 903	5 480	5 270	819	20 976 060	2 497 430
4	8 373	5 153	4 957	771	19 727 344	3 746 146
5	7 843	4 827	4 643	722	18 478 629	4 994 861
6	7 313	4 501	4 329	673	17 229 914	6 243 576
7	6 783	4 175	4 015	624	15 981 199	7 492 291
8	6 253	3 849	3 702	576	14 732 483	8 741 007
9	5 723	3 522	3 388	527	13 483 768	9 989 722
10	5 193	3 196	3 074	478	12 235 053	11 238 437
11	5 193	3 196	3 074	478	12 235 053	11 238 437
12	5 193	3 196	3 074	478	12 235 053	11 238 437

## 7.2 Overland conveyor

The conveyor is between Phola Coal Washing Plant and Kusile Power Station.

- Total: 21 km
- Outside of proposed New Largo mining area: 10,8 km and at a buffer of 30 metres, the area is roughly 30.3 hectares.

Assuming the same income projections as that of the land that will be mined, then the loss of farming income at R2 440 per hectare is estimated at R73 811 per year.

Land use	Length (metre)	Area (hectare) 30 m buffer
<b>Within AAIC owned land and proposed New Largo mining area</b>	<b>10 203</b>	<b>30.6</b>
Arable	8 275	24.8
Grazing	1 928	5.8
<b>Outside of proposed New Largo mining land boundary</b>	<b>10 844</b>	<b>30.3</b>
Arable	5 397	16.2
Grazing	4 497	13.5
Mine land	950	2.9
<b>Grand Total</b>	<b>21 047</b>	<b>63.1</b>

## 8 Recommendations

### 8.1 Enterprise composition

Mining will bring about significant land use changes, particularly for the arable portions. Introduction of new capital may allow for intensification of farming - the extent of which depends on agreements reached between New Largo Mine and the farmers.

Indications from similar sites elsewhere is that the reclamation is successful, albeit that there is a time required for the soil to settle before cropping can gainfully take place. Clean water is a prerequisite for any intensification of farming, particularly as far as irrigation is concerned. The impact of mining on the surface water is uncertain, but history has indicated deterioration at many similar sites, especially in the short term.

Although future land use is impossible to predict, the following land use patterns may emerge:

- Cropping and animal production will cease on the mined land for the period that mining takes place;
- After rehabilitation it is foreseen that the land will be planted to pastures in order to settle the soil and build the structure and soil fertility. This process may last for up to 5 years.
- Gradually the land will be planted to crops. If rehabilitation is constructive and rock and hard pans are removed, then it may even increase the arable portion.
- Natural veld grazing has a carrying capacity of around 3,0 hectares per LSU. Pastures however, if fertilised well during establishment can increase the carrying capacity significantly. The palatability will likewise improve.
- Balmoral and Ogies are not recognised fruit producing areas. Some of the surrounding areas, like Bronkhorstspuit, Witbank and Middleburg have proven suitable. If promoted, it can become a production hub for nectarines, peaches and apricots. The potential income far exceeds that which is presently produced. However, development cost is high.
- The implications of the land use changes depends on the negotiations between New Largo and the land owners and how rehabilitation may be used to upgrade the on-farm and regional infrastructure.
- Economic activities that will emanate from mining may increase theft and vandalism and can then influence land use patterns.

## 8.2 Biological

Some possible environmental impacts of the development are the following:

- Dust along the main roads that is created by large trucks has a severe impact on crop yield and on the livestock capacity.
- Potential deterioration of water quality and volume available to farming can detrimentally affect farming.

## 9 APPENDIX: Sensitivity analysis of major enterprises

**TABLE 1: SENSITIVITY OF DAIRY CATTLE PER LSU**

Yield (L/LSU/d)	Price/Litre (300/365 days in lactation)						
	3.00	3.10	3.20	3.30	3.40	3.50	3.60
5	-3012	-3462	-3312	-3162	-3012	-2862	-2712
7	-1812	-1602	-1392	-1182	-972	-762	-552
9	12	258	528	798	1068	1338	1608
11	1788	2118	2448	2778	3108	3438	3768
13	3588	3978	4368	4758	5148	5538	5928
15	5388	5838	6288	6738	7188	7638	8088
17	7100	7680	8260	8840	9420	10000	10580
19	8988	9658	10328	10998	11668	12338	13008
21	10788	11418	12048	12678	13308	13938	14568
<b>Total expenditure</b>							<b>8112</b>

**TABLE 2: SENSITIVITY OF BEEF CATTLE PER LSU**

Yield	Price/Weaned calf						
	2800	2950	3100	3250	3400	3550	3700
50	-814	-739	-664	-589	-514	-439	-364
55	-674	-591	-509	-426	-344	-261	-179
60	-534	-444	-354	-264	-174	-84	7
65	-394	-296	-199	-101	-4	94	192
70	254	140	44	62	167	272	377
75	-174	-1	112	224	337	449	562
80	27	147	267	387	507	627	747
85	167	294	422	549	677	804	932
90	307	442	577	712	847	982	1117
<b>Total expenditure</b>							<b>2214</b>

**TABLE 3: SENSITIVITY OF MUTTON/WOOL SHEEP PER SSU**

Yield (Lam %)	Price/Weaned lamb + R25 wool included						
	400	450	500	550	600	650	700
70	102	67	32	3	38	73	109
75	-82	-44	-7	37	68	105	144
80	-62	-22	18	58	98	139	179
85	-42	1	43	80	129	171	214
90	-22	23	60	114	159	204	249
95	2	46	93	141	180	235	281
100	18	68	119	169	219	269	319
105	38	97	144	196	249	307	354
110	59	114	169	224	279	334	389
<b>Total expenditure</b>							<b>382</b>

**TABLE 7: SENSITIVITY OF POTATOES (Irrigation) PER HA**

Yield (bag/ha)	Price/10kg bag						
	14.00	15.50	17.00	18.50	20.00	21.50	23.00
2500	-19602	-15852	-12102	-8352	-4602	-852	2892
3000	-16256	-11758	-7256	-2756	1744	6244	10744
3500	-12910	-7660	-2410	2840	8090	13340	18590
4000	-9565	-3565	2435	8435	14435	20435	26435
4500	6219	531	7281	11031	20781	27631	34281
5000	-2873	4627	12127	19627	27127	34627	42127
5500	473	8723	16873	25223	33473	41723	49973
6000	3010	12010	21010	30010	39010	48010	57010
6500	7164	16914	26664	35414	46164	55914	65664
Total expenditure					7.31	5164	31167
					Variable	Allotted	Direct

**TABLE 8: SENSITIVITY OF DRY BEANS PER HA**

Yield (ton/ha)	Price/ton							
	4500	5000	5500	6000	6500	7000	7500	
0.25	-8325	-8200	-8075	-7950	-7825	-7700	-7575	
0.50	-7200	-6950	-6700	-6450	-6200	-5950	-5700	
0.75	6075	5700	5325	4950	4575	4200	3825	
1.00	-4950	-4450	-3950	-3450	-2950	-2450	-1950	
1.25	-3825	-3200	-2575	-1950	-1325	-700	-75	
1.50	-2700	-1950	-1200	-450	300	1050	1800	
1.75	-1575	-700	175	1050	1925	2800	3675	
2.00	-450	550	1550	2550	3550	4550	5550	
2.25	675	1800	2925	4050	5175	6300	7425	
Total expenditure								9450

**TABLE 9: SENSITIVITY OF MAIZE (Dry land) PER HA**

Yield (ton/ha)	Price/ton							
	800	900	1000	1100	1200	1300	1400	
2.00	-2811	-2611	-2411	-2211	-2011	-1811	-1611	
2.40	2491	2251	2011	1771	1531	1291	1051	
2.80	-2171	-1891	-1611	-1331	-1051	-771	-491	
3.20	-1851	-1531	-1211	-891	-571	-251	69	
3.60	-1531	-1171	-811	-451	-91	269	629	
4.00	-1211	-811	-411	-11	309	709	1109	
4.40	-891	-451	-11	429	869	1309	1749	
4.80	571	91	389	869	1349	1829	2309	
5.20	-251	269	789	1309	1829	2349	2869	
Total expenditure								4471

**TABLE 10: SENSITIVITY OF MAIZE (Irrigation) PER HA**

Yield (ton/ha)	Price/ton							
	800	900	1000	1100	1200	1300	1400	
6.00	-3662	-3062	-2462	-1862	-1262	-662	-62	
7.00	-2862	-2162	-1462	-762	-62	638	1338	
8.00	-2062	-1262	-462	338	1138	1938	2738	
9.00	-1262	-362	538	1438	2338	3238	4138	
10.00	-462	538	1538	2538	3538	4538	5538	
11.00	338	1438	2538	3638	4738	5838	6938	
12.00	1138	2338	3538	4738	5938	7138	8338	
13.00	1938	3238	4538	5838	7138	8438	9738	
14.00	2738	4138	5538	6938	8338	9738	11138	
Total expenditure								8462

**TABLE 11: SENSITIVITY OF SUNFLOWER PER HA**

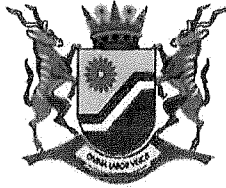
Yield (ton/ha)	Price/ton							
	2400	2650	2900	3150	3400	3650	3900	
0.50	-2187	-2062	-1937	-1812	-1687	-1562	-1437	
0.75	-1587	-1399	-1212	-1024	-837	-649	-462	
1.00	-987	-737	-487	-237	13	263	513	
1.25	-387	-74	238	551	863	1176	1488	
1.50	213	588	963	1338	1713	2088	2463	
1.75	813	1251	1688	2126	2563	3001	3438	
2.00	1413	1913	2413	2913	3413	3913	4413	
2.25	2013	2576	3138	3701	4263	4826	5388	
2.50	2613	3238	3863	4488	5113	5738	6363	
<b>Total expenditure</b>								<b>3387</b>

**TABLE 14: SENSITIVITY OF PEANUTS PER HA**

Yield (ton/ha)	Price/ton							
	3000	3500	4000	4500	5000	5500	6000	
0.80	-3090	-2690	-2290	-1890	-1490	-1090	-690	
1.00	-2490	-1990	-1490	-990	-490	10	510	
1.20	-1890	-1290	-690	-90	510	1110	1710	
1.40	-1290	-590	110	810	1510	2210	2910	
1.60	-690	110	910	1710	2510	3310	4110	
1.80	-90	810	1710	2610	3510	4410	5310	
2.00	510	1510	2510	3510	4510	5510	6510	
2.20	1110	2210	3310	4410	5510	6610	7710	
2.40	1710	2910	4110	5310	6510	7710	8910	
<b>Total expenditure</b>								<b>5490</b>







the **dedet**

Department:  
Economic Development, Environment and Tourism  
MPUMALANGA PROVINCIAL GOVERNMENT

**Details of specialist and declaration of interest in respect of an application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010**

**PROJECT TITLE**

Phola-Kusile Coal Conveyor

<b>Specialist:</b>	Agriculture	
<b>Nature of specialist study compiled:</b>	Agricultural Economic Study (ARC)	
<b>Contact person:</b>	Dr E Gouws	
<b>Postal address:</b>	PO Box 96023, Waterkloof Valley	
<b>Postal code:</b>	0145	<b>Cell:</b> 082-553-3787
<b>Telephone:</b>	012-346-5307	<b>Fax:</b> 012-246-5670
<b>E-mail:</b>	index@iafrica.com	
<b>Qualifications &amp; relevant experience:</b>	PhD (Integrated agricultural development) See attached table for experience. Member of the Soil Science Society of South Africa.	
<b>Professional affiliation(s) (if any)</b>	Member of the South African Council for Natural Scientific Professions: Agricultural Sciences.	

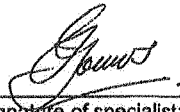


## The specialist appointed in terms of the Regulations

I, Johan Andries Gouws declare that -

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Signature of specialist:

INDEX(PTY) LTD

Name of company:

27 September 2011

Date:



Signature of Commissioner of Oaths

27 SEPT 2011

Date:

Designation:

Official stamp (below)

**CHRISTIAN GOUWS**  
COMMISSIONER OF OATHS  
PRACTISING ATTORNEY (RSA)  
414 SUSSEX AVENUE  
LYNNWOOD, PRETORIA



# J ANDRIES GOUWS

1. PERSONAL DATA				
Family name: Gouws		First Name: Johan Andries		
Year of birth: 12 April 1955				
Nationality: South African				
Contact details:				
Barari Forest Management, Abu Dhabi				
Tel: +971 50 592 5738				
E-mail: andries@barari.ae or index@iafrica.com				
Country of permanent residence: South Africa				
2. EMPLOYMENT RECORD				
Employer's Company Name:	Period of service and length:	Position with the Enterprise:		
Barari Forest Management	Since 2008	Chief Technology manager		
Fundile	2004 - 2008	Technical Director		
Integrated Development Expertise (INDEX)	Since 1993	Managing Director and owner		
South African Development Trust	1984 - 1993	Senior agriculturist, agronomy and planning		
Groeikrag organic Fertilisers	1981 - 1984	Agricultural and technical advisor		
OTK	1979 - 1981	Soil scientist		
3. EDUCATION				
Institution	Length of education	Degree/Diploma obtained:		
University of Pretoria, South Africa	1975 - 1979	BSc. Agriculture		
University of Bloemfontein.	1986 - 1987	BSc. Honours, Agriculture		
Potschefstroom Collage for Agriculture	1981	Diploma: Stereoscopic aerial photo interpretation of natural resources for farm planning		
University of South Africa	1992	Diploma: Financial management		
Trinity University	2007	PhD: Integrated agricultural development		
4. LANGUAGE SKILLS OF RELEVANCE TO THE ASSIGNMENT				
Language:	Formal Education:	Speaking skills:	Reading skills:	Writing skills:
English	Presentation and writing skills	Mother tongue	Excellent	Excellent
Afrikaans	Presentation and writing skills	Mother tongue	Excellent	Excellent
5. PROFESSIONAL EXPERIENCE				
<p>Manager of technology development for Barari Forest Management. The divisions under his control is research and development, geographical information systems, a chemical laboratory, new product development, mangrove consultancy, wildlife management and tourism, and quality control during project implementation.</p> <p>He is personally a specialist in evaluation of farming enterprises, with special reference to vegetation, soil and climate's capacity to accommodate enterprises such as animal production and crops. This includes, for example, assessment of soil, veld conditions (including wetlands), farm layout planning, farm management programmes (maintenance of veld conditions through sound grazing rotation strategies and pasture utilisation) and water quality assessment for agricultural use.</p> <p>He has extensive experience in surveys with GPS, mapping and spatially-based resource analysis through which informed management decisions can be made.</p> <p>His research and development expertise includes modelling of tree performance in relation to soil conditions where they are irrigated with saline water, Effect of well washing on sustainable groundwater yield, irrigation systems evaluation and recommendations on maintenance, identification of trees resistant to saline soil conditions and to insect attack through which superior trees can be produced.</p>				



<b>6. SPECIAL EXPERIENCE FROM DEVELOPING COUNTRIES</b>				
<b>Year:</b>	<b>Project name:</b>	<b>Country:</b>	<b>Responsibility:</b>	<b>Name of Client:</b>
2009	Setting up a GIS system for Barari Forest Management	Abu Dhabi	All technical components	Barari
2009	Financial modelling of the Western Region Forests with the aim of reducing management costs	Abu Dhabi	All technical components	Barari
2009	Business plan to set up a mature tree nursery for Barari	Abu Dhabi	All technical components	Barari
1994/5	Consultancy for the development of an integrated overview of water pollution and associated health risks and knowledge transfer requirements for the implementation of water treatment technology.	South Africa	All technical components	ESCOM
1997	Quantifying the impact of salinisation of South Africa's water resources, with special reference to economic effects	South Africa	Project co-ordinator, water chemistry and financial assessment	Water Research Commission, South Africa
1997/8	Klein & Middle Letaba rivers Water augmentation project: Agriculture & land use	South Africa	Full assignment	Department of Water Affairs and Forestry
1999/2000	Settlement planning for the Daniels Group on a farm at Malmesbury in the Western Cape. A business plan was compiled after a detailed resource assessment, in line with the LRAD redistribution policy of the Department of Land Affairs.	South Africa, Western Cape	Full assignment	Department of Land Affairs, Department of Agriculture
2002	Share equity scheme for the farm Anne's reward at Belfast using the LRAD process. Compilation of a business plan for the settlement of 32 families.	South Africa, Mpumalanga	Full assignment	Department of Land Affairs.
2004/5	Compilation of an EMF for the North-eastern part of Ekurhuleni	South Africa, Gauteng	Agriculture	DACE, Local Municipality
2003/4	Compilation of an EMF for the Western part of Kungwini	South Africa, Gauteng	Agriculture	DACE
1997	Agricultural potential and land use proposals of the south eastern section of the Greyton Communal Land.	South Africa, Western Cape	Full assignment	Compiled for LANOK.
1995	Agricultural opportunities emanating from waste disposal in Komasi, Takoradi-Sekondi and Tamali, Ghana.	Ghana	Agriculture	World Bank and Ministry of Local Government.

<b>6. SPECIALIST STUDIES ON AGRICULTURAL POTENTIAL (selected)</b>		
<b>Year:</b>	<b>Project Name:</b>	<b>Name of Client:</b>
2006	Specialist study: Agriculture and delineation of wetlands, Cloud's End, North-western KwaZulu-Natal.	Rock Environmental Consulting
2003	Specialist Study: Agricultural Potential of the Proposed Featherwood Development	Eco Assessments Cc
2004	Specialist Study: Agricultural Potential of Portions 86, 9, 10 and 25 of Boschkop 369 Jr Riverview Country Estates	Rock Environmental Consulting
2005	Specialist Study: Agricultural Assessment of the Proposed Badirile Bulk Water Pipeline and Water Reservoir	Enviroafrik
2005	Specialist Study: Agricultural Assessment of Holding 24 In the Amarosa Agricultural Holdings In Roodepoort Gauteng	Eco Assessments Cc





2004	Agricultural Assessment Amandasig Extension 16	Lokisa Development Consulting
2005	Specialist Study: Agricultural Assessment of Portion 1 of the Farm Uitsig 208 Iq.	Eco Assessments Cc
2005	Specialist Study: Agricultural Assessment of the Proposed Protea Glen Ext 17	Seaton Thomson And Associates
2005	Aalwynspoort Agricultural Analysis	Seaton Thomson And Associates
2005	Specialist Study: Agricultural Assessment of Holding 51, North Riding Agricultural Holdings, Gauteng	Deon Van Zyl
2005	Southdowns Development Proposal: Agricultural Assessment	Eco Assessments Cc
2005	Agricultural Assessment of Portion 201 of the Farm Wilgespruit 190iq, Gauteng	Holgate & Associates
2005	Specialist Study: Agricultural Assessment - Portions 230 & 231 of the Farm Witfontein 301-Jr -	Seaton Thomson And Associates
2004	Specialist Study: Agricultural Potential of Portion 7 of Modderfontein	Gouws, Uys and White
2005	Specialist Study: Agricultural Potential of Portion 78, Hartebeeshoek, Pretoria North	
2005	Agricultural Potential of Portion 80, Witfontein, Pretoria North	
2006	Agricultural Potential of Farm Donkerpoort	Africanepa
2001	Valaqua Project: Risk Assessment	Valpre
2003	Development Proposals For Straalhoek	Contour Project Managers
2005	Limpopo Critical Economic Development Projects – Cost Benefit Analysis	Limpopo Government
2006	EMF Kyalami	Local Government
2006	Development Proposals: Highbury Estates	
2003	Maruleng Land Care Project - Pre-Feasibility Report: input on agriculture	Limpopo Government
2004	Agricultural Evaluation of the Farms Bedford, Wilgerivier, Ontario, Missouri, Boundary Slopes and Braambosch	ESKOM
2005	Specialist Study: Agricultural Assessment Suickerboschfontein Ptns 8,9,10	African EPA
2006	Agricultural Potential - Holding 7 Winternest Agricultural Holdings -	Landscape Dynamics
2006	Agricultural Potential - Rem of 2, 3, 7 of Schurweberg 488 Jq-	
2005	Specialist Study: Agricultural Potential of Plot 177, Pomona Agricultural Holdings	Deon Van Zyl
2005	Agricultural Assessment of Portion 104 of the Farm Palmietfontein	Eco Assessments
2005	Agricultural Development on a Portion of Ollifantsfontein 410 JR	Eco Assessments
2006	Baseline Study: Agricultural Potential of the Vredefort Dome World Heritage Site	African EPA
2005	Specialist Study: Agricultural Potential & Development Framework of the Site For the Proposed Katberg Golf Estate	Kat Leisure Group
2006	Specialist Study: Agricultural Potential of Portions 4 and 20 To 26 of Farm 1016, Eastern Cape	Siebert Developments
2006	Subdivision and Zoning As Sub-Divisional Area of A Portion of Portion 8 and Portion 9 of Farm 723, East London	Eddie Jackson
2006	Agricultural Potential Study of Farm 282, Portion of Farm 483 and Farm 487	Chintsa Golfing Estate
2006	Agricultural Potential & Development Framework of Dorchester Heights, East London	Metcalf And Associates
2006	Soil Potential and Land Use Recommendations For Kranshoek, Western Cape	Casidra
2006	the Subdivision of Farming Land Is Regulated By Act 70 of 1970	Montiwood Developers
2006	Agricultural Potential & Development Framework of Farms 98, 102 & 106, Eastern Cape	Ages Eastern Cape (Pty) Ltd

**J A Gouws**



