ENVIRONMENTAL BASIC ASSESSMENT FOR THE PROPOSED 134 kV POWERLINE IN WALMER, NELSON MANDELA BAY MUNICIPALITY

Socio-Economic Impact Assessment Report

Final

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1. Introduction

SRK Consulting was commissioned by the Nelson Mandela Bay Municipality to undertake an Environmental Basic Assessment (BA) to facilitate authorisation of the proposed 132 kV powerline from the existing Lorraine 132 kV substation to the existing 132 kV 17th Avenue, Walmer substation in terms of the National Environmental Management Act No 107 of 1998 (NEMA) as amended, and the associated Environmental Impact Assessment (EIA) Regulations, 2014.

As part of this process it is necessary to quantify the socio-economic impacts of the proposed development. SRK Consulting subsequently appointed Urban-Econ Development Economists to undertake this socio-economic impact assessment of Option 1 and Option 2 of the proposed 132 kV powerline (see Section 1.2). This report seeks to identify the various socio-economic impacts associated with the development as well as make high level recommendations on reducing the potential negative impacts of the project in order to enhance the benefits of the development.

1.1 Study goals and objectives

The national guidelines for conducting Environmental Basic Assessment indicate that the overall aim of the process is to inter alia understand the current social and economic environment and use it to assess the impact of a proposed development (DEA, 2014). More specifically, this study seeks to determine and assess potential positive and negative socio-economic impacts of the proposed development (including the alternative route) in order to identify whether the proposed development will have a net positive or a net negative effect on the society and economy. Specific objectives of the study include:

- Generating a profile of the local and regional economy in order to understand the economic dynamics, potential and challenges of the area
- Identifying possible positive and negative socio-economic impacts that could be expected to arise from the project during both the construction and operational phases of the development
- Where possible, quantify socio-economic impacts using an economic model developed on the basis of a Social Accounting Matrix (SAM) or other techniques
- Make recommendations regarding the appropriate management of impacts identified and how best to incorporate these into the proposed development

1.2 Project Background and Locality

The proposed development involves a double circuit 132 kV powerline from the existing Lorraine 132 kV substation to the existing 132 kV 17th Avenue Walmer substation. The proposed route is approximately 2.8 km long and will cross private properties as well as land owned by the Nelson Mandela Bay Municipality.

Two alternative route alignments for the 132 kV powerline have been proposed by the project engineers (see Map 1.1). The route alignment from Lorraine to 17th Avenue Substation follows the railway line from the Lorraine substation, thereafter it crosses Circular Drive and follows the waterway up to 17th Avenue, where it crosses over William Moffet Drive and terminates at the existing 17th Avenue substation.

Due to availability of land only one route was considered between the Lorraine substation and Circular Drive (namely point A to point E). Two alternative routes were investigated from the Circular Drive crossing onwards.

1. **Option 1: Point A,B,C,D,E,F,H,I,J,K & L (Red alignment in Map 1.1)**

   A to E: From Lorraine substation the route follows the railway line up to the point where it swings north to cross erf 271 (this proposed section is overhead using "Petechane" structure type).

   E to K: From the overhead structure at point E the route connects to point K via an overhead structure (either two single monopole circuits or "Petechane" tower). The exact position of point K is dependent upon soil conditions and floodline restrictions

   K to L: From the overhead structure at point K, the alignment then goes via an underground cable, which will go under William Moffet Drive to the eastern side of the existing 132 kV substation. The underground cable will be one uninterrupted length of cable approximately 420 m long.

2. **Option 2: Point A,B,C,D,E1,G,H,I,J,K & L (Orange alignment in Map 1.1)**

   A to E1: From Lorraine substation the route follows the railway line up to the point where it swings north to cross erf 271 (this proposed section will be overhead using "Petechane" structure type).

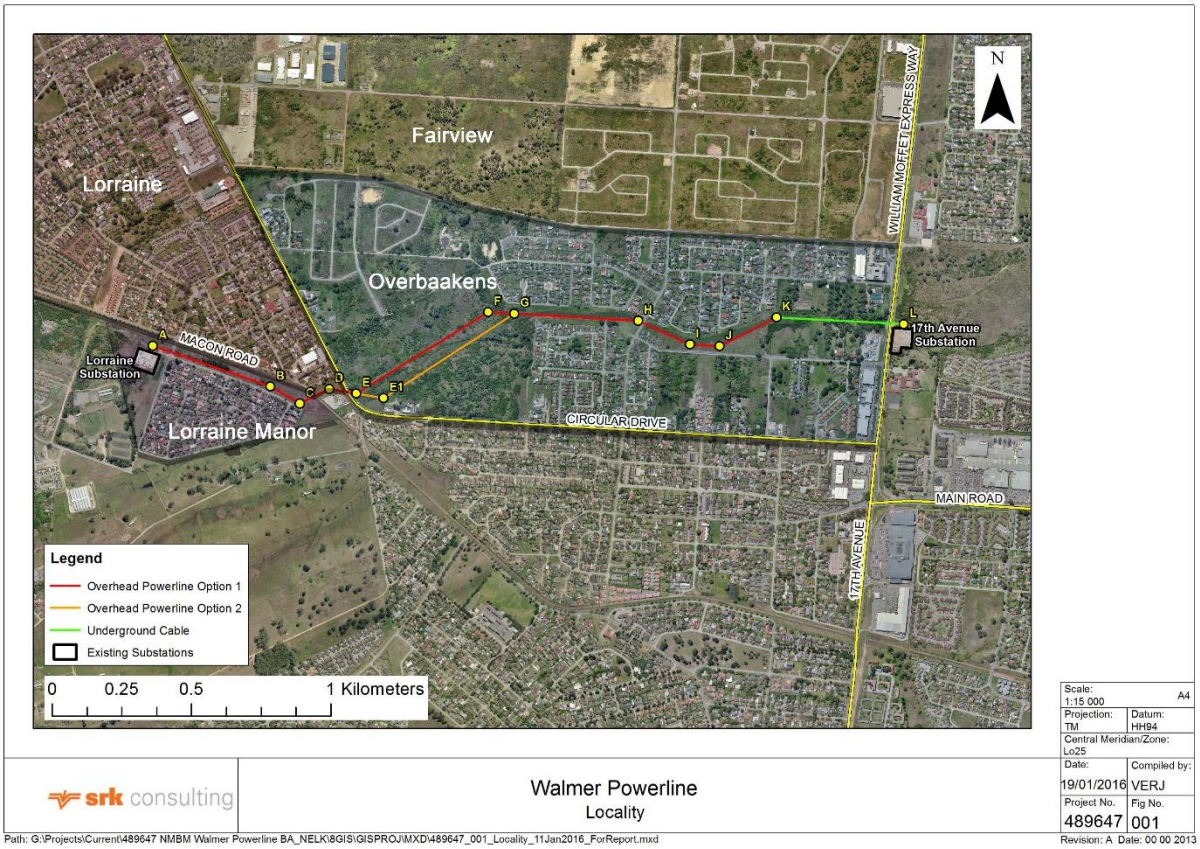
   E1 to K From the overhead structure at point E1 the route connects to point K (on the Northern side of Circular Drive) via an overhead structure (either two single monopole circuits or "Petechane" tower). The exact position of point K is dependent upon soil conditions and floodline restrictions.

   K to L From the overhead structure at point K, the alignment then goes via an underground cable, which will go under William Moffet Drive to the eastern side of the existing 132 kV substation. The underground cable will be one uninterrupted length of cable approximately 420 m long.

The following infrastructure specifications are relevant to the proposed development:

- All overhead lines will be constructed with dual circuit 132 kV monopole self-supporting steel structures, with a servitude width of 25 m;
- Maximum span lengths are limited by line alignment but could be between 140 m and 180 m;
- Should the 'Petechane' tower type be used the servitude may be reduced to 16 m;
- A servitude width of 1.5 m is required for underground cables;
- The powerline will be positioned not closer than 12.5 m from the railway line; and
- Where relevant, tower footing foundations will be specially designed for towers placed near or in a watercourse.

Map 1.1: Site locality



Source: Adapted from SRK (2016a)

The proposed infrastructure is intended to provide for future load growth in the Lorraine, Fairview and Overbaakens area. Many commercial and residential developments are either currently under construction or are envisaged for the area and it is accordingly necessary to increase the existing capacity to meet this additional need.

The proposed powerline runs across two suburbs in Port Elizabeth (Nelson Mandela Bay Metro) namely Overbaakens and Lorraine (refer to Map 1). The proposed powerline will run along open space adjacent to Macon Road Lorraine before crossing Circular Drive. The proposed powerline (as well as the alternative route) will then bisect erf RE/1226[1]. Current development proposals for this erf include the construction of a private hospital, retirement village, residential units and a school. The proposed powerline will then transverse open space in the suburb of Overbaakens before converting to an underground cable to be installed under William Moffet Drive, Walmer.

1.3 Study methodology

1.3.1 Economic Impact Assessment Method

Economic impact studies are undertaken to attempt to measure or estimate the change in economic activity in a particular area, caused by a specific business, project, activity, or other economic intervention. Such an intervention could be to a pre-existing activity or take the form of an entirely new development (e.g. the construction of a powerline).

[1] Powerline Option 1 will also cross a small part of erf 4033, while Option 2 will exclusively be located in erf RE/1226.

Economic impacts generated by an intervention can be disaggregated in terms of the initial or direct impacts that occur when the intervention begins. Such impacts in turn trigger secondary and further flow-on rounds of impacts thereby creating a multiplier effect. This multiplier effect can be either positive or negative in nature.

Projection of the initial impacts and multiplier effects are usually done by employing an input-output model or a General Equilibrium Model. The use of these models in economic impact assessments allows for the quantification of potential impacts in terms of a number of economic indicators such as production, Gross Domestic Product (GDP), employment and income. The scale of these impacts is dependent on the size and diversification of the economy under analysis which in turn determines the leakage. Secondary and cumulative effects can be identified through an expert opinion technique, consultations, development matrices and interviews. Such impacts can be difficult to quantify. Overall, an economic impact analysis that includes the assessment of primary impacts, multiplier effects, secondary impacts and cumulative effects provides a comprehensive assessment of potential impacts of the proposed intervention. It furthermore assists in ranking the intervention using a methodology prescribed by the Department of Environmental Affairs (DEA).

This economic impact assessment made use of the economic models based on the Eastern Cape Social Accounting Matrix (SAM) developed in 2006 and adjusted to represent 2015 figures. The SAM is a comprehensive, economy-wide database that contains information about the flow of resources that takes place between the different economic agents in this case the Eastern Cape economy. The selection of this model in the assessment it attributed to the expected spatial distribution of procurement during both the construction and operational phases of the project.

1.3.2 Impact Evaluation Model

In line with the Regulation 31(2)(l) of the NEMA (Act 107 of 1998) each potential impact identified is clearly described including whether the potential impact will have a positive or negative outcome on the biophysical and/or social environment (thereby providing the nature of the impact) and be assessed in terms of the following factors:

- **Extent** (spatial scale) i.e. Will the impact affect the national, regional or local environment, or only that of the site?
- **Duration** (temporal scale) i.e. How long will the impact last?
- **Magnitude** (severity) i.e. Will the impact be of high, moderate or low severity? and
- **Probability** (likelihood of occurring) i.e. How likely is it that the impact may occur?

The impact assessment is based on sound validated scientific information and professional judgement in the context of the specific project and site conditions. To enable a scientific approach for the determination of the environmental significance (importance) of each identified potential impact, a numerical value has been linked to each factor. The following ranking scales are applicable:

Occurrence	**Probability** 1 – Improbable 2 – Low probability 3 – Medium probability 4 – Highly probable 5 – Definite/don't know	**Duration** 1 – Immediate 2 – Short term (0-5 years) 3 – Medium term (5-15 years) 4 – Long-term (ceases with the operational life) 5 – Permanent
S e	**Extent/Scale**	**Magnitude**

	0 – None 1 – Site only 2 – Local 3 – Regional 4 – National 5 – International	2 – Minor 4 – Low 6 – Moderate 8 – High 10 – Very high/uncertain

Source: Adapted from DEA (2008)

In addition to the above, each impact is evaluated in terms of the following:

- The degree to which the impact can be reversed (Reversible or Not)
- The degree to which the impact may cause irreplaceable loss of resources (Yes or No)
- The degree to which the impact can be mitigated (Yes or No)

Once the above factors had been ranked for each identified potential impact, the environmental significance of each impact can be calculated using the following formula:

Significance = (Duration + Extent + Magnitude) x Probability

The maximum value that can be calculated for the environmental significance of any impact is 100. The environmental significance of any identified potential impact is then rated either high, moderate or low on the following basis:

- More than 60 significance value indicates a high (H) environmental significance impact
- Between 30 and 60 significance value indicates a moderate (M) environmental significance impact
- Less than 30 significance value indicates a low (L) environmental significance impact

In order to assess the degree to which the potential impacts can be reversed and be mitigated, each identified potential impact will need to be assessed twice.

Firstly, the potential impact will be assessed and rated prior to implementing any mitigation and management measures and secondly, the potential impact will be assessed and rated after the proposed mitigation and management measures have been implemented.

The purpose of this dual rating of the impact before and after mitigation is to indicate the significance rating of the initial impact is and should be higher in relation to the significance of the impact after mitigation measured have been implemented.

1.4 Data collection

As part of the data collection process for the socio-economic impact assessment of the proposed 132 kV powerline the following activities were undertaken:

1.4.1 Review of planning documents

In order to document the socio-economic context of the study area within the Nelson Mandela Bay Municipality, a number of important documents or sources of information were reviewed, referenced and used to inform the impact assessment. These documents included:

- Nelson Mandela Bay Municipality: Integrated Development Plan (IDP)
- Nelson Mandela Bay Municipality: Metropolitan Spatial Development Framework (MSDF)
- Draft Walmer Local Spatial Development Framework (LSDF)
- Lorraine Local Spatial Development Framework (LSDF)

1.4.2 Literature Review

In order to substantiate the findings of the socio-economic impact assessment a number of secondary research documents have been considered as they relate to the proposed 132 kV powerline.

These documents include academic journals and studies available on the internet or print media. It is intended that these documents substantiate the baseline profile while at the same time providing context to the project.

1.5 Study area delineation

Study area delineation depends on the type of economic activity that is analysed and the perceived spread of economic impacts that are expected to be generated from the project during both the construction and operational phases. The municipal area where the site is located is likely to experience most of the direct, indirect and induced impacts resulting from the activities on the site; however, it is unlikely that any local economy can be sufficiently diversified to supply all materials and services and support construction and operational activities from start to finish. Economic impacts therefore tend to extend beyond municipal boundaries and spread throughout the entire national economy.

For the purpose of this study both a primary and secondary study area were delineated. These are discussed in more detail in the subsequent section.

1.5.1 Primary study area

The primary study area (hereafter referred to the local area) refers to the locality where the direct economic impacts of the proposed development will be primarily concentrated. The primary study area is defined based on the actual location of the proposed development, proximity too skilled and unskilled labour, position relative to suppliers of products and data availability.

Based on these criteria the Nelson Mandela Bay Municipality was selected as this was the smallest administrative units for which current economic can be obtained. It is, however, possible to obtain social data at a lower administrative level and accordingly socio-economic data is presented for the greater Lorraine area as well as for Overbaakens.

1.5.2 Secondary study area

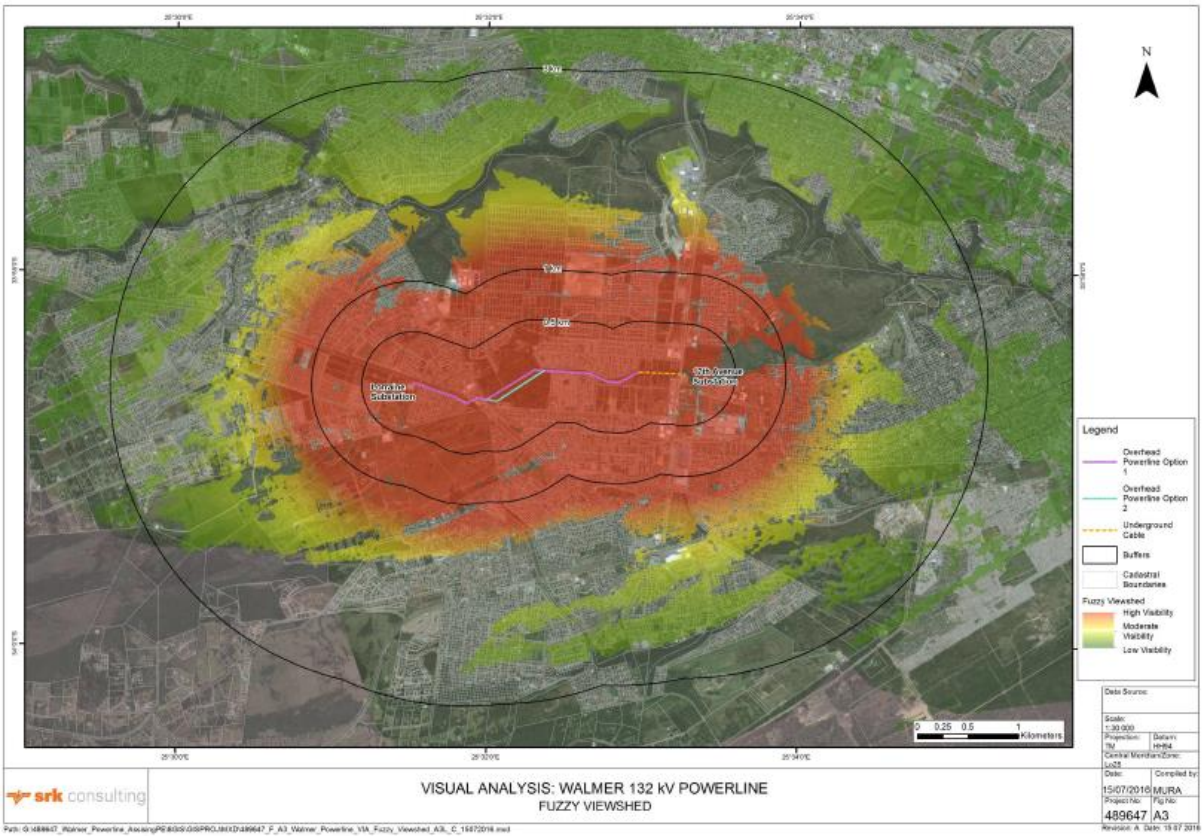
Given that a some of the inputs that will be used during the construction and operational phases of the proposed powerline are likely be sourced from outside of the Nelsons Mandela Bay Municipality, it is probable that some of the indirect and induced effects resulting from the economic impact assessment will accrue to areas outside of the municipality. Accordingly, the secondary study area was demarcated as the rest of South Africa.

1.5.3 Visually affected study area

Through consultation with other specialists on the project team it is evident that one of the more significant environmental impacts associated with the development of the proposed powerline will be

the visual impact. The public participation process also highlighted several concerns about the visual impacts of the proposed powerline, specifically the potential adverse effect on the surrounding property values through this new visual disturbance.

Map 1.2: Visual analysis on the proposed powerline – Fuzzy Viewshed



Source: SRK (2016b)

In order to determine, and where possible quantify, the economic impacts that can potentially be induced by the proposed powerline, a visually affected zone was delineated. This area was restricted to the potential visual exposure that was determined by the visual specialist on the project team. This area is illustrated in Map 1.2 above. Only properties located within this viewshed were considered in the subsequent analysis.

In analysing and interpreting Map 1.2 the following limitations and assumptions should be noted as set out by SRK (2016b):

- A desktop assessment was undertaken, which did not include a site visit.
- The Nelson Mandela Bay 1 metre contour dataset was used in the analysis. The viewshed[2] therefore illustrates the area from which the proposed powerline is likely to be visible. It does not take local undulations, existing vegetation and man-made structures into account. This means that the proposed development may not be visible from everywhere within the viewshed, as the development may be obscured by other existing infrastructure, vegetation or small/localised variations in the topography.

[2] A viewshed is an analysis technique, whereby the visual influence of a given structure is predicted in the landscape.

- A Viewshed Analysis, by nature, is not a purely objective or a quantitative process, but is dependent on the subjectivity of the judgments made. Where subjective judgments are required, appropriate criteria and motivations have been clearly stated.

2. Socio-Economic Profile of the Study Area

This chapter documents various aspects of the primary study area including, population and household numbers, income levels and employment. In addition, the chapter also reviews the economic structure and performance of the study area.

The intention of this review is to provide an overview of the socio-economic context of the area so as to better understand the dynamics of the area and to inform the socio-economic impact assessment process.

2.1 Population, Income and Employment Profile

The Nelson Mandela Bay Municipality falls within the Eastern Cape and collectively accounts for 17.6% of the provincial population, and 19.2% of the households in the province. The two suburbs likely to be impacted by the proposed powerline are Lorraine and Overbaakens which collectively accounted for 1.1% of the Nelson Mandela Bay Municipality's total population in 2011.

Population growth between 2001 and 2011 was 8.1% for Lorraine and 1.9% for Overbaakens. These figures are higher than both the Nelson Mandela Bay Municipality's (1.4%) and Eastern Cape's (0.4%) population growth rates. It is further evident from the figures that Lorraine in particular is a rapidly growing suburb and suggests that there is significant in-migration from other areas in the Nelson Mandela Bay Municipality.

Table 2.1: Overview of the primary study areas population structure, 2011

Indicator	Lorraine[3]	Overbaakens	Nelson Mandela Bay Municipality
Area (km^2)	5.4	3.1	1 959.9
Population	10 623	2 520	1 152 115
Number of Households	4 435	800	324 293
Population density (km^2)	1 950.5	815.6	588.1
Average household size	2.4	3.2	3.6
Population growth rate (2001-2011)	8.1%	1.9%	1.4%
Average monthly household income	R 26 633	R 26 730	R 9 456

Source: Stats SA (2012)

The disposable average monthly income of households in Lorraine and Overbaakens is R 26 633 and R 26 730 respectively. These figures were approximately 182% higher than that of the Nelson Mandela Bay Municipality average (R 9 456). According to Census 2011 (StatsSA, 2012) poverty levels within both Lorraine and Overbaakens are notably lower than both the municipal and provincial averages. In these two suburbs the number of households that earn above R 12 800 per month is between 54.3% and 57.7%. The comparable to a provincial and municipal figures are 9.2% and 17.2% respectively. These figures are indicative of the relative affluence of these areas.

The review of the employment profile of the both suburbs indicates that less than 10% of the economic active population within these suburbs is unemployed (see Table 2.2). The unemployment rates and labour force participation rates in both Lorraine and Overbaakens were also notably better than that of

[3] For the purpose of this demarcation Lorraine includes both the Lorraine and Lorraine Manor sub places.

the greater Nelson Mandela Bay Municipality (Unemployment rate: 37.2%; Labour force participation rate: 58.2%).

Table 2.2: Employment profile of the primary study

Indicator	Lorraine	Overbaakens	Nelson Mandela Bay Municipality
Employed	94.1%	90.6%	63.7%
Unemployment Rate	5.9%	9.4%	37.2%
Not Economically Active	26.9%	25.7%	41.8%
Labour force participation rate	73.1%	74.3%	58.2%

Source: Stats SA (2012)

The low unemployment rates and high labour force participation rates relative to the Nelson Mandela Bay Municipality's average further supports the assertion that both Lorraine and Overbaakens are fairly affluent suburbs.

2.2 Economic Profile

The Gross Domestic Product per region (GDP-R) of the Nelson Mandela Bay Municipality was R 60.5 billion in 2011 (current prices), which collectively account for just over 30% of the Eastern Cape's economy and 2.3% of South Africa's GDP-R (Quantec, 2016). Per capita GDP in the municipality in 2011 was R 52 545 at 2005 prices, which was 72.5% higher than in the Eastern Cape and 1.7% higher than in the rest of South Africa. These figures suggest that Nelson Mandela Bay Municipality is a critically important part of the Eastern Cape economy, and contributes significantly to the economic output of the province.

Table 2.3: GDP-R structure of the Nelson Mandela Bay Municipality between 2005 and 2011 in Constant 2005 prices

Sector	2005	2011	CAGR 2005-2011
Primary Sectors	**0.5%**	**0.6%**	**4.2%**
Agriculture, forestry and fisheries	0.4%	0.5%	4.2%
Mining and quarrying	0.1%	0.1%	4.4%
Secondary Sectors	**28.4%**	**27.5%**	**-0.1%**
Manufacturing	25.6%	23.8%	-0.8%
Electricity, gas and water	0.9%	1.0%	3.5%
Construction	1.9%	2.6%	5.8%
Tertiary Sectors	**71.2%**	**71.9%**	**0.6%**
Trade	13.8%	12.4%	-1.4%
Transport and communication	11.4%	11.6%	0.7%
Finance and business services	22.7%	24.1%	1.4%
Community services	8.1%	8.4%	1.1%
General government	15.2%	15.4%	0.7%
TOTAL REAL GDP-R	**R 42 045 mil**	**R 43 096 mil**	**2.1%**

Source: Quantec (2016)

Over the last six years, the Compounded Annual Growth Rate (CAGR) of the Nelson Mandela Bay Municipality was 0.4% which means that it grew slower than both the provincial (3.1%) and national economies (3.2%) (Quantec, 2016). This can be attributed to the Nelson Mandela Bay Municipality's

dependency on both manufacturing and trade sectors, both of which had performance poorly over the last several years.

Despite the weak performance of the manufacturing and trade sectors, both the construction sector and the primary sectors (i.e. agriculture and mining), exhibited strong positive growth between 2005 and 2011. As indicated in Table 2.3, the construction sector has grown by a strong 5.8%, making it the best performing sector over the last six years. Other sectors that showed the highest growth rates in the area over the period include agriculture, forestry and fisheries (4.2%), mining and quarrying (4.4%) and utilities (3.5%). It is, however, important to note that these three sectors only accounted for a marginal 1.6% of the total GDP-R of the Nelson Mandela Bay Municipality in 2011.

Table 2.4: GDP-R per sector for the Nelson Mandela Bay Municipality in current prices (in R' millions)

Sector	2005	2011
Primary Sectors	**R 198.2**	**R 438.9**
Agriculture and hunting	R 168.3	R 338.7
Mining and quarrying	R 29.9	R 100.2
Secondary Sectors	**R 11 924.7**	**R 13 989.0**
Manufacturing	R 10 756.5	R 11 127.3
Electricity, gas and water	R 366.9	R 947.2
Construction	R 801.2	R 1 914.5
Tertiary Sectors	**R 29 922.0**	**R 46 109.9**
Trade	R 5 809.6	R 9 240.5
Transport and communication	R 4 781.1	R 6 361.9
Finance and business services	R 9 541.6	R 13 999.6
Community services	R 3 411.4	R 5 527.8
General government	R 6 378.3	R 10 980.0
TOTAL GDP	**R 42 044.8**	**R 60 537.7**

Source: Quantec (2016)

As evident by both Table 2.4 and Table 2.5 the agricultural sector, despite strong GDP-R growth has experienced a significant decline in its employment levels between 2005 and 2011. This has resulted in the sector shedding 18.2% of its workforce per annum over a six-year period. This sharp decline in employment could possibly be attributed to the ongoing diversification of the Nelson Mandela Bay Municipality's economy away from primary production.

Table 2.5: Employment structure of the Nelson Mandela Bay Municipality between 2005 and 2011

Sector	2005	2011	Change 2005-2011
Primary Sectors	**6.4%**	**1.8%**	**-17.8%**
Agriculture and hunting	6.2%	1.7%	-18.2%
Mining and quarrying	0.1%	0.1%	-3.1%
Secondary Sectors	26.8%	22.7%	-1.4%
Manufacturing	17.5%	13.4%	-3.0%
Electricity, gas and water	0.2%	0.3%	6.7%
Construction	9.1%	9.0%	1.2%
Tertiary Sectors	**66.8%**	**75.5%**	**3.5%**
Trade	26.5%	25.7%	0.9%
Transport and communication	5.0%	7.2%	7.9%
Finance and business services	10.9%	14.7%	6.5%

Community services	12.9%	14.3%	3.2%
General government	11.5%	13.7%	4.3%
TOTAL EMPLOYMENT	**343 658**	**374 048**	**1.4%**

Source: Quantec (2016)

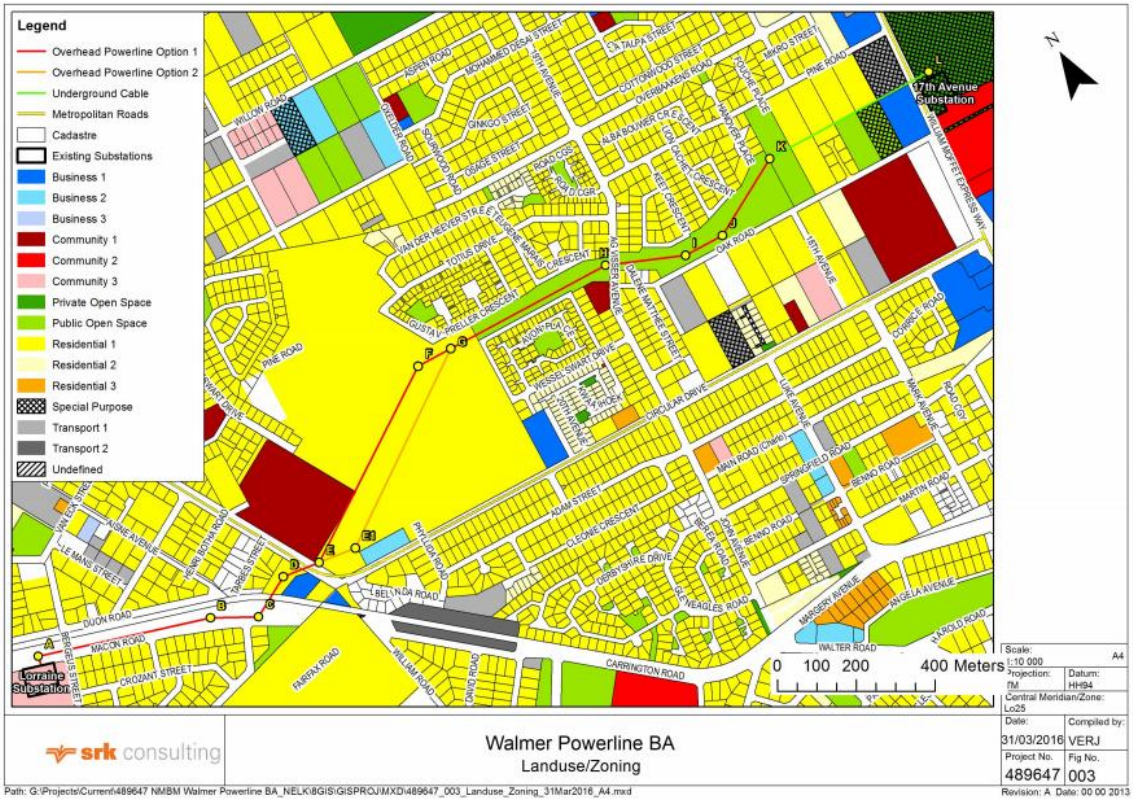
Aside from the primary sectors and the manufacturing industry, all other economic sectors experienced an increase in employment levels between 2005 and 2011. In absolute terms, the finance and business services sector saw the greatest employment growth, creating an additional 17 279 jobs between 2005 and 2011, offsetting the 10 105 jobs lost in the manufacturing sector over the same period. This growth coupled with additional employment created by the trade sector resulted in a positive 1.4% employment growth for the Nelson Mandela Bay Municipality between 2005 and 2011.

During the construction phase of the proposed powerline, employment is likely to be created in the construction sector (albeit temporarily), while during the operational phase employment is likely to be created in the utilities sector.

2.3 Spatial development and composition

In terms of the Draft Environmental Basic Assessment Report the route of the proposed powerline passes through an existing servitude (i.e. points A to C in Map 3), as well as through areas zoned Residential 1 (i.e. points E to G including E1; and K to L in Map 3) and Public Open Space (i.e. points G to K in Map 3). The proposed powerline route also runs adjacent to property zoned Business 1 (point D in Map 3) which is currently being used as a minor retail node (e.g. take-away restaurant). The proposed alternative route (E1 to G) runs adjacent to property zoned Business 2. This property is currently being used as a filling station.

Map 2.1: Land Use Zoning for Proposed Powerline



Source: SRK (2016c)

The proposed powerline, specifically points E to G, crosses Erf 1226 and RE/1226. Although this property is currently undeveloped and Zoned Residential 1 plans are underway to rezone the property and develop the site further. Currently plans for the site include the construction of a new private hospital, retirement village, private school and further residential units.

2.4 Profile of the immediately affected environment

2.4.1 Land use profile

The area surrounding the proposed powerline is comprised of almost exclusively of low density, free standing residential units. As an important growth node in the Nelson Mandela Bay Municipality, however, the area surrounding the proposed powerline has seen significant degree of both commercial and residential development in the last several years. These developments include:

- Higher density residential units along Circular Drive adjacent to Pine Street
- The construction of the Willow Road Shopping Centre
- Redevelopment of the Willow Road/Circular Drive intersection

Some of the other existing retail and other commercial offerings in the immediate area include:

- Gardens Shopping Centre
- Versatile Centre
- Willow Road Business Park
- Walmer Park Shopping Centre
- Moffett on Main
- Fig Tree Centre

It addition to existing investments in the area there are also a number planned developments for the immediate area surrounding the proposed powerline include the following:

- Private hospital
- Retirement village
- Low to medium density residential development
- Private school

Of these proposals, the two most significant are the development of Erf 1226 and Erf 4033. The latter development proposes the development of ten (10) separate medium density residential clusters, a retirement village and access roads on the north-eastern part of Erf 1226. This proposal will necessitate the rezoning of Erf 1226 form Residential 1 to Residential 2 and Residential 3. This will allow the development of a proposed 587 dwelling units as well as a 0.57 hectares of Public Open Space (Urban Dynamics, 2013). In terms of this development it is important to note that this is a Concept Site Development Plan and is only an indication of the proposed development envelope and a final SDP will be submitted to the Nelson Mandela Bay Municipality prior to construction. The development of the Erf 4033 will entail the construction of a private hospital anticipated to open in 2018.

Within close proximity to the proposed powerline are the suburbs of Overbaakens and Fairview. Overbaakens is currently experiencing significant investment. Over the last two years a number of high density, affordable housing units have been built in the area. These new residential units have served as a catalyst for new business investment in the area. The Nelson Mandela Bay Municipality's administration is also actively seeking to develop Overbaakens as a sustainable, integrated suburb with a range of housing typographies for all income groups. Although not yet developed, the Nelson Mandela Bay Municipality's administration has similar development objectives for the suburb of Fairview.

The aforementioned developments as well as the planned future developments are likely to place considerable pressure on existing infrastructure particularly transport and electrical infrastructure. Accordingly, it will be necessary for the Nelson Mandela Bay Municipality to ensure both adequate transport and electrical infrastructure is in place to meet this increased demand.

2.4.2 Property Market Profile

The major growth region in the Nelson Mandela Bay Municipality has not been in the underdeveloped spaces closer to the main business and retail districts, particular in the Circular Drive / Walmer Park area. A large amount of development has taken place in the suburb of Lorraine. Development in this area has focussed predominantly on the lower-middle to upper-middle income markets. Significant development, although on a much smaller scale has taken place in the suburb of Sherwood. Units in this area have focussed on the lower-middle income segment of the market.

In recent years, in line with a number of municipal planning documents, development in the Fairview and Overbaakens has been actively encouraged. This, in conjunction with the commercial developments along William Moffett, have resulted in a sharp rise in the number of residential developments in both these suburbs. This rapid growth is clearly highlighted in Map 2.2 which shows the Fairview and Overbaakens areas between 2011 and 2015.

Area 1 in the images shows the growth in the Fairview area. Despite the availability of affordable land, development in the greater Fairview area has been slow with most growth being concentrated in the area adjacent to Circular Drive. This is due to the outstanding land claim for Fairview which still needs to be finalised. Once this claim is finalised it is highly likely that large scale development of the area will start.

Area 2 shows the nearby suburb of Overbaakens which has performed relatively strongly over the same time period. Most residential property growth in this area has been in medium to high density developments. These residential units have predominately taken the form of two- to four-storey blocks of flats. Many of these housing developments are intended to meet the affordable housing criteria set out by the Department of Human Settlements. This is a particularly attractive market for developers with a high local demand. In addition to these blocks of flats, a number of new freehold properties have also been developed in the area in an effort to create a suburb with multiple housing typographies and affordability levels.

The development of these areas has all been in-line with the vision and planning of the Nelson Mandela Bay Municipality which is promoting the infill of underdeveloped areas within the city to prevent urban sprawl (NMBM, 2015). This trend has been – across the board – for the development in the form of blocks of flats, housing estates or town-house complexes. This follows the trend seen in all major metropolitan housing markets in South Africa (CAHF, 2015).

Map 2.2: Port Elizabeth – Fairview and Overbaakens: 2011 and 2015

2011 **Source:** Google Earth (2016a)

2015 **Source:** Google Earth (2016b)

Table 2.6 provides a summary of the key property market trends in the affected areas of Lorraine (including Lorraine Manor), Fairview and Overbaakens based on individual Lightstone Property (2016) reports for the respective suburbs. Collectively these suburbs account for 6 120 of the residential properties in the Nelson Mandela Bay Municipality.

Lorraine is recognised as one of the fastest growing suburbs in the Nelson Mandela Bay Municipality with approximately 3 591 properties sold between 2006 and 2015 and average annual sales of 165. The suburb is particularly popular with young, first-time home buyers with new buyers between the ages of 18 and 35 years old accounting for approximately 36.0% of all purchases in Lorraine during 2015. This high value is attributable to both the nature of the properties available, the areas proximity to major

retail and commercial centres, as well as the areas overall affordability for middle income earners (i.e. average residential property price between 2006 and 2015 was R 711 150).

Lorraine Manor, which accounts for 2.3% (95) of all residential properties in the greater Lorraine area, is notably more affluent that the rest of the suburb. Average residential property prices in this area are R 974 000, 37.0% higher than the average price for the rest of Lorraine. Property turnover in Lorraine Manor is notably lower than the rest of Lorraine, with only one property being sold in 2015, and, on average, only three properties being sold annually between 2006 and 2015. The low property turnover rate is further highlighted in the average period of ownership, with 57.0% of residential properties in Lorraine Manor being owned for longer than 11 years.

Table 2.6: Property market trends for selected suburbs between 2006 and 2011

	Greater Lorraine			**Fairview**	**Overbaakens**
	Lorraine	**Lorraine Manor**	**Total**		
Number of properties (2015)	4 010	95	4 105	982	1 033
Total Number of Sales					
2015	165	1	166	14	36
2006 to 2015	3 591	35	3 626	76	650
Average number of sales (2006 to 2015)	326	3	330	7	59
Average Selling Price (R' million; 2006 – 2015)	R 711.1	R 974.0	R 798.7	R 894 600[4]	R 546.8
Estimated Cumulative Annual Value of Sales (R' million)	R 232 158.2	R 3 099.1	R 263 302.5	R 6 181.2	R 32 316.2

Source: Lightstone Property (2016a-d)

Fairview remains largely undeveloped with the 982 freehold residential properties located in the suburb, clustered around the northern part of Fairview adjacent to the William Moffett Expressway. Although the average number of property sales between 2009 and 2015 has remained low (7), there has been a sharp increase in property sales since 2009. In 2009 only 6 properties were sold in Fairview but by 2015 this figure had increased 131. Despite this sharp rise in the number of sales, average prices remain comparably low. If the three high value properties sold in 2009 and 2013 are removed from the data, the average selling price decreases to R 213 500 from R 894 600. The low selling price is attributable to the fact that most properties are either undeveloped, or notably smaller than the other study areas.

Overbaakens, particular the area close to Circular Drive, has become an increasingly popular residential suburb as evident by the 650 residential properties sold between 2006 and 2015 – the second highest in the study area after Lorraine. Average residential property prices are also the lowest amongst the various study areas (R 546 889), making it attractive to first time home buyers as evident by the 38.0% of new buyers in 2015 that were between the ages of 18 and 35 years old. Despite the low average selling prices, residential properties closer to Circular Drive are currently on the market at between R 850 000 and R 1 500 000.

The following section provided an overview of the property market in the suburbs of Lorraine (including Lorraine Manor), Fairview and Overbaakens based on individual Lightstone Property reports, Google

[4] It should be noted that no property sales were recoded between 2006 and 2009. In addition, several high value properties were sold in 2009 (R 5 450 000) and 2013 (R 8 600 000). Removing these outliers reduces the average selling price to R 213 500.

Earth imagery and a visual assessment of the area. This information presented in this section will be used to inform the subsequent property analysis (i.e. Section 3.2), which seeks to quantify the potential impact on the proposed powerline on property prices.

3. Impact Assessment Assumptions

This chapter of the report describes the assumptions used in the socio-economic impact assessment study and specifically in the economic modelling exercise which aims to quantify the economic impact of the project. The assumptions presented in this section refer to:

- Construction and operation assumptions applicable to the project as provided by SRK Consulting
- Assumptions associated with the visual impacts resulting from the project and the related potential losses of affected businesses

3.1 132 kV powerline assumptions

The proposed development involves a double circuit 132 kV powerline from the existing Lorraine 132 kV substation to the existing 132 kV 17th venue substation. The length of the proposed powerline is approximately 2.8 km. The assumptions specific to the phases of the project's lifespan are provided in the following paragraphs.

3.1.1 Construction phase assumptions

The following assumptions regarding the construction phase of the proposed powerline are made:

- The construction of the powerline is planned to commence in mid-2017 contingent on the project receiving all necessary regulatory and environmental approval.
- The anticipated duration of the construction phase of the development is approximately 12 months.
- The total investment into the establishment of the powerline for each route (see Map 1.1) is as follows:
    - **Option 1:** R 4 731 700.29 of construction spending.
    - **Option 2:** R 6 990 175.15 of construction spending.
- All of the direct expenditure will be spent within the South African economy.
- Only local expenditure is considered in this analysis.
- All of the construction spend will be incurred in South Africa.
- The construction of the powerline will create an estimated 15 project specific personnel jobs over the course of the project.

3.1.2 Operational phase assumptions

The assumptions regarding the operational phase of the project used in the modelling exercise are as follows:

- The facility is anticipated to begin operating immediately following completion of the construction phase. Based on this, the powerline is anticipated to being operating in the latter part of 2017.
- For the first five years following the construction of the powerline the following annual costs are anticipated:
    - R 60 000 for visual inspections every three months
    - R 80 000 for the regular maintenance of the servitude
- After five years of operating the following additional functions will need to be performed:

    - A climbing inspection which is intended to determine the level of deterioration and may include conductor, insulators or rusted steel costing about R 250 000.
- Approximately 10 people will be employed on an annual basis for bush clearing along the powerline route. A further two artisans as well as four artisan assistants will be employed to undertake maintenance activities on the powerline. These individuals will be part of the NMBM existing staff compliment.

3.2 Assumptions regarding potential impacts on property values due to visual impacts

One of the more important environmental impacts that can be associated with the development, and that can generate negative socio-economic effects for the area, is the visual impact created by the constructed powerline. As described earlier, the immediately affected environment is characterised by low to medium density residential units.

The following paragraphs describe the sensitivity of the residential property market towards the visual disturbance of the proposed powerline and provide an estimation of the potential reduction in property value that could potentially result from the establishment of the powerline.

3.2.1 Existing research regarding sensitivity of property owners to visual disturbances

The area surrounding the route of the proposed powerline is used almost exclusively for residential purposes. During the pre-application phase of the project, certain members of the community exhibited concern that the visual impact and properties proximity to the proposed powerline could negatively impact property values in the area.

In general, any development associated with some negative environmental effects can influence property values in two primary ways:

- Firstly, it can reduce the value of the land if the proposed development has a negative image associated with it. This could be related to the real or perceived adverse effects that the proposed development could have on air quality, noise levels, aesthetics, traffic congestion, health, and crime levels in the area.
- Secondly, the development could increase the demand for surrounding properties and lead to the rise in the area's property values. This could occur in situations where nearby properties are found to carry valuable marketable natural resources or they offer improved accessibility of workers to the facility or other nearby developments.

Impact on real estate and property (i.e. net physical asset value)

Over the years, extensive international studies have been undertaken of the impact of high-voltage transmission lines (HVTL) on the value of residential property. These impacts, however, are not easily measurable. Existing research (Pitts & Jackson, 2007) suggests that HVTL effects residential properties in varied ways based on the interplay of the following five factors namely:

- Proximity to towers and lines
- The view of towers and lines
- The type and size of HVTL structures

- The appearance of easement landscaping; and surrounding topography

A large number of international studies indicate that HVTL has no significant impact on residential properties studies (see Table 3.1). An increasing number of more recent studies, however, have indicated a small reduction in the values attributable to the properties that are in close/immediate proximity of these powerlines.

In such studies, where a negative impact is evident, average discount rates of between 1% and 10% of property values have been found. These reductions in value are attributable to the visual unattractiveness of the powerlines, potential actual and perceived health hazards, disturbing sounds, and safety concerns (Delaney & Timmons, 1992). These impacts, however, diminish as distance from the powerline increases and disappear at a distance of 60 m from the powerlines. Where views of the powerlines and associated towers are completely unobstructed, negative impacts can extend up to 400 m. If the HVTL structures are at least partially screened from view by trees, landscaping, or topography, any negative effects are reduced considerably. It is important to note, that almost all these studies indicate that value reduction attributable to powerline proximity have been shown to be temporary and usually disappear entirely in 4 to 10 years (Kinnard & Dickey, 1995).

Table 3.1: Summary of empirical for studies reviewed

Author	Powerline Type	Effects Found
Kinnard (1967)	Not specified	Most homeowners surveyed did not mind living near a power line. Over 85% said they would purchase again in the same location. Screening a tower or powerline from view through landscaping reduced any negative reactions by homeowners. The owners of higher priced or custom homes had a slightly more negative reaction to the lines. In general, the attitudes of those who influence residential sales were more negative than the attitudes of the homeowners.
Colwell & Foley (1979)	138 kV transmission line	Statistical analysis indicated a reduction of approximately 6% at between 15 m and 61 m from the powerline.
Colwell (1990)	138 kV transmission line	Utilising the same data as Colwell & Foley (1979; see above), the largest negative impact detected was 6.6%.
Rigdon (1991)	138 kV transmission line	Distance to a powerline was not found to be correlated with sales price. No evidence of a relationship between sales price and the proximate distance of recreational properties to a powerline was established.
Delaney & Timmons (1992)	Not specified	Survey based research. Approximately 84% of respondents indicated that the market value of residential property near an HVTL is negatively affected, and the average estimate of the decline in value was 10%**.** The most commonly cited reason for the decline in value was the visual unattractiveness of the lines. About 10% of appraisers surveyed believed the HVTLs had no significant impact on value, and 6% believed that the lines increase the value of a property due to larger yards and additional privacy.

Kung and Seagle (1992)	Not specified	About 50% of respondents said they consider the transmission lines an eyesore. About 72% of those who consider the lines an eyesore said the lines had no effect on purchase price. 87% of respondents claimed that if they had known of potential health risks from the lines, they would have paid less for their home or looked elsewhere.
Hamilton & Schwann (1995)	Transmission lines varying in voltage from 60 kV to 500 kV	A reduction of 6.3% in the value of residential properties adjacent to the easement corridor of 140 metres wide powerline route. More distant properties are scarcely affected, losing on average only 1% of value.
Cowger. Bottemiller, & Cahill (1996)	Transmission lines varying in voltage from 115 kV to 500 kV	On average, homes adjoining a power line in Portland sold for a 0.95% premium, in Vancouver a 1.03% discount, and in Seattle a 1.82% discount. None of these price differences were statistically significant from zero at the 95% confidence level. Therefore, it is assumed that proximity to a transmission line has no substantial effect on the sales prices of these homes. Other factors, such as location, type and condition of improvements, and real estate market conditions, are far more important in determining the value of residential property.
Bond & Hopkins (2002)	110 kV transmission line	With no easement, a 20% reduction in the price of residential property within 10 m to 15 m from the powerline was recorded. This figure decreased to 5% at 50 m, and was negligible at 100 m. This price reduction was significantly higher than a number of other similar studies.
Des Rosiers (2002)	315 kV transmission line	Reductions of between 5% and 12% were recorded for residential properties within close proximity to the powerline. Some properties, however, increased in value due to the easement corridor benefits occurring as a result of the powerline.
Wolverton & Bottemiller (2013)	Transmission lines vary from 115 kV to 500 kV	None of the measures of the effects of abutting an HTVL line were statistically significant. However, results from King county show an average impact of -1.4% and results from Clackamas County show an effect of -3.2%. Washington and Clark County results show a near zero difference.
Sims & Dent (2005)	275Kv transmission line	Within 100 m of a powerline residential property values experienced between 6% and 17% reduction in value.
Chalmers & Voorvardt (2009)	345 kV transmission line	No effect found from the powerlines
EirGrid Plc (2016)	Transmission lines vary from 110 kV to 400 kV	Mixed results. The real estate agent's opinions of negative impact from HVTLs on residential property values in the survey part of the research were 3%, 13% and 20% for 110 kV, 220 kV and 400 kV powerlines respectively. These reductions were significantly higher than that found generally in surveys of property

		professionals in other countries. Statistical analysis did not find a statistically significant negative impact from HVTLs in close proximity to residential properties.

Evidence from existing research also indicates that the negative impact on properties adjacent to or with a direct view of a tower or pylon may be slightly greater than impacts on properties further away from the tower. This is most likely due to the fact that the visual obstruction associated with the tower is more substantial than that of the powerlines themselves. The reduction in value of properties adjacent to or with direct views on the tower may not decrease with time (Colwell, 1990).

Extended marketing period for residential properties adjacent to a tower powerline and slower absorption rates were observed in some studies. If nearby properties are attractively developed, however, the properties abutting a tower powerline right-of-way will sell more quickly (Reese, 1967). It has also been observed that higher-end custom homes are generally more sensitive to the negative impacts of HVTL than lower-end homes (Des Rosiers, 2002).

Although most research indicates that HVTLs have either no significant impact on residential property prices or a slight negative impact, some studies have shown that properties adjacent to, or with views of an HVTL right-of-way actual sell for a premium over more distant lots. This premium is most likely due to improved visual clearance, increased privacy and larger property sizes (Delaney & Timmons, 1992; Des Rosiers, 2002).

While academic literature provides a broad background of findings on the price effects of HVTL, real estate agents and other appraisers can provide additional perspective into property market conditions. Again international literature in this regard is instructive. In interviews conducted by Real Property Analytics (2007) approximately half of the real estate agents and appraisers interviewed said that they had not observed a negative impact on either residential sale prices or days on market due to the presence of the powerlines. According to these real estate agents and appraisers, major factors affecting sale price and marketability of residential properties include:

- Location
- The general economy
- Interest rates
- Inventory (i.e. the number of properties in the area currently on the market)
- Neighbourhood amenities

The remaining real estate agents and appraisers interviewed by Real Property Analytics had observed negative impacts on homes directly adjacent to a powerline right-of-way. These real estate agents and appraises indicated that on average, the price discounts ranged between 2% and 7% for adjacent homes. For homes not directly adjacent but with a view of the powerlines, average price impacts were estimated at between 0% and 5%, depending on the view and proximity to the powerlines. On average, residential properties adjacent to or with a view of the powerlines could anticipate an increase of 0 to 60 days on the market. None of the real estate agents or appraisers that were interviewed as part of this study had observed any negative impacts on residential properties in close proximity to the powerlines, but without a direct view.

Many real estate agents and appraisers indicated that price and marketability effects of HVTL depend on the market conditions at the time of sale. One of the key findings of Real Property Analytics' study

were that the negative effects from powerlines (and from other negative externalises) are evident in a slow market. When demand is strong, these effects diminish. The price effect of the powerline then depends on property characteristics and market conditions.

The impact of the powerlines on residential property values may also be influenced by a buyer's personal preference. Several real estate agents and appraisers indicated that there might not be a market consensus on the impacts of powerlines because some buyers may consider these powerlines a nuisance and an eyesore, while other buyers may not.

Another study undertaken EirGrid Plc (2016) sought to investigate the potential relationship between property values and HVTL in Ireland. In addition to considering existing academic literature, this study conducted structured face-to-face interviews with estate agents as well as undertook a statistical analysis of both rural and urban property transactions in selected regions in Ireland.

The findings of EirGrid Plc mirror many of the other studies with the academic literature review indicating that approximately half of the residential studies considered did not find a negative impact. Where negative impacts were detected they were generally low in the region of 3% to 6% or less. In many cases these negative effects were not statistically significant.

Impacts on residential property diminished rapidly with increasing distance from HVTLs. Where an impact was found it was deemed to be mainly from the visual impact of HVTLs with no evidence appearing that would suggest that health concerns were adversely impacting prices. Where negative impacts were found there is evidence to suggest that they generally decrease with time.

While the EirGrid Plc did not specifically look at 132 kV powerlines (i.e. they considered 110 kV, 220 kV or 400 kV HVTL), the structured surveys indicated an, on average, a reduction in value of 3% for 110 kV HVTLs. The statistical analysis of the sales data for both residential properties, in contrast, showed that prices paid were closely associated with features of the properties such as location, size and year of sale of the property. Additional information related to HVTLs was then added into each of these models in order to determine (a) whether the added HVTL information assisted further in explaining the difference in price between properties and (b) if so, what the size of that impact was. This study, at a 95% confidence level, did not find a statistically significant negative impact from HVTL in close proximity to residential properties.

The studies reviewed, while having some inconsistencies in their detailed results, generally pointed too small or no effects on sales price due to the presence of HVTLs. Some studies found an effect but this effect generally dissipated with time and distance. The effects that were found ranged from approximately 2% to 9%. Most studies found no effect and in some cases a premium was observed. This was attributed to the additional open area usually behind the residence created by the transmission line easement.

In summation, the impacts of powerlines on residential properties are varied and difficult to measure. The impacts from powerlines, as well as other negative externalities, depend on many factors, including market condition, location, and personal preference.

3.2.2 Assumptions regarding the extent of visual disturbances on affected properties

Using the visual impact index map developed by SRK Consulting (see Figure 1.2) in respect of the proposed powerline, assumptions with regard to the sensitivity of residential households towards the visual impact where made.

The first step was determining the extent to which particular suburbs demarcated in the study area (see Section 1.5) would be visually affected by the proposed powerline. This determination was based on the following factors:

- The visual index determined by SRK Consulting
- The extent to which the visual impact would spread over the entire property
- The existing and future visual disturbances (i.e. existing power lines, proposed hospital) in the area

The results of this assessment are presented in Table 3.2. Values presented in Table 3.2 represent the percentage of residential properties in the respective suburbs that are likely to have a high to moderate visibility of the proposed powerline. The selection of areas that have a high to moderate degree of visual exposure to the proposed powerline is based on the finding of the literature that indicates that distant properties experience almost no impact from HVTL.

These percentages were then applied to the average number of residential property sales within each suburb (see Table 2.6) in order to apportion these sales based on the likelihood that they would be impacted by the proposed powerline.

Table 3.2: Percentage of residential properties per study area with high to medium visual impact

Study Area	Properties with high to medium visual impact[5]
Lorraine	42%
Lorraine Manor	100%
Fairview	84%
Overbaakens	100%

This study acknowledges the limitations of this approach, particularly the fact that historic sales within affected suburbs may all have occurred inside or outside of the area visually impacted by the powerline. Furthermore, the location of historic sales is also not necessarily a good predictor of the location of future sales.

3.2.3 Estimation of potential property value reductions due to visual disturbances

Using the outcomes of the research reviewed in Table 3.1, three scenarios relating to the potential impact of the proposed powerlines on the value of residential properties were specified. These scenarios are then applied to the average annual cumulative value of total property sales (see Table

[5] In order to calculate the percentage of properties that were affected by the proposed development an overlay analysis in ArcMap 10 was undertaken to determine which residential erfs had between a medium and high degree of exposure based on the fuzzy viewshed. Erf coverage was based on whether or not the centroid was covered. A visual analysis was then undertaken in order to ensure that the results were accurate.

2.6) in order to establish the potential negative impact for an average year as a result of the proposed powerlines. The three scenarios are as follows:

Table 3.3: Three scenarios for the impact of the proposed powerline on property values

Scenario	Description	Probability/Likelihood
Low	There is no reduction in the average sell prices of properties in the affected areas.	75%
Medium	Residential properties in the affected areas experience a **2.5% reduction** in their average selling price	19%
High	Residential properties in the affected areas experience a **4.9% reduction** in their average selling price	6%

The results of the estimated potential reduction in the cumulative value of property sales that could occur as a result of the proposed powerline are presented in Table 3.4. It is important to note when interpreting these results that, should any reduction in cumulative property sales values occur, it will be **once-off** (i.e. it will not recur on an annual basis and will not be sustained).

Table 3.4: Potential estimated reduction in cumulative property value sales associated with visual impact (R' thousands; 2016 prices)

Study Area	Scenario		
	Low	Medium	High
Lorraine	-	R 2 469.3	R 4 849.5
Lorraine Manor	-	R 77.3	R 151.9
Fairview	-	R 130.5	R 256.3
Overbaakens	-	R 806.3	R 1 583.5
Total	**-**	**R 3 483.4**	**R 6 841.2**

As indicated in Table 3.4, the potential reduction in the value of property sales due to the construction of the proposed powerline could range from R 0 to R 6.8 million in 2016 prices. At an individual property level (see Table 3.5), potential reductions in value range from between R 7 564 (Lorraine, Medium scenario) to R 47 726 (Lorraine Manor, High scenario). It should be noted, however, the varying probability levels for the respective scenarios, with the Low scenario being the most probable (75.0%).

Table 3.5: Potential estimated reduction in individual property value associated with visual impact (R' thousands; 2016 prices)

Study Area	Scenario		
	Low	Medium	High
Lorraine	-	R 7.6	R 14.9
Lorraine Manor	-	R 24.3	R 47.7
Fairview	-	R 18.9	R 37.1
Overbaakens	-	R 13.6	R 26.8

It is also important to note that, should a reduction in property values depicted in Tables 3.4 and 3.5 occur, this reduction would only persist for a limited period of time, with the impact of any reduction diminishing over time. As per the literature reviewed in Section 3.2.1, this duration could be as little as one year. Over the long-term, the value of properties in the study area is unlikely to be negatively affected as the powerline will become part of the surrounding built environment.

4. Evaluation of Impacts as a Result of the 132 kV proposed powerline

This chapter of the report seeks to describe and evaluate the economic and social impacts that are expected to occur as a result of the development of the powerline. This chapter also provides a net effect and trade off analysis of the development of the proposed powerline.

4.1 Defining Economic Impacts

Economic impacts can be defined as the effects (positive or negative) on the level of economic activity in a given area(s). The net economic impact is usually measured as the expansion or contraction of an area's economy, resulting from the changes in (i.e. opening, closing, expansion or contraction of) a facility, project or programme.

4.1.1 Temporal Nature of Impacts

All new projects/interventions have two basic types of investments namely an initial capital injection/expenditure (CAPEX) which can take the form of either a greenfield development (i.e. new construction project on vacant land) or brownfield development (i.e. a modification of an existing structure and there is an annual investment made to maintain/operate the investment).

The economic impacts created by a capital injection (CAPEX) are once-off impacts that will occur for the duration of construction. Thus economic impacts associated with the construction phase are not sustainable economic impacts. Operational economic impacts, unlike capital expenditure economic impacts are sustainable and thus are calculated as an annual impact based on operational expenditure (OPEX) for a given year.

It is important to note that because of this temporal nature CAPEX and OPEX impacts cannot be added together to determine the „total" economic impact.

4.1.2 Types of economic impacts

The net economic impact of an exogenous change in the economy will be translated according to various direct and indirect economic effects, as are defined below:

- **Direct economic impacts:** are the changes in local business activity occurring as a direct consequence of public or private activities in the economy, or public programmes and policies. Furthermore, increased user benefits lead to monetary benefits for some users and non-users (individuals and businesses) within the geographical area:

    - For affected businesses, there may be economic efficiency benefits in terms of product cost, product quality or product availability, stemming from changes in labour market access, cost of obtaining production inputs and/or cost of supplying finished products to customers. For affected residents, benefits may include reduced costs for obtaining goods and services, increased income from selling goods and services to outsiders, and/or increased variety of work and recreational opportunities associated with greater location accessibility.

- **Indirect and induced impacts:** The direct benefits to business and the residents of communities and regions may also have broader impacts, including:

    - Indirect business impacts – business growth for suppliers to the directly affected businesses and potential growth of municipal revenue due to raised taxes and service levies.
    - Induced business impacts – business growth as the additional workers (created by direct and indirect economic impacts/effects) spend their income on food, clothing, shelter and other local goods and services.

4.1.3 Economic impacts considered

The direct and indirect economic impacts listed are measured according to the following broad economic variable categories:

- **Production/Business Sales**: refers to the value of all inter- and intra-sectoral business sales generated in the economy as a consequence of the introduction of an exogenous change in the economy. Explained more simply, new business sales equate to additional business turnover as a result of the introduction of an exogenous change in the economy (e.g. the construction of a powerline).

- **Contribution to GDP-R**: 'Gross Domestic Product per Region' (GDP-R) is a broader measure of the full income effect. This measure essentially reflects the sum of wage income and corporate profit generated in the study area as a result of an exogenous change in the economy.

- **Employment**: Refers to the employment resulting from the construction or operation of the project under investigation.

Using the Input/Output model methodology, various anticipated direct and indirect economic impacts of construction and operational phases of the proposed powerline have been quantified. These economic impacts have been derived using an understanding of economic cause-effect relationships. The principle of cause-effect is that for any economic action, there can be a multitude of different economic reactions (effects).

4.2 Construction phase impacts

The following sections indicate the positive and negative impacts that are likely to occur during the construction phase of the proposed powerline. Where applicable, the construction phase impact for each Option is specified. When no Option is specified, the construction phase impact and associated ratings occurs equally in both options.

4.2.1 Positive impacts during construction

a) Temporary stimulation of the national and local economy

The proposed powerline will cost between R 4.7 million and R 6.9 million (2016 prices) to establish depending on option selection. This expenditure on the project will stimulate the local and national economies albeit for a temporary period of up one year.

As indicated in Table 4.1 it is estimated that the project will increase the production in the country by between R 11.7 million and R 17.3 million in 2016 prices based on route selection, which will translate into an additional between R 4.0 million and R 5.9 million of Gross Domestic Product per Region (GDP-R) (see Table 4.1). These effects will take place for one year.

Table 4.1: Estimated impact on the national and local economies – CAPEX (R' thousands, 2016 prices)

Indicator	Direct	Indirect	Induced	TOTAL
Impact on Production				
Option 1	R 4 731 700	R 5 176 868	R 1 841 701	**R 11 750 269**
Option 2	R 6 990 175	R 7 647 824	R 2 720 759	**R 17 358 758**
Impact on Gross Domestic Product per Region				
Option 1	R 1 348 496	R 1 707 470	R 956 745	**R 4 012 711**
Option 2	R 1 992 142	R 2 522 458	R 1 413 407	**R 5 928 007**

The greatest effects on production and GDP-R stimulated during construction activities will be created through the multiplier effects, specifically through a combination of production and consumption induced effects. The former refers to the impact generated along backwards linkages when the project creates demand for goods and services required for construction and subsequently stimulates the business sales of the suppliers of inputs that are required to produce these goods and services. The latter refers to the effects of household spending which is derived from an increase in salaries and wages directly and indirectly stimulated by the project's expenditure.

Based on preliminary estimates by SRK Consulting it is estimated that all of the direct spend will be spent within local economies. It should be noted that actual final figures will depend on the choice of suppliers and contracts as well as their procurement strategies. Local spending will generate between R 4.7 million and R 6.9 million of the total direct impact on production depending on route selection and by between R 1.3 million and R 1.9 million of the total direct impact on GDP-R. Besides the value added that could be generated by local construction businesses through sub-contracting agreements and employment of free-lancers, the sectors that are expected to benefit the most from the production and consumption induced effects are tertiary services such as trade, transport services, and insurance.

A portion of the goods and services required for construction will be procured outside of the local economy (i.e. Nelson Mandela Bay Municipality). The South African spend will also result in between R 7.0 million and R 10.3 million in additional business sales through the indirect and induced impacts depending on route selection.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Short	High	Highly probable	High	+	High
Management Measures							
○ The developer should encourage the contractor to increase the local procurement practices and promote the employment of people from local communities, as far as feasible, to maximise the benefits to the local economies. ○ The developer should engage with local authorities and business organisations to investigate the possibility of procuring construction materials, goods and products from local suppliers were feasible.							

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
After Management	National	Short-term	High	Highly probable	High	+	High

b) Temporary increase employment in the national and local economies

The proposed powerline is anticipated to create 15 Full Time Equivalent (FTE) employment positions over the course of the development (see Table 4.2).

As evident by Table 2.5 the construction sector in the Nelson Mandela Bay Municipality employing 33 627 people in 2011 (Quantec, 2016). Given the size of the construction sector within the municipality it is anticipated that there will be sufficient local labour to satisfy the demand for 15 construction workers.

Table 4.2: Estimated Full Time Equivalent positions to be created during construction

Indicator	Direct	Indirect	Induced	Total
Option 1	15	1	0	16
Option 2	15	1	0	16

Beyond the direct employment opportunities that will be created by the project during the construction phase the development will also have a positive spin-off effect on the employment situation in other sectors of the national and local economies. Through the procurement of local goods (i.e. consumption induced effects) the project will support an additional one FTE employment position.

Based on these figures the total contribution of the proposed powerline towards employment creation in South Africa is estimated at 15 FTE employment positions for both options. Throughout the construction phase it is recommended that the developer encourage the contractor to fill as many local positions as possible using labour with the Nelson Mandela Bay Municipality.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Short	High	Highly probable	High	+	High
Management Measures							
o Recruit local labour as far as feasible o Employment labour-intensive methods in construction where feasible o Sub-contract to local construction companies particularly SMMEs and BBBEE compliant enterprises where possible o Use local suppliers where feasible and arrange with the local SMMEs to provide transport and other services to the construction crews.							
After Management	National	Short	High	Highly probable	High	+	High

c) Temporary increase in household earnings

The proposed powerline will create a total of 16 FTE employment positions during construction generating between R 785 109 (Option 1) and R 1.1 million (Option2) of revenue for the affected households in the country through direct, indirect and induced effects depending on route selection. Of

this figure between R 256 910 (Option 1) and R 379 534 (Option 2) will be paid out in the form of salaries and wages to those individuals directly employed during the construction phase. The remaining values of between R 528 119 (Option 1) and R 780 313 (Option 2) in households' earnings will be generated through indirect and induced effects resulting from project expenditure. Given the average household size in the Nelson Mandela Bay Municipality and South Africa was 3.6 and 3.6 respectively, a total of 39 people are likely to benefit from the employment positions created and the income derived through these 11 FTE employment positions.

Although temporary, this increase in household earnings will have a positive effect on the standard of living within these households. The average annual salary that will be paid to people employed in the construction of the facility will be R 58 988.16, with this figure varying significantly based on the respective skill levels and job specifications of the employee.

	Spatial Extent	**Duration**	**Magnitude**	**Probability**	**Significance**	**+-**	**Confidence**
Before Management	National	Short	Moderate	Probable	Medium	+	High
Management Measures							
o Recruit local labour as far as feasible to increase the benefits to the local households o Employ labour intensive methods in construction where feasible o Sub-contract to local construction companies where possible o Use local suppliers where feasible and arrange with local SMME's and BBBEE compliant enterprises to provide transport, catering and other services to the construction crews							
After Management	National	Short	Moderate	Probable	Medium	+	High

d) Temporary increase in government revenue

The construction of the proposed powerline will generate revenue for the government during the construction period through a combination of personal income tax, VAT, companies tax etc. Additional government revenue will also be earned through corporate income tax. Government earnings will be distributed by national government to cover public spending which includes amongst others the provision and maintenance of transport infrastructure, health and education services as well as other public goods.

	Spatial Extent	**Duration**	**Magnitude**	**Probability**	**Significance**	**+-**	**Confidence**
Before Management	National	Short	Low	Highly probable	Medium	+	High
Management Measures							
o None suggested							
After Management	National	Short	Low	Highly probable	Medium	+	High

4.2.2 Negative impacts during construction

a) Negative changes to the sense of place

A community's sense of place is developed over time as it embraces the surrounding environment, becomes familiar with its physical properties and creates its own history (Lynch, 1981). The sense of place is created through the interaction of a number of different factors such as the areas visual resources, its aesthetics, climate, culture and heritage as well as the lifestyle of individuals that live in and visit the area (Steele, 1981). Most importantly, it is a highly subjective matter and dependent on the demographics of the population that resides in the area and their perceptions regarding trade-offs.

For example, a community living in poverty is generally more likely to be accepting of industrial development that promises employment opportunities while a more affluent residential area is more likely to oppose such a development on the grounds that the development is likely to have an adverse impact on property values.

The area proposed for the development as well as its surrounds does not currently have any large scale industries or high rise buildings. **Existing powerlines in close proximity to the new development** have a very **similar visual footprint** to the proposed new powerline. Accordingly, most **properties that have a high degree of visual exposure** to the proposed new powerline **already have a high degree of visual exposure to the existing powerline**. This existing powerline along with the railway line are the dominant infrastructural elements that affect the visual resources in the area. Given the above characteristics the area can be defined as being largely residential. Any rapid changes that significantly alter the characteristics that define the areas sense of place could potentially have a negative impact.

During the construction of the proposed powerline there are likely to be noise impacts caused by the movement of vehicles as well as construction activities on site. These impacts are anticipated to occur primarily during the day with some limited illumination from the site being experienced during the night. The presence of this noise is likely to alter the way the surrounding environment is experienced by households in the area. As construction activities progress and the footprint of the facility grows, the visual impact will also become more apparent and the sense of place experienced by households residing within the visually affected area will be altered further.

It is anticipated that households residing on properties within +/- 500 m from the construction of the powerline will experience the greatest disruption in their sense of place during the construction period. These individuals will, over the course of the construction phase of the project, be subjected to either visual or noise disruptions that are currently not present in the area.

The sense of place at the properties located adjacent to or beyond the site of the proposed powerline will also be affected to some extent. The visual exposure on all these properties during the construction phase will not be continuous given the proximity of some of the properties from the proposed powerline. Nevertheless, the knowledge of the powerline near the properties and the fact that it could be seen from some parts will still have a negative connotation and will alter the sense of place experienced by the households residing on these properties.

As stated the sense of place of local residents is likely to begin to alter once the construction of the proposed powerline begins. Visual impacts will, however, remain for the entire operation of the development. This means that although the effect on the sense of place could be relatively small considering the population to be affected, the duration of the impact increases it significantly.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	Local	Long	Moderate	Highly probable	Medium	+	High
Management Measures							
○ Natural areas that are not affected by the footprint should remain as such. Efforts should also be made to avoid disturbing such sites during construction ○ Construction activities should be kept to normal working hours according to the Noise Control Regulations in terms of the Environmental Conservation Act (Act 73 of 1989) ○ Activities that may disrupt neighbours must be preceded by notice being given to the affected neighbours at least 24 hours in advance ○ Equipment that is fitted with noise reduction facilities must be used as per operating instructions and maintained properly during site operations							
After Management	Local	Long	Low	Highly probable	Medium	+	High

b) Temporary increase in social conflicts associated with the influx of people

Despite the Nelson Mandela Bay Municipality being sufficiently diversified to supply the required workforce for the construction of the proposed powerline, it is highly unlikely that this workforce will be drawn from the surrounding area. Workers involved in the construction of the proposed powerline will therefore be traveling to the site on a daily basis.

The influx of construction workers into the area could result in social conflicts between the local population, existing construction workers currently operating in the area and this new workforce. Likewise, the influx of people into the area, could potentially lead to a temporary increase in the level of crime, illicit activity, waste and possibly a deterioration of the health of the local community through the spread of infectious diseases.

Addressing the challenges related to potential social impacts is best done in partnership with all stakeholders in the area, specifically the affected and adjacent property owners, ward councillor and municipality. This would promote transparency, information sharing and help build good relationships between all affected parties.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	Local	Medium	Low	Highly probable	Medium	-	High
Management Measures							
○ Establish a management forum comprising key stakeholders to monitor and identify potential problems that may arise due to the influx of workers to the area ○ Assign a dedicated person to deal with complaints and concerns of affected parties ○ Litter collection bins should be provided and appropriately placed within the contractor's site camp and on site, and should be regularly cleared							
After Management	Local	Medium	Low	Improbable	Low	+	High

c) Impact on property and land value in the immediately affected area

Based on existing research it is estimated that the construction of the proposed powerline could result in a reduction in property values of between R 0 (75% probability) and R 6.8 million (6.0% probability). This equates to a reduction in individual property values of between R 7 564 (Lorraine, Medium scenario) to R 47 726 (Lorraine Manor, High scenario). A detailed more detailed discussion of impact of the proposed powerline on property values is presented in Section 3.2.

In viewing these figures it is important to note that, should a reduction in property values occur, it is highly probable that this reduction would only persist for a limited period of time. Furthermore, any impact that does occur would likely diminishing over time.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	Local	Long	Moderate	Low	Low	-	Medium
Management Measures							
o Meet with the affected owners and discuss their concerns over property and land values, as well as educate and inform them on the potential environmental impacts that could ensue o Mitigation measures to reduce the impact on the sense of place should also be implemented							
After Management	Local	Long	Low	Low	Low	+	Medium

4.3 Operational phase impacts

The following section describes the impact that the proposed powerline will have once it is operational. The proposed powerline is anticipated to be permanent which means that the impacts observed during this phase, regardless of whether the impacts are positive or negative, will be long-lasting.

4.3.1 Positive impacts during operations

a) Sustainable increase in production and GDP nationally and locally

Proposed powerline will require annual operational expenditure of R 320 000 for the first five years after which an additional R 250 000 may be required in order to address routine maintenance and/or component replacements.

The total impact on production in the country as a result of the powerline's operations will equate to R 657 490 in 2016 prices per annum and R 1.1 million in the fifth year after completion. Aside from the utilities sector, industries that will experience the greatest stimulus from the project will include electrical machinery and apparatus, insurance, and transport service.

Table 4.3: Estimated impact on the national and local economies – OPEX (R' thousands, 2016 prices)

Indicator	Direct	Indirect	Induced	TOTAL
Impact on Production	R 320.0	R 202.1	R 135.3	**R 657.4**
Impact on GDP-R	R 170.7	R 43.6	R 27.2	**R 241.6**

Due to the annual spending on labour and procurement of local goods and services required in the maintain the proposed powerline, almost all of these new business sales will be generated on an annual

basis in the Nelson Mandela Bay Municipality through the multiplier effects. Only a very small proportion of the annual production resulting from the powerlines operations will be accounted for in other parts of the country.

It is estimated that the project will directly generate R 170 745 of value add per annum. Through indirect and induced effects, an additional R 70 889 of GDP-R will be generated per annum, which means that the total impact of the project on the national GDP-R will equate to R 241 634 per annum in 2016 prices.

In addition, many commercial and residential developments are envisaged by landowners in and around the proposed powerline development. These new developments will require additional electrical capacity to be installed. The construction of the powerline will therefore help to contribute to the further economic development of the area.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Long	Moderate	Highly probable	Medium	+	High
Management Measures							
o The operator responsible for the maintenance of the powerline and servitude should be encouraged to, as far as possible, procure materials, goods and products required for the operation of the facility from local suppliers to increase the positive impact in the local economy							
After Management	National	Long	Moderate	Highly probable	Medium	+	High

b) Creation of sustainable employment positions nationally and locally

The ongoing maintenance and monitoring of the proposed powerline will create 16 permanent employment positions irrespective of the route selection all of which will be retained for the lifespan of the powerline. Aside from the direct employment opportunities, the powerline will support one FTE employment positions created through the production and consumption induced effects. Due to the spatial allocation of procurement spending and direct employment created, most of the indirect and induced positions will also be created within the local area.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Long	Moderate	Highly probable	Medium	+	High
Management Measures							
o Where possible, local labour should be considered for employment so as to increase the positive impact on the local economy o As far as possible, local small and medium enterprises should be approached to investigate the opportunities to supply maintenance services							
After Management	National	Long	Moderate	Highly probable	Medium	+	High

c) Improved standards of living for benefiting household

The creation of 17 FTE employment positions throughout the country will generate R 83 495 of additional personal income (2016 prices), which will be sustained for the entire duration of the powerline's lifespan. Given the average household size in affected local municipalities and nationally, this increase in household earnings will support up to 61 people. The sustainable income generated as a result of the project's operation will positively affect the standard of living of all benefitting households.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Long	Moderate	Probable	Medium	+	High
Management Measures							
o Where possible, local labour should be considered for employment so as to increase the positive impact on the local economy o As far as possible, local small and medium enterprises should be approached to investigate the opportunities to supply maintenance services							
After Management	National	Long	Moderate	Probable	Medium	+	High

d) Sustainable increase in national and local government revenue

The proposed powerline will, through salaries and wages payments, contribute towards both local and national government revenue. This will occur at a national level with the revenue derived from the payment of salaries and wages to permanent employees involved with the maintenance of the powerline will contribute to the national fiscus. Although it is impossible to trace exactly how such revenue is allocated, any additional revenue generated means that national governments can increase its spending on public goods and services.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	National	Long	Low	Highly probable	Medium	+	High
Management Measures							
o None suggested							
After Management	National	Long	Low	Highly probable	Medium	+	High

e) Provision of electricity for future development

Strengthening of the electricity network in the surrounding area will benefit both residents and business owners, in that the reliability of the current supply will be increased and residences and businesses who do not currently have access to electricity may obtain access. In addition, the engineering team for the proposed 132 kV powerline suggest that it will help to unlock further development in the surrounding suburbs of Fairview, Lorraine and Overbaakens. Construction of the powerlines is therefore not anticipated to limit the expansion potential of the residential or commercial areas.

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	Local	Long	High	Highly probable	Medium	+	High
Management Measures							
o None suggested							
After Management	Local	Long	High	Highly probable	Medium	+	High

4.3.2 Negative impacts during operations

a) Negative changes to the sense of place

The effects on the community's sense of place will initially be felt during the construction period and will continue into the operational phase. The assessment of the negative change in the sense of place provided for the construction phase covers the effects during the operational phase due to the long term duration of the effect.

b) Negative impact of Electro-Magnetic Field (EMF)

The proximity of residential and commercial properties to the proposed powerline has the potential for Electro-Magnetic Field (EMF) exposures and possible associated health risks. The health effects associated with EMF exposure that have received the most attention are cancer, reproductive effects and neurobehavioral effects.

EMF fields are known to interact with tissues by inducing electric fields and currents in them. The electric currents induced by EMF fields commonly found in the typical human environment, however, are normally much lower than the strongest electric currents naturally occurring in the body such as those that control the beating of the heart.

There is no convincing evidence that exposure to EMF fields below currently accepted international exposure limits causes direct damage to biological molecules, including DNA (WHO 2001). Since the evidence suggests that it is unlikely that EMF fields could initiate cancer, a number of investigations have instead focused on whether EMF exposure can influence cancer promotion or co-promotion. Results from animal studies used in the health risk assessments have been mostly negative (WHO, 2001).

Over 80 occupational studies have examined magnetic fields as a potential risk factor for a variety of cancers (WHO, 2001). A few of these studies also considered electric fields as a risk factor. These studies have varied widely in the design, types of study subjects, methods of exposure assessment, outcomes considered and quality.

Despite the large number of studies published, several endpoints have not been rigorously examined in a sufficient number of studies. As the methodology of studies improved, the estimates of risk have become lower, making it unlikely that these studies are failing to identify a high risk. Nevertheless, a sufficient uncertainty remains as to the potential of EMF involvement in the causes of cancer. Therefore, even a small risk associated with EMF exposure could have important public health consequences.

Accordingly, the International Commission for Non-Ionizing Radiation Protection (ICNIRP) specified guidelines for EMF exposure in 1998 and subsequently updated these guidelines in 2010. These guidelines recommend the maximum Electric and Magnetic Fields allowable for limiting EMF exposure and subsequently protecting any individuals from any adverse health effects. Eskom has likewise published a study that sets minimum servitude boundaries for powerlines in order to limit adverse EMF exposure (Eskom, 2006).

	Spatial Extent	Duration	Magnitude	Probability	Significance	+-	Confidence
Before Management	Site only	Permanent	Low	Probable	Low	+	High
Management Measures							
o No buildings shall be constructed within the powerline servitude o During maintenance activities, NMBM personnel should ensure that no vagrants stay within the powerline servitude							
After Management	Site only	Permanent	Low	Probable	Low	+	High

4.4 Net effect and trade-off analysis

The review of the proposed powerline is associated with both positive and negative socio-economic impacts. In order to assess whether the project is beneficial, the additions to the environment brought about by the project need to be evaluated. The additional benefits of the intervention are the difference between the reference case position (i.e. the no-go option) and the position if the intervention is implemented. It involves the evaluation of the net effect and trade-offs associated with the proposed intervention.

Table 4.4 provides a summary of the socio-economic gains and losses that could be expected to occur as a result of the project (i.e. construction and operation). Where gains and losses are quantifiable, figures have been included into the table in order to illustrate the total gain or loss during a particular phase. Where it was possible, local impacts were also quantified. These included direct as well as production and consumption induced impacts that could ensue from the direct effects.

Table 4.4: Summary of socio-economic gains and losses for the proposed powerline

Impact	Total gains	Total Losses	Net Effect
Construction (once-off)			
Production			
Option 1	R 11.7 million	None	Positive
Option 2	R 17.3 million	None	Positive
Employment			
Option 1 and 2	16	None	Positive
Household income			
Option 1	R 785 109	None	Positive
Option 2	R 1.1 million	None	Positive
Government Revenue	Low	None	Positive
Social conflicts	None	Slight increase	Negative
Property Values	None	R 0 – R 6.8 million; Low probability of occurring	Negative

Operation (permanent)			
Production	R 657 490	None	Positive
Employment	17	None	Positive
Household income	R 83 495	None	Positive
Government Revenue	Increased investment and rise in property values (and taxes) due to additional development capacity	Loss in property taxes through potential reduced residential values	Positive
Provision of electricity	Unlocking surrounding area for further development and ensuring reliable energy supply	None	Positive
Sense of place	-	Perceived visual aesthetic	Negative
EMF	None	Low probability of increased health issues related to EMF	Negative

The following can be concluded from the data presented in Table 4.4:

- *During construction:* The comparison of gains and losses associated with the project during the construction phase of the project indicates that gains related to production, employment, government revenue and household income outweigh the expected losses with regard to the same indicators. This shows that from a pure economic perspective the project's construction would be beneficial to the local economy which is affected by a relatively high unemployment level. The project will however bring some form of disruption in the lives of the local communities. Furthermore, there is a low probability that the property values of residential properties will be affected. The main trade-off during the construction phase would therefore be between the economic net benefits that would accrue in the local economy and the socio-economic dis-benefits experienced by the local communities. The positive net effect on the economy though is deemed to be greater than the negative net effects that can ensue from the project.

- *During operations:* The project is associated with a greater set of positive net impacts than negative net impacts. It is also evident that when considering the effects of the project on production, employment, income and government revenue it is associated with greater potential gains than losses. Locally, the project is also associated with greater positive economic gains than losses, especially in respect of community benefits, employment and household income. Net negative impacts that can ensue from the project are expected to relate to the loss of sense of place, and potential health concerns related to EMF. The impact on the sense of place will be caused by changes in aesthetics and visual resources of the environment and can be mitigated although not entirely eliminated. Nevertheless, the positive net effects are expected to outweigh the net negative impacts.

The review of the net effects of the project and the trade-offs between positive and negative impacts suggest that positive net effects would outweigh the negative net effects. This is largely due to the fact that the project is expected to have a positive net impact on economic development, employment, household earnings and government revenue in the country and most importantly in the local community that experiences a high unemployment rate. The net negative impacts that are expected to occur as a result of the project will be much more localised and would affect a significantly smaller number of households than in the case of the net benefits that would be derived by the project.

In addition to the net effects outlined in this section, it is important to note that the proposed powerline is envisioned to meet future load growth requirements in nearby Fairview, as well as commercial developments along William Moffet Drive and Circular Drive. It is probable that without the establishment of the proposed powerline the future economic development of the area will be stunted.

5. Key Findings and Recommendations

This report contains the analysis of the socio-economic impact assessment for the proposed 132 kV Walmer Powerline. The proposed development involves a double circuit 132 kV powerline from the existing Lorraine 132 kV substation to the existing 132 kV 17th Avenue Walmer substation. The proposed route is approximately 2.8 km long and will cross private properties as well as land owned by the Nelson Mandela Bay Municipality. The powerline is planned to be built over a 12-month period. Once construction is completed the powerline is anticipated to be permanent.

The purpose of the socio-economic impact assessment is to determine, and where possible, quantify the potential socio-economic impacts that can result from the proposed powerline. It compares various scenarios and, based on these, provides recommendation in respect of the most beneficial option. The study made use of the economic modelling technique based on the Social Accounting Matrix to quantify the potential positive and negative impacts of the project where feasible and applicable.

The following paragraphs outline the key findings of the study and provide recommendations on the way forward.

5.1 Baseline assessment

The study includes an overview of the socio-economic characteristic of the study area to understand the context within which the proposed powerline is to be established.

The review of the local municipality's socio-economic characteristics revealed that the Nelson Mandela Bay Municipality's economy was relatively large and dependant on the manufacturing and services sector. Importantly, the manufacturing sector which generated over 25% of the municipality's GDP in 2005 has contracted significantly and lost more than 10 000 employment opportunities in the last seven years.

In 2011, the suburbs of Lorraine and Overbaakens had a combined population of approximately 13 143 as well as population growth trends that suggest notable in-migration. This figure suggests that the area is a popular, fast growing residential area which is likely to experience high future demand for services. The average household income for the two suburbs was between R 26 633 and R 26 730 per month in 2011 – approximately 182.0% higher than the rest of the municipality. This is in correlation with the low unemployment rate (5.9% - 9.4%) and a relatively high labour participation rate. All of these figures suggest that households in the Lorraine and Overbaakens have a relatively high standard of living and are better off, on average, than households in other parts of the municipality.

Suburbs surrounding the proposed powerline have been identified by the Nelson Mandela Bay Municipality as rapidly growing areas, with a large number of developments including a private hospital, school and retirement village anticipated to come online in the near future. The high residential demand is reflected in the approximately 4 352 properties that have been sold in Lorraine, Overbaakens and Fairview between 2006 and 2015. Average selling prices for residential properties in the area range from R 546 889 in Overbaakens to R 974 000 in Lorraine Manor.

5.2 Key modelling assumptions

For the purpose of the study, the following key assumptions were used:

- Project-related assumptions:
    - *Construction phase*: The proposed powerline will cost between R 4.7 million and R 6.9 million to build, all of which will be spent in South Africa. It is estimated that 15 Full Time Equivalent employment positions.
    - *Operational phases*: The powerline will be a permanent built feature and will cost R 320 000 per annum to operate and maintain over the first five years. After five years a climbing inspection will be required that may require additional expenditure of R 250 000. This ongoing maintenance will create 17 permanent employment positions.
- Assumptions related to effects of visual impacts on local economic activities:
    - Depending on the visual exposure of affected residential properties as well as the individual buyer's preferences property values in the area may be affected.
    - Based on three proposed scenarios, the potential reduction in cumulative sales values could be between R 0 to R 6.8 million in 2016 prices.

5.3 Impacts associated with the proposed powerline

The proposed powerline will generate both positive and negative impacts starting from the construction period and continuing into the operational phase. The following paragraphs and tables summarise the key socio-economic impacts that were identified to have the potential to occur during the different phases.

5.3.1 Impacts during construction

During the construction phase, the proposed powerline will have both positive and negative effects on the socio-economic environment.

The project is anticipated to make a contribution towards the national and local economy. It is estimated that a total of R 16.3 million of new business sales, R 5.5 million of GDP-R and 11 employment positions will be generated by the project in the national economy through multiplier effects. Aside from the above positive effects, the powerline will also increase household earnings for those individuals working on the project. The increase in household earnings is also likely to improve the standards of living of the affected households albeit temporarily.

Aside from the positive impacts though, the proposed powerline will be creating negative direct, secondary and cumulative impacts on the local community, specifically areas surrounding the sites where the proposed powerline is to be built. The main factors that will cause this negative impact are (1) the influx of workers and (2) visual disturbances that would be created by the construction activities that could adversely impact property prices.

Visual and noise disturbances are anticipated to have various secondary and cumulative impacts particularly on individual's sense of place. This could contribute to a reduction in the value of properties in nearby areas.

Potential negative impacts can be mitigated, although some more successfully than others. Visual impacts though cannot be eliminated although it is possible to reduce their significance. The summary of the significant socio-economic impacts during construction is provided in Table 5.1.

Table 5.1: Summary of construction phase impacts resulting from the proposed powerline

Impact	Type	Before Mitigation	After Mitigation
Temporary stimulation of the national and local economy	Positive	High	High
Temporary increase in employment in the national and local economies	Positive	High	High
Temporary increase in household earnings	Positive	Medium	Medium
Temporary increase in government revenue	Positive	Medium	Medium
Impact on the sense of place experienced by the local community as a result of the visual and noise effects that last until the end of the operational lifespan of the powerline.	Negative	Medium	Medium
Temporary increase in social conflicts associated with an influx of people	Negative	Medium	Low
Impact on property and land values in the immediately affected area	Negative	Medium	Low

5.3.2 Impacts during operations

During the operation of the proposed powerline the socio-economic impacts are likely to last longer when compared to those observed during the construction phase. This is the case for both positive and negative effects.

The operation of the proposed powerline will generate R 657 490 of new business sales and create about 17 sustainable FTE employment positions due to ongoing maintenance costs. These new business sales and employment opportunities will likely be created in the local economy, which will positively influence local government revenue and the standard of living of the affected households.

Aside from the stimulation of the local and national economy, the project could lead to some production and employment losses, and also potentially losses to property and business values. This is related to the potential changes to the aesthetics and visual resources of the area which could impact property values.

As in the case with the impacts observed during construction, negative effects can be mitigated and positive impacts enhanced. Mitigation of the negative impacts though will not result in their complete elimination as visual disturbance of the nature inherent to the project are difficult to eradicate entirely. Nevertheless, the significance ratings of the negative impacts are expected to be somewhat reduced.

Table 5.2: Summary of operational phase impacts resulting from the proposed powerline

Impact	Type	Before Mitigation	After Mitigation
Sustainable increase in production and GDP nationally and locally	Positive	Medium	Medium
Creation of sustainable employment positions nationally and locally	Positive	Medium	Medium
Improved standards of living of benefiting households	Positive	Medium	Medium
Sustainable increase in national and local government revenue	Positive	Medium	Medium
Provision of electricity for future development	Positive	Medium	Medium
Impact on the sense of place	Refer to the rating for the construction phase		

Negative impact of EMF on health	Negative	Low	Low

5.3.3 Net effect and trade off analysis

The assessment of the proposed powerline, or its net effect from a socio-economic perspective, indicates that the project would generate greater socio-economic benefits during both the construction and operational phases than the potential losses that could occur as a result of its establishment. Stimulation of production, employment, government revenue and household income as a result of the investment in the project and its subsequent operations will outweigh possible property value reductions as a result of changes in the areas aesthetic and visual resources.

The positive effects generated by the project will not entirely offset many of the negative impacts. These include impacts on the sense of place and property values that could occur during both construction and operation and crime and social conflicts in the area that could be created during only the construction phase. These impacts will manifest either temporarily or over the long term. These impacts are not highly significant and can be traded off for the net positive impact created by the project in terms of production, employment, government revenue, development benefits households' earnings, and increased electricity supply. This means that when compared with the no-go option, the proposed powerline is associated with greater socio-economic benefits.

Table 5.3: Summary of the net effect on the socio-economic environment

During construction		**During operations**	
Net effect on production	Positive	Net effect on production	Positive
Net effect on employment	Positive	Net effect on employment	Positive
Net effect on household income	Positive	Net effect on household income	Positive
Net effect on government revenue	Positive	Net effect on government revenue	Positive
Net effect on sense of place	Negative	Net effect on electricity supply	Postive
Net effect on property and business values	Negative	Net effect on sense of place	Negative
Net effect on economic and social infrastructure	Negative	Net effect of EMF on public health	Negative

5.4 Recommendations

Based on the information presented in this report, the following can be recommended from the socio-economic perspective:

- The net positive impacts associated with the development and operation of the proposed powerline is expected to outweigh the net negative effects. The project is also envisaged to have a positive stimulus on the local economy and employment creation, leading to the economy's diversification, a small reduction in the unemployment rate and the opening up of the area for further development. The proposed powerline should therefore be considered for development. It should however be acknowledged that the potential negative impacts would be largely borne by the nearby residential properties, whilst the positive impacts will be largely concentrated in the local and national economies. Due to this imbalance, it is recommended that the mitigation measures suggested be strictly adhered. The application of these mitigation measures will ensure that the negative impacts on the nearby residential properties is minimised and that the distribution of the potential benefits of the project are more balanced.

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