10 IMPACT ASSESSMENT

The Impact Assessment will highlight and describe the impact to the environment following the abovementioned methodology and will assess the following components:

- Geology;
- Climate;
- Surface Water;
- Topography;
- Soils;
- Land Capability
- Land Use;
- Flora;
- Fauna; and
- Visual Assessment.

The impact assessment was undertaken for the construction, operational and decommissioning phases of the project. The impact of each line/route alternative was also assessed separately, however, where the impact was not significantly different, only one impact assessment was undertaken. Also, at the time of writing this report, no technical data was available as to the type of tower to be used for the construction of the transmission lines. Therefore, it is assumed that the Self-supporting strain and suspension tower type would be used. Contained in this assumption is that the maximum distance between towers would be 300 m and that the tower would be erected on concrete footings with dimensions of 2 x 2 x 2 m (area = 4 m^2 and volume = 8 m^3).

10.1 Construction Phase

During the construction phase, the 400 kV power lines will be erected. A 400 kV Transmission line requires a servitude width of 55 m. Where there are physical constraints such as other power lines adjacent to the new servitude, a minimum of 35 m-separation distance from such lines is required. Without physical constraints, parallel lines will have at least 55 m-separation distance. The power line cables are strung between pylons / towers, which are steel structures erected on concrete footings fixed in the substrate (soil or rock) below the pylon.

The major impacts during construction are the construction activities associated with the erection of the power lines and include, amongst others, heavy vehicle movement, construction of an access road and any wastes generated.

10.1.1 Geology

Initial Impact

Impacts that could occur to geology are limited to the physical removal of geological strata, resulting in permanent damage to those strata. However when placing pylons on ridges damage may occur to the shallow strata. When placing pylons in valleys there no indication of damage due to the depth of the geological strata which lies well below the surface ground level. There are no present indications that any existing impacts to geology have ocurred and therefore there is no initial impact rating

Additional Impact

The additional impact resulting from the power line construction could occur because of power line construction on the rocky ridges (depending on which alternative is selected); the impact would be limited to the construction of the pylon footings. Impact to the geological strata may occur due to which alternative is selected. If Alternative 1 is selected, for example approximately 60 pylons could be placed on ridges, which would equate to 240 footings. This would result in a combined area 1 920 m^3 of geological strata would be disturbed. This Low impact could probably occur along other ridges as existing servitudes exist and these possible servitudes may provide alternative routes for the proposed constructed power lines. This results in a final impact class of **Low** as rated in the table below for a selected Alternative. If Alternative 1 is selected than the impacts would be much larger because of the greater distance covered.

TABLE 39: GEOLOGY ADDITIONAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Geology	VERY LOW	*Isolated sites*	Long Term	*Probably*	Low
	1	**1**	**4**	**4**	**1.6**

Cumulative Impact

Since there is no initial impact, the cumulative impact is the same as rated for the additional impact above.

Mitigation Measures

The following mitigation measures are proposed:

- No blasting is undertaken on site without a suitable blast design , compiled in line with relevant SANS codes and approved by an appropriately qualified proffessional.;
- Topsoil and subsoil strata should be stripped separately;
- Disturbed areas are profiled and stabilised, and erosion control measures are installed in places identified as being at risk of erosion. Methods of stabilisation may include: brushcut packing,

mulch or chip cover, straw stabilising, sodding, hydroseeding, soil binders, gabions, reno mattresses, armourflex, retaining walls;

- Excavation of any material on site is done in accordance with the relevant SANS codes;
- All disturbed areas are profiled and stabilised, and erosion control measures are installed in places identified as being at risk of erosion. Methods of stabilisation may include: brushcut packing, mulch or chip cover, straw stabilising, sodding, hydroseeding, soil binders, gabions, reno mattresses, armourflex, retaining walls; and
- Clear demarcation of excavation areas, topsoil storage areas, subsoil storage areas, and construction hard parks should be undertaken with painted stakes and / or fences prior to commencement of construction activities.

Residual Impact

If so for any reason any geological structure is encountered, it should not be removed. The pylon footings must be placed directly on that geological structure. The impact is **Very Low** over a long period. The impact class is very low. The only concern is the amount of pylons placed on ridges, which may lead to a much larger impact over a greater distance

TABLE 40: GEOLOGY RESIDUAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Geology	VERY LOW	*Isolated sites*	Long Term	*Unlikely*	Very Low
	1	***1***	**4**	**2**	**0.8**

10.1.2 Topography

Initial Impact

There are no initial impacts present on site except for existing infrastructure. These include existing roads fences and power lines. None of these has affected the topography as existing power lines follow the topography and no shaping of the landscape is need.

Additional Impact

As mentioned above the power lines follow the topography of the landscape and no landscaping is needed.

TABLE 41: TOPOGRAPHY ADDITIONAL ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Topography	VERY LOW	*Isolated sites / proposed*	Long Term	*Practically impossible*	Very Low

		site			
	1	***1***	**4**	**1**	**0.4**

Therefore, from Table 41 above, the significance will be VERY LOW, occur in ***Isolated sites / proposed site*** and will be Long Term and is ***Practically impossible*** to occur, resulting in a rating of 0.4 or a Very Low impact class.

Cumulative Impact

Since there are no initial impacts the cumulative impacts are the same as above.

Mitigation Measures

- Temporary storm-water control measures should be installed in case a rain event should occur that has the potential to cause erosion of exposed soil;
- Cut-off drains must be installed to facilitate the control of surface water runoff velocities;
- Storm-water control barriers should be used to divert surface water runoff into grassland buffers and not directly into the exposed workings;
- Stockpiles of soils and material should be located on high ground out of the reach of flood flows; and
- Stockpiles will be sited in areas demarcated for such purposes prior to the commencement of construction activities.

Residual Impact

Should the need arise to grade the power line route, it can be mitigated by ensuring that the grading only takes place for the area immediately under the pylons. Thus, restricting the impacted area to a small footprint under the pylons.

TABLE 42: TOPOGRAPHY RESIDUAL IMPACT ASSESMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Topography	VERY LOW	*Isolated sites / proposed site*	Long Term	*Unlikely*	Very Low
	1	***1***	**4**	**2**	**0.8**

From Table 42 it can be seen that the Residual Impact Assesment will be VERY LOW, occur in ***Isolated sites / proposed site*** and will be Long Term and is ***Unlikely*** to occur. The rating of 0.8 places the Residual Impact Assesment in a Very Low impact class.

10.1.3 Soils, Land Capability and Land Use

Soils, land capability and land use need to be grouped together, because the type of soil will determine the capability of the land and what the land can be used for in the future. If the soil is arable, then it is suitable for farming and the land use will be farms.

The land use of the site is divided up into three sections. The land use in the area is divided up into land that is used for agriculture, land used for industry and land that are used for urban areas. Approximately 80% of the area that the existing servitudes and Alternative 2 run along is used for agriculture. Urban areas are located closer to Pretoria and Johannesburg. A Hard Park will need to be constructed but will be taken down after construction.

Agricultural areas and livestock grazing areas that are impacted due to existing power line servitudes. If other Alternatives are selected that don't run along existing servitudes there will be a greater impact compared to areas that have existing servitudes. Other existing impacts are the existing pylon footings and cultivation of soils.

Initial Impact

The soils within the study site have been impacted on already by the existing infrastructure and surrounding farmlands.

TABLE 43: SOIL AND LAND CAPABILITY INITIAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soils	Moderate	*Study Site*	Long Term	*Is ocurring/Has Occured*	Moderate
	3	**2**	**4**	**5**	**3**

The Initial Impact Assesment to soils, land capability and land use as calculated in Table 43, is MODERATE, occurs in ***Study sites***, is Long term and ***Has occurred***, resulting in a rating of 3 or a Moderate impact class.

Additional Impact

The adittional-impact of the proposed power lines will be the loss of the soil as a resource and therefore render the land not suitable for any other use. This would occur under the power lines at the concrete footings, as well as along the access road. For Alternative 1 and 3 with existing servitudes, roads may not need to be consrtucted, but for Alernative 2 a haul road will need to be constructed for access. The road will remain and act as a servitude for Eskom employess and maintainace staff.

TABLE 44: SOIL IMPACT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soil, Land Capability and Land Use	LOW	*Study Sites*	Long Term	*It's going to happen*	Moderate
	2	***2***	**4**	**5**	**2.6**

The additional impact to soils, land capability and land use will be LOW, occur in *Study Site* , is Long term and *It's going to happen*, resulting in a rating of 2.6 or a Moderate impact class.

TABLE 45: SOIL AND LAND CAPABILITY ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 1 AND 3

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soil, Land Capability and Land Use	VERY LOW	*Isolated sites /proposed sites*	Long Term	*It's going to happen*	Moderate
	1	***1***	**4**	**5**	**2**

The addirional impact to soils, land capability and land use for Alternatives 1 and 3 will be VERY LOW, occur in *Isolated sites/proposed sites* , is Long term and *It's going to happen*, resulting in a rating of 2 or a Low impact class.

TABLE 46: SOIL AND LAND CAPABILITY ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVES 2

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soil, Land Capability and Land Use	Moderate	*Study Sites*	Long Term	*It's going to happen*	Moderate
	3	***2***	**4**	**5**	**3**

The additional impact to soils, land capability and land use will be MODERATE, occur in *Study Site* , is Long term and *It's going to happen*, resulting in a rating of 3 or a Moderate impact class.

Cumulative Impact

The cumulative impact, as rated in Table 47 below, will be LOW, occur in the *Study area* and will be Long Term and *It's going to happen / has occurred.*

TABLE 47: SOIL, LAND CAPABILITY AND LAND USE CUMULATIVE IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soil, Land	MODERATE	*Study area*	Long Term	*It's going to happen / has*	

Capability and Land Use				*occurred*	
	3	***2***	**4**	**5**	**3**

Mitigation Measures

- Demarcate topsoil and subsoil stockpile areas, berms, and storm-water management features prior to the commencement of construction activities;
- At least 300mm of topsoil (or until refusal) must be stripped and stockpiled separately;
- Strip sub-soils and stockpile adjacent to the working area in close proximity to the final footprint;
- Stockpiles are to be located on high ground out of the reach of flood flows;
- Sub-soil stockpiles should be sited upslope of the development site, and shaped to channel storm-water runoff around the site and disturbed areas;
- Topsoil stockpiles are to be sited outside of the development footprint;
- Use berms to minimise erosion where vegetation is disturbed, including hard parks, plant sites, borrow pit and office areas;
- Spread absorbent sand on areas where oil spills are likely to occur, such as the refuelling area in the hard park; and
- Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility.

Residual Impact

Mitigation measures include, amongst others, the stripping and stockpiling of soil excavated for construction. This would ensure that the soil could be re-used elsewhere in the project area or utilized for rehabilitation purposes

10.1.4 Surface Water

Surface water features are demarcated as sensitive because of the high variety of fauna and flora that occur in the area. Areas such as rivers, dams and wetlands provide habitats for many plant and animal species that are endangered, which makes these areas very sensitive and of a high conservation status.

Initial Impact

There are a number of streams and drainage lines that have been dammed which may have caused damage to down stream aquatic life. The presents of agriculture and urban areas will also have had an affects on surface water flow. The construction of the existing power lines have had minimal affect on surface water flow

TABLE 48: SURFACE WATER INITIAL IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	VERY LOW	*Isolated sites / proposed site*	Medium Term	*Could happen*	Low
	1	***1***	**3**	**3**	**1.6**

The initial impact for surface water is VERY LOW, occurs in ***Isolated sites / proposed site*** and will be Medium Term and ***It's going to happen / has occurred***. This results in a rating of 1.6 or a Low impact class.

Additional Impact

The construction of the proposed power lines should have no affect on drainage lines because of the distance found between pylons, but it should be noted that many drainage, streams, rivers and wetlands cross over the proposed and existing lines, It must be noted that buffer zones should be in place to project sensitive aquatic areas.

Waste generated during the construction phase may enter the environment through surface water runoff i.e. litter or pollution such as hydrocarbons can be washed into aquatic systems affecting those systems negatively. Storm-water flowing over the site will also mobilise loose sediments, which may enter the surface water environment affecting water quality. Storm-water containing sediment can be discharged to grassland buffers to ensure sediments fall out prior to water entering surface water bodies. Care must be taken that storm-water containing hydrocarbons and other pollution sources are not discharged.

TABLE 49: SURFACE WATER ADDITIONAL-IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	VERY LOW	*Isolated sites / proposed site*	Medium Term	*Could Happen*	Very Low
	1	***1***	**3**	**3**	**1**

The additional impact for surface water is VERY LOW, occurs in ***Isolated sites / proposed site***, will be Long Term and ***Could Happen*** to occur. This results in a rating of 1 or a Very Low impact class.

Cumulative Impact

Alternative 1 and 3 follow existing servitudes and Alternative 2 is the proposed line that does not follow an exiting servitude and crosses over the Bronkhorstspruit Dam. The distance that the line has to cross is estimated at 175 m, which falls within the maximum distance of the pylon construction.

TABLE 50: SURFACE WATER CUMULATIVE IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	LOW	*Study area*	Long Term	*Could happen*	Low
	2	***2***	**4**	**3**	**1.6**

The Cumulative impact, as rated in Table 50 aboce, will be LOW, occur in the *Study area* and will be Long Term and *It's going to happen / has occurred.* This results in a rating of 1.6 or a Low impact class.

Mitigation Measures

- Demarcated areas where waste can be safely contained and stored on a temporary basis during the construction phase should be provided at the hard park;
- Waste is not to be buried on site;
- Hydro-carbons should be stored in a bunded storage area;
- All hazardous materials inter alia paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment;
- Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur;
- Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented;
- A storm-water management plan, including sufficient erosion-control measures, must be compiled in consultation with a suitably qualified environmental practitioner / control officer during the detailed design phase prior to the commencement of construction; and
- The propagation of low-growing dense vegetation suitable for the habitat such as grasses, sedges or reeds is the best natural method to reduce erosion potential in sensitive areas.

Residual Impact

In order to mitigate for residual impacts it is important that no power lines cross drainage points. This is not feasible because of the amounts of drainage points the power lines will have to cross the mitigation measures should be able to regulate the amount of residual impact occurred on site however low these impacts are. The overall rating for the residual impacts is the same as that of the additional impacts.

10.1.5 Flora

Initial Impact

The vegetation in and around the study area has significantly been transformed by farming activities, urbanisation and industrial activities. In addition, the remaining natural vegetation is being utilised for grazing and is being invaded by alien invasive species.

TABLE 51: FLORA INITIAL IMPACT RATING SCALE

Impact	Significance	*Spatial Scale*	Temporal Scale	Probability	Rating
Impact to Flora	**MODERATE**	***Study Site***	**Long Term**	**Is occurring**	**Moderate**
	3	***2***	**4**	**5**	**3.00**

The initial impacts to flora include extensive grazing, cultivation and alien invasive colonisation. The initial impact to flora is **definitely** MODERATE negative impact acting over the long term, and is *presently occurring* in the *study area*. As indicated in Table 51 above the impact rating class is a Moderate Impact.

Additional Impact

Additional impacts will be the removal of vegetation for the construction of the new power lines and the associated haul roads. There is a major concern to the affects on endangered and threatened endangered vegetation types. Vegetation types that are of concern are Marikana Thornveld (rated as endangered and 2.5% of the route is covered by this vegetation type), Carletonville Dolomitic Grassland (rated as vulnerable) and Egoli Grassland (rated as endangered and approximately 25% of the corridors fall within this vegetation type). There is concern about the loss of vulnerable and threatened vegetation types below illustrates the length that each route alternative will cross over each vegetation types identified.

TABLE 52: FLORA IMPACT

Vegetation Type	Alternative 1	Alternative 2	Alternative 3	Minerva to Lulamisa
Egoli Granite Grassland	0 km	0 km	0	16.9 km
Rand Highveld Grassland	28.6 km	20.3 km	27 km	0 km
Eastern Highveld Grassland	0 km	0.8 km	3.7 km	0 km
Cartonville Dolomite Grassland	1.3 km	7.3 km	0 km	5.7 km
Gold Reef Mountain Bushveld	12.9 km	0 km	0 km	0 km
Andesite Mountain Bushveld	3.5 km	0 km	0 km	0 km
Marikana Thornveld	5.8 km	0 km	0 km	0 km

Eastern Temperate Freshwater Wetlands	0.5 km	3 km	1 km	0.3 km
Cultivated Lands	17.7 km	29.3 km	24.3 km	2.7 km
Disturbed Lands	3 km	2 km	1.4 km	12.2 km

TABLE 53: VEGETATION ADDITIONAL-IMPACT RATING SCALEALTERNATIVE 1

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	LOW	*Study Site*	Short Term	*It's going to happen*	Moderate
	2	***2***	**2**	**5**	**2**

The additional impact to vegetation is LOW, occurs in *Isolated sites / proposed site* and will be Medium Term and *It's going to happen*. A rating of 2.2 gives an impact class of Moderate.

TABLE 54: VEGETATION ADDITIONAL-IMPACT RATING SCALEALTERNATIVE 2

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	LOW	*Study Site*	Long Term	*It's going to happen*	Moderate
	2	***2***	**4**	**5**	**2.6**

The additional impact to vegetation is LOW, occurs in *Isolated sites / proposed site* and will be Medium Term and *It's going to happen*. A rating of 2.3 gives an impact class of Moderate.

TABLE 55: VEGETATION ADDITIONAL-IMPACT RATING SCALEALTERNATIVE 3

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	LOW	*Study Site*	Short Term	*It's going to happen*	Moderate
	2	***2***	**2**	**5**	**2**

The additional impact to vegetation is LOW, occurs in *Isolated sites / proposed site* and will be Medium Term and *It's going to happen*. A rating of 2 gives an impact class of Moderate.

Due to Alternative 1 and 3 following existing servitude, acces to these areas is easier and the resultant construction phase is shorter. For Alternative 2 the construction phase is longer because the line does not follow any existing servitudes, this results in a higher rating compared to Alternative 1 and 3. Alternative 3 does run over more cultivated land so the loss in endemic floral species would be less than Alternative 1 and 3.

TABLE 56: VEGETATION ADDITONAL-IMPACT RATING SCALE: MINIRVA TO LULAMISA

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	HIGH	*Study Site*	Medium Term	*It's going to happen*	Moderate
	4	***2***	**3**	**5**	**3**

The additional impact for vegetation is HIGH, occurs in ***Isolated sites / proposed site*** and will be Medium Term and ***It's going to happen***. A rating of 3 gives an impact class of Moderate.

The Minerva to Lulamisa section traverses over sensitive grassland species and placement of pylons should be very particular in order to avoid these sensitive areas.

Cumulative Impact

The cumulative impacts take into account the affects that the construction and the initial impacts have on the vegetation. Due to the construction of the power lines through sensitive vegetation the cumulative impacts by be higher than expected for sections of the power line.

TABLE 57: VEGETATION CUMULATIVE-IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	LOW	*Study area*	Long Term	*It's going to happen / has occurred*	Moderate
	2	***2***	**5**	**5**	**3**

The cumulative impact as rated in Table 57 above, will be LOW, occur in the ***Study area*** and will be Long Term and ***It's going to happen / has occurred***. This results in a rating of 3 or a Moderate impact class.

Mitigation Measures

- All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse).
- Topsoil and vegetation should be stripped together to a depth of 300mm on all areas earmarked for the new development to ensure the seed bank is maintained to facilitate with rehabilitation, especially in the area of the borrow pit.
- The entire borrow area should be rehabilitated to the same / better condition as before.
- A suitable seedmix of indigenous plants should be used in all rehabilitation programmes on the site.
- All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is complete

- Minimal construction work should take place in sensitive areas.

Residual Impact

All impacted vegetation should be rehabilitated to its current state or original state before construction took place

TABLE 58: VEGETATION RESIDUAL-IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Vegetation	VERY LOW	*Study Sute*	Medium Term	*Unlikely*	
	1	***2***	**3**	**2**	**0.8**

The residual-impact\, as calculated in Table 58 above, will be VERY LOW, occur in ***Study sites*** and will be Medium Term and is ***Unlikely*** to occur. A rating of 0.8 is a Very Low impact class.

10.1.6 Fauna

Initial Impact

As described in the habitat assessment in Section 3.9, the site is relatively disturbed with the disturbed/grazed grassland, the undisturbed/natural grassland and the wetland and riparian zones the main habitat still available for fauna. The site is disturbed and while this is not ideal habitat for fauna, it will still provide habitat for various fauna. The suitable areas did show high species diversity, indicating that the impact is limited to isolated sites throughout the study area.

The study area is criss crossed with existing high voltage power lines that could potentially impact on the faunal life, especially large avi-faunal species. While there appears to be no negative impacts associated with electro magnetic fields generated by the power lines, Eskom's document, *Transmission Bird Collision Prevention Guideline* (Ref. no.: TGL41-335)[5], the major impact to birds or avi-fauna is in the form of collisions with power lines. According to the document, it was found that the majority of birds affected are large flighted birds, which are also often endangered or threatened species.

These large flighted birds are also long lived, with low breeding rate and often mate for life. Therefore, a single mortality due to a collision with a power line should be viewed as a high impact. In addition some of the most sensitive species to power line collisions such as Blue Crane are found in the study site in addition to other sensitive species such as White-Bellied Korhaan and Secretary Birds.

The current impact on fauna on site is **probably** of a HIGH negative significance, affecting the *region*, and acting in the long-term. The impact can *likely occur*. The impact class is classified as a High impact.

TABLE 59: FAUNA INITIAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	HIGH	*Region*	Long Term	*Likely*	High
	4	**4**	**4**	**4**	**3.2**

Additional Impact

The impact to fauna during the construction phase of the power lines will mostly be in the form of disturbance from the construction workers and vehicle noise. Due to the fact that the area is habitat to sensitive species, the impact could be quite high.

The additional impact to fauna is **probably** MODERATE negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 60 below the impact rating class is a Low Impact.

TABLE 60: FAUNA ADDITIONAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	MODERATE	*Isolated Site*	Short Term	*Will occur*	Low
	3	**1**	**2**	**5**	**2**

Cumulative Impact

The cumulative impact to fauna remains as assessed for the initial impact assessment as the impacts are identical. Therefore the impact remains a High impact to Fauna.

Mitigation Measures

- All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse);
- The sensitive habitat should be avoided and construction limited to 50 m from the edge of the wetlands and streams;
- Alternative 1 should be considered as the preferred alternative;
- All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is complete;
- Adhere to the Eskom vegetation management guideline (Appendix O); and
- Install power lines according to the Eskom bird collision prevention guideline.

Residual Impact

The mitigation measures proposed above will ensure that the construction of the proposed power line remains a Moderate impact but the Residual Impact remains High. If the mitigation measures were to be extended into the existing power lines and bird flappers be installed, the residual impact could be mitigated to a Moderate Impact Class.

10.1.7 Wetlands

The impact assessment for wetlands is the same as for the surface water section, please refer to Section 7.1.4.

10.1.8 Visual Impact

At present the viewers in the viewshed are seeing the Lulamisa and Minerva Sub-station and the various mining activities including the coal collieries in the area. In addition to the power station there are numerous power lines already traversing the landscape. The initial impact to the visual environment is HIGH negative acting in the long term, and *has already occurred*. The impact has **definitely** impacted on the *local region.*

Initial Impact

The study site has several existing high voltage power lines that impact on the visual character of the landscape.

TABLE 61: VISUAL INITIAL RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Visual	HIGH	*Local*	Long Term	*Has occurred*	High
	4	***3***	**4**	**5**	**3.6**

The initial impact to the visual landscape is High, occurs in *Local,* is Long Term and *Has occurred*. This results in a rating of 3.6 and a High impact class.

Additional Impact

During the construction phase, the local residents will be able to see the construction workings. This will impact negatively on the visual character of the landscape but is of short duration.

TABLE 62: VISUAL VISUAL ADDITIONAL IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Visual	LOW	*Local*	Short Term	*It's going to happen*	Low
	2	***3***	**2**	**5**	**2**

The additional impact to the visual landscape is VERY LOW, occurs in ***Local site*** and will be Short termand ***It's going to happen***. A rating of 2 gives an impact class of Low.

Cumulative Impact

The cumulative impact will not change and the cumulative impact remains a High impact.

Mitigation Measures

- Only the footprint of the proposed power line should be exposed. In all other areas, the natural vegetation should be retained;
- Dust suppression techniques should be in place at all times during the construction phase;
- Access roads should be minimised to prevent unnecessary dust; and
- Utilise non-shiny structures for the hard park and toilets, i.e. avoid unpainted roofs.

Residual Impact

The initial visual impact of the power lines can not be mitigated and therefore the mitigation measures merely ensure that the additional impact is managed responsibly. The residual impact remains a High impact.

10.1.9 Archaeology and Cultural Historical Sites

Types and ranges of heritage resources

The Phase I HIA study for the proposed project area revealed the following types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999), namely:

- Remains of stone walled sites which can be associated with the Battle of Bronkhorstspruit (1880) and with dwellings dating from the early 20th century.
- Memorabilia consisting of a monument and a Garden of Remembrance associated with the Battle of Bronkhorstspruit (1880).
- Graveyards with possible historical significance.
- Houses and other structures with possible historical significance.

The stone walls, memorabilia associated with the Battle of Bronkhorstspruit and graveyards were geo-referenced, mapped and discussed in this section of the report (Figure 74). Their significance is indicated and mitigation measures are outlined should they be affected by the proposed project.

The importance of historical structures such as houses is merely pointed out as each and every historical structure in close proximity to the proposed transmission line corridors were not geo-referenced due to time restrictions and the fact that Eskom does not outright demolish structures in order to make way for new power lines.

Remains from the more recent past have no significance and are not discussed in this report.

The Phase I HIA study is now briefly discussed and illustrated with photographs.

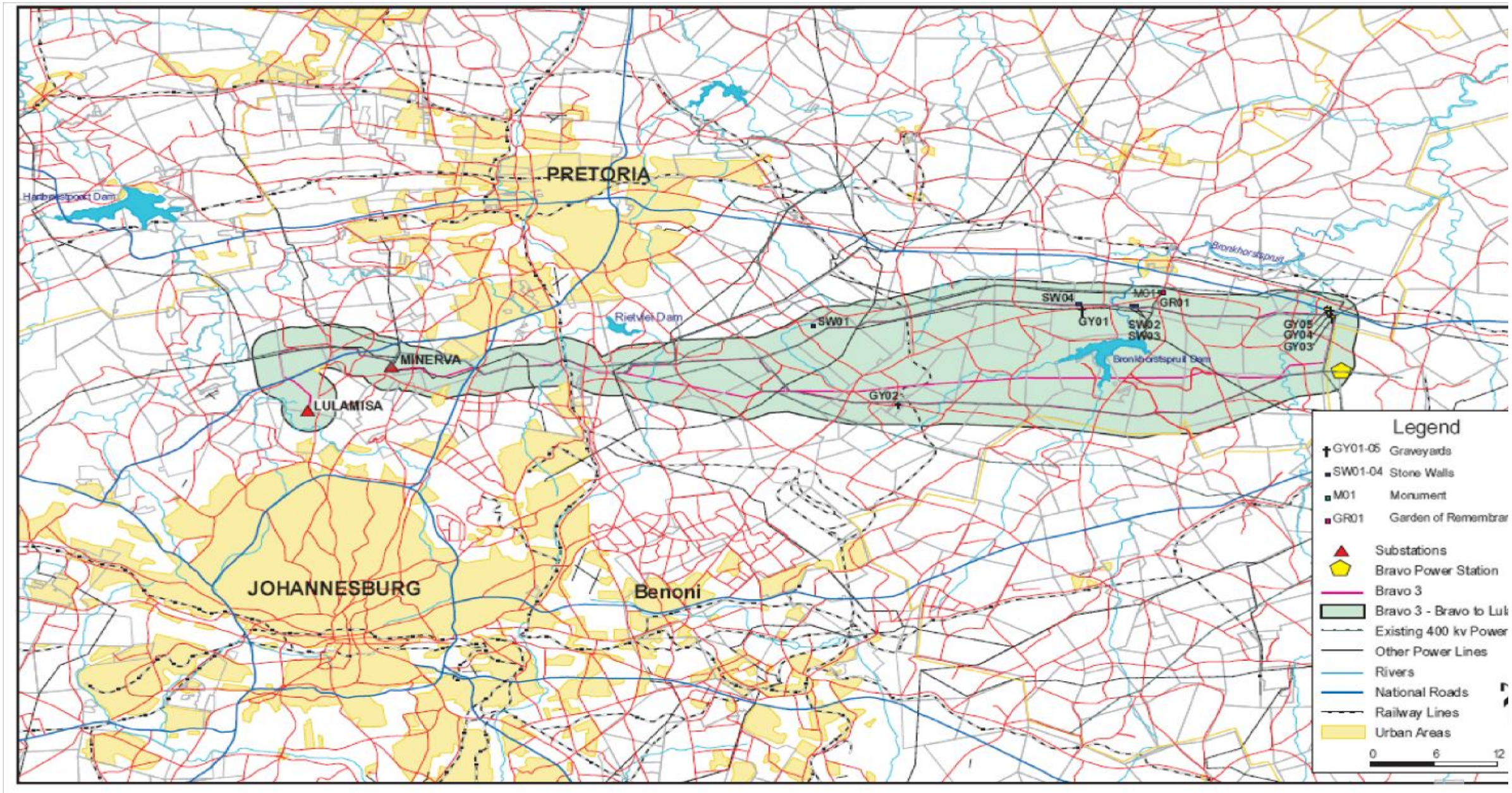


Figure 3- The Eskom Project Area involves the construction of a proposed new 400kV power line running between the Bravo power station in the Mpumalanga Province a Lulamisa substation in the Gauteng Province of South Africa (above).
Note stone walls, memorabilia commemorating the Battle of Bronkhorstspruit and graveyards in and near the Eskom Project Area.

FIGURE 74: STONE WALLS, MEMORABILIA COMMEMORATING THE BATTLE OF BRONKHORSTSPRUIT AND GRAVEYARDS IN AND NEAR THE PROJECT AREA.

Stone walls

The Battle of Bronkhorstspruit probably occurred on the farm Klipeiland 524JR as is indicated on the 1:50 000 topographical map of Bronkhorstspruit 2528DC.

Stone walls constructed with quartzite occur on several of the low quartzite ridges to the south of Bronkhorstspruit. Some of these walls occur near Eskom's central option for the proposed new Bravo/Lulamisa power line.

It is highly likely that:

- Some of these structures may be associated with the Battle of Bronkhorstspruit (1880) as they occur in the general area where this battle took place. The stone walls probably served as outlook positions and may have been used for defensive purposes as well.
- Some of the stone walls served as dwellings for people working as farm labourers on farms in the project area during the early 20th century.

Memorabilia associated with the Battle of Bronkhorstspruit

The Battle of Bronkhorstspruit is commemorated on the farm Klipeiland 524JR by a Garden of Remembrance and a national monument sign located on opposite sides of the R25/42.

The beacon at the Garden of Remembrance holds the following inscription:

- 'In memory of the 94th Regiment (Later 2nd Bn Connaught Rangers) who were killed in action in this area on the 20th Dec 1880 or subsequently died of wounds. Erected by the Northern Transvaal Soldiers Grave Association. War Veteran Association 23rd April 1961.'

FIGURE 75: QUARTZITE STONE WALLS ON A RIDGE TO THE SOUTH OF BRONKHORSTSPRUIT. SOME OF THESE STONE WALLS SERVED AS DWELLINGS FOR FARM WORKERS. IT IS ALSO POSSIBLE THAT SOME OF THE WALLS MAY HAVE SERVED AS DEFENSIVE STRUCTURES DURING THE BATTLE OF BRONKHORSTSPRUIT (1880) (ABOVE)

The monument holds the following inscription:

- 'A Boer commando of about 250 men commanded by Cmde Frans Joubert defeated a British force of 257 men with 34 wagons under Lt Col Anstruther here on 20th December 1880. During the brief battle Lt Col Anstruther with 66 of his men and two Boers were killed. Historical Monument Commission 1999'.

FIGURE 76: MONUMENT COMMEMORATING BATTLE OF BRONKHORSTPRUIT (1880) (ABOVE).

FIGURE 77: GY01 CLOSE TO SOUTHERN OPTION FOR THE PROPOSED NEW 400 KV BRAVO/LULAMISA POWER LINE (BELOW).

Graveyards

At least five graveyards were observed close to options for the proposed new Bravo/Lulamisa power line. More graveyards may occur in or near the proposed power line corridors considering the lengths of the various options for the new power line.

The graveyards that were observed were the following;

Graveyard 01

This graveyard is located near the Boschkop Agricultural Holdings and holds the remains of approximately twenty individuals. Most of the graves are edged with cement strips and fitted with cement headstones. Some are also decorated with granite headstones.

This graveyard is located on a small holding next (south) to the southern option for the proposed new Bravo/Lulamisa power line.

Graveyard 02

GY02 is located on the northern shoulder of the R25, directly to the south of a quartzite reef running from the east to the west, more or less parallel with the R25.

Eskom's existing 400 kV power line and the proposed northern option for the Bravo-Lulamisa power line is located along this reef and above (north) of the graveyard.

The graveyard contains an unknown number of graves as they are covered with tall grass. Several of the graves are fitted with granite headstones.

Graveyards 03-05

A number of graves are scattered in an area to the north of the Bravo Power Station at a point where the northern option for the proposed Bravo/Lulamisa power line turns towards the west. The three locations with single and more than one grave were recorded as three separate graveyards. At least one of the graves is associated with stone walls.

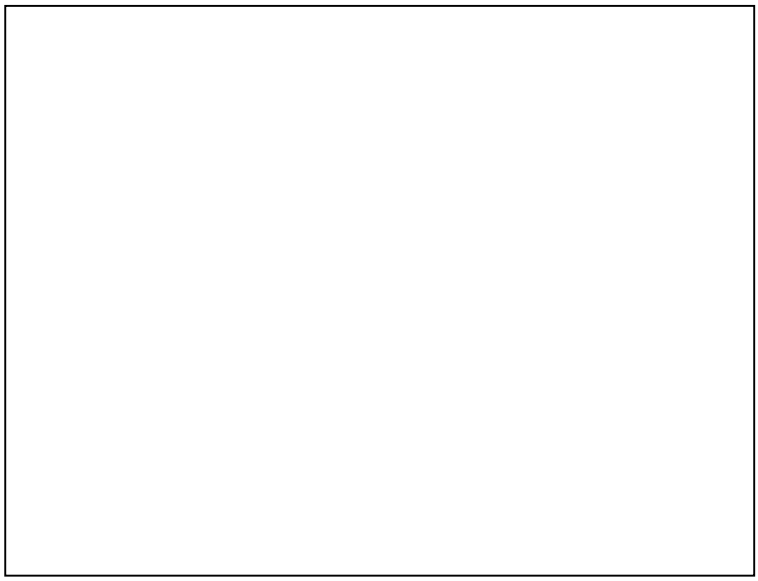


FIGURE 78: ONE OF AT LEAST THREE GRAVES NEAR THE NORTHERN OPTION FOR THE PROPOSED NEAR BRAVO/LULAMISA POWER LINE. THIS GRAVE IS ASSOCIATED WITH A FEW STONE WALLS.

Historical structures

Historical structures such as farmhouses, sometimes with outbuildings, occur in some instances close to some of the options for the proposed new Bravo/Lulamisa power line.

These structures were not geo-referenced due to time restrictions. It is also unlikely that they will be affected by the proposed project as Eskom do not outright demolish structures to make way for new power lines. However, cognisance should be taken of any structures older than sixty years which may be affected by the proposed project.

TABLE 63: COORDINATES FOR STONE WALLS ON QUARTZITE RIDGES LOCATED IN THE GENERAL AREA WHERE THE BATTLE OF BRONKHORSTSPRUIT OCCURRED DURING 1880 (ABOVE). SOME OF THESE STONE WALLS ALSO SERVED AS RESIDENCES DATING FROM THE EARLY 20TH CENTURY (ABOVE).

Heritage resources	Coordinates	Significance
Stone walls (SW01)	S 25°52'58.5" E 28°26'58.5"	**HIGH**
Stone walls (SW02)	S 25º51'29.2" E 28º43'18.0"	**HIGH**
Stone walls (SW03)	S 25º51'28.2" E 28º43'02.4"	**HIGH**
Stone walls (SW04)	S 25º51'18.3" E 28º40'29.9"	**HIGH**

TABLE 64: COORDINATES FOR A MONUMENT AND GARDEN OF REMEMBRANCE ASSOCIATED WITH THE BATTLE OF BRONKHORSTSPRUIT (1880) ON OPPOSITE SIDES OF THE R25/42 TO THE SOUTH BRONKHORSTSPRUIT (ABOVE).

Heritage resources	Coordinates	Significance
Monument	25º 50.403' 28º 44.464'	**HIGH**
Garden of Remembrance	25º 50.425' 28º 44.518'	**HIGH**

TABLE 65: COORDINATES FOR GRAVEYARDS IN CLOSE PROXIMITY OF THE VARIOUS OPTIONS FOR THE 400 KV BRAVO/LULAMISA POWER LINE (ABOVE).

Heritage resources	Coordinates	Significance
GY01	S 25º 51.590' E 28º 40.485'	**HIGH**
GY02	S 25º 57.603' E 28º 30.968'	**HIGH**
GY03	S 25º52’03.2” E 28º53’33.5”	**HIGH**
GY04	S 25º51’58.5” E 28º53’25.7”	**HIGH**
GY05	S25º51’54.6” E 28º53’10.2”	**HIGH**

The significance of the heritage resources

It is possible that some of the types and ranges of heritage resources that were identified in and near the proposed project area may be impacted by the project. The significance of these various types and ranges of heritage resources therefore is indicated by means of stipulations derived from the National Heritage Resources Act (No 25 of 1999).

Stone walls

Stone walled sites qualify as archaeological and historical remains and are protected by Section 38 of the National Heritage Resources Act (No 25 of 1999).

Memorabilia

The monument and Garden of Remembrance qualify as commemorative beacons which are protected by Section 37 of the National Heritage Resources Act (No 25 of 1999).

Graveyards

All graveyards and graves can be considered to be of high significance and are protected by various laws. Legislation with regard to graves includes Section 36 of the National Heritage Resources Act (No 25 of 1999) whenever graves are older than sixty years. The act also distinguishes various categories of graves and burial grounds.

Other legislation with regard to graves includes those which apply when graves are exhumed and relocated, namely the Ordinance on Exhumations (No 12 of 1980) and the Human Tissues Act (No 65 of 1983 as amended).

Historical structures

Historical structures such as houses or outbuildings which are older than sixty years are protected by Section 34 of the National Heritage Resources Act (No 25 of 1999).

Mitigating the heritage resources

The following mitigation measures have to be followed whenever any of the identified heritage resources may be affected by the proposed project

Stone walls

Stone walled sites must be avoided by pylons by placing the pylons on opposite ends of small stone walled sites. However, when stone walls cover large surfaces which represent cultural landscapes should rather be avoided by the power lines.

If stone walls have to be destroyed to make way for pylons and power lines these stone walled sites need to be subjected to Phase II investigations. These investigations require that the stone walled sites be documented by means of mapping the sites and possibly by means of small test excavations of the site. Phase II investigations can only be conducted by archaeologists accredited with the Association for Southern African Professional Archaeologists (ASAPA). The archaeologist has to obtain the necessary permit from the South African Heritage Resources Authority (SAHRA) which will authorise the Phase II investigation and subsequent destruction of the archaeological site.

Memorabilia

The memorabilia associated with the Battle of Bronkhorstspruit must be avoided by the proposed project as they represent heritage sites with outstanding significance. These memorabilia are also accessible to the public and are regularly visited by tourist or school groups or other interested individuals.

Graveyards

GY01 and GY02 as well as any other undiscovered graves and graveyards in the project area can be mitigated by following one of the following strategies, namely:

- Graveyards and graves can be conserved *in situ* beneath power lines. Pylons should be erected on opposite ends of graves or graveyards. Consequently, power lines can be strung across and above graveyards and graves. Conserving graves and graveyards in power line corridors create the risk that they may be damaged, accidentally, and that Eskom may be held responsible for such damages. Controlled access must exist for any relatives or friends who wish to visit graves or graveyards in power line corridors.
- Graveyards can also be exhumed and relocated. The exhumation of human remains and the relocation of graveyards are regulated by various laws, regulations and administrative procedures. This task is undertaken by forensic archaeologists or by reputed undertakers who are acquainted with all the administrative procedures and relevant legislation that have to be adhered to whenever human remains are exhumed and relocated. This process also includes social consultation with a 60 days statutory notice period for graves older than sixty years. Permission for the exhumation and relocation of human remains have to be obtained from the descendants of the deceased (if known), the National Department of Health, the Provincial Department of Health, the Premier of the Province and the local police.

Historical structures

Historical structures may not be affected (demolished, renovated, altered) by the proposed project *prior* to their investigation by a historical architect in good standing with the South African Heritage Resources Agency (SAHRA). The historical architect has to acquire a permit from the South African Heritage Resources Authority (SAHRA) *prio*r to any of these structures and features been affected or altered as a result of the proposed project.

10.1.10 Socio-Economic Environment

As mentioned in Section 7.3 a change process can be defined as change that takes place within the receiving environment as a result of a direct or indirect intervention. A potential impact follows as a result of the change process. However, a change process can only result in an impact once it is experienced as such by an individual/community on a physical and/or cognitive level.

The following changes are expected during the construction and decommissioning phases and are discussed in more detail below:

- Demographic change;
- Geographic change;
- Economic change;
- Institutional and empowerment; and
- Socio-cultural change.

Expected Demographic Change Process

It is expected that the construction and operation of the proposed transmission power line will lead to a change in the number and composition of the population within the affected areas, which in turn may impact on health, safety and community cohesion.

Table 66 below provides an overview of the expected change process to occur as well as the expected impacts that might occur as a result of these change processes taking place.

TABLE 66: EXPECTED DEMOGRAPHIC CHANGE PROCESSES

DEMOGRAPHIC CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
Population change	***Will the development lead to an increase in numbers of a certain section of the population, e.g. migratory workers?***	***X***		***Influx of construction workers that will lead to a change in the number and composition of the local community, and impact on economy, health, safety and social well-being.***
In-migration of unemployed work seekers	***Will the development intentionally or unintentionally contribute to the in-migration of work seekers into the area?***	***X***		***Influx of job seekers that will lead to a change in the number and composition of the local community, and impact on economy, health, safety and social well-being.***
Relocation or displacement of individuals or families	***Will the development at this or future stages lead to the relocation of residents?***	***X***		***Relocation of households would have an impact on people's way of life and the standard of life that these people have grown accustomed to.***

This sub-section deals with the expected demographic change processes and resultant impacts that can be expected with the introduction of the proposed project to the affected areas. The demographic change processes that can be expected during this phase of the project are as follows:

- Influx of construction workers;
- Influx of job seekers; and
- Relocation of households and/or population segments.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change process taking place. All the demographic change processes during the construction and decommissioning phases, apart from relocation of households and/or population segments, are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives.

Influx of Construction Workers

The impact of the influx of construction/decommissioning workers is mostly applicable to the areas surrounding the construction camps where workers spend evenings and weekends. Contact between the local community and the workers can be expected and conflict could be expected. An estimated total of approximately 245 people from various disciplines will form part of the construction team. As some of these disciplines require unskilled labour, up to a total number of approximately 20 people, it assumed that this segment of the construction team would be sourced from within the local area, thereby reducing the number of construction workers who enter the area to approximately 225 people.

On a total population of 104 150 people, as is the case with the KLM, this means a population increase of approximately 0.2% over the construction period. In the CTMM and CJMM, this influx results in a population increase of between 0.005% and 0.01%, which is regarded as an insignificant increase. The influx of construction workers to the area is therefore not expected to cause any significant impacts on the baseline population size. It is however unclear if, and how many, of these construction workers will live in a construction village.

Influx of Job Seekers

Job seekers can be expected in the area, either at the construction village or at the construction site. Although a small number of job seekers could be employed in this way, job seekers mostly hang around the camp for a few days in the hope of securing a job on site. Local individuals could jeopardise their current employment in leaving their workplace in the hope of earning a better income in construction. It is not possible to accurately predict the amount of job seekers that would flood to the area, which could range from a single job seeker to hundreds and thousands of job seekers.

The influx of job seekers into the environment will lead to an increased demand on local services and will not necessarily lead to a boost in the local economy, seeing as these job seekers are mostly unemployed. The influx of job seekers might further lead to conflict with local residents in respect of competition over limited job opportunities.

Apart from situations such as these, the influx of job seekers could also lead to the expansion of informal settlements, which could be close to the servitude area, as these settlers have no resources and therefore aim to settle as close to economic activity as possible. A construction site or process taking place in the area is viewed as an economic activity as it might offer the opportunity of employment. A job seeker would normally first live in the field while trying to secure employment at the construction site. Later on he/she might grow accustomed to the area (even if they did not secure employment) and then also move their family into the area, which is normally the period in which they would construct a more ‘formal’ housing structure.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 67 below.

TABLE 67: CONSTRUCTION & DECOMMISSIONING PHASES: DEMOGRAPHIC CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance		*Spatial*		*Duration*		*Degree of Probability*		*Degree of Certainty*	*Risk*		*Status*
PRE-MITIGATION												
Influx of construction workers	*Very low*	*1*	*Study area*	*2*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.78*	*Very low*	*Negative*
Influx of job seekers	*Low*	*2*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Possible*	*0.96*	*Very low*	*Negative*
POST MITIGATION												
Influx of construction workers	*No impact*	*0*	*Study area*	*2*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.6*	*Very low*	*Neutral*
Influx of job seekers	*Very low*	*1*	*Study area*	*2*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.78*	*Very low*	*Negative*
MITIGATION MEASURES												

Construction Workers:

- **Raise awareness amongst construction workers about local traditions and practices.**
- **Inform local businesses that construction workers will move into the area to enable local businesses to plan for the extra demand.**
- **Ensure that the local community communicate their expectations of construction workers' behaviour with them.**
- **Construction workers should be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags.**

Job Seekers:

- **Ensure that employment procedures / policy are communicated to local stakeholders, especially community representative organisations and ward councillors.**
- **Have clear rules and regulations for access to the camp / site office to control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the construction site.**
- **Eskom (or its appointed contractor) should monitor areas where people gather in the field on a regular basis as this is normally the first indication that settlement might take place in the area. These people should be removed in co-operation with the local SAPS to prevent the formation and/or expansion of informal settlements in such an area, especially if it encroaches upon the servitude.**

Relocation of Households and/or Population Segments

In various cases along the proposed alternative route corridors, settlement has taken place within the existing transmission power lines' servitudes. By proxy this means that settlement would also encroach on or within the proposed new servitude. This also implies that relocation would have to take place of households that have settled within the existing servitude.

On the corridor between the Lulumisa and Minerva substations, a total of 12 buildings could be found that are either within the existing servitude or encroach upon the proposed new servitude. The majority of these structures (10 residential houses) are located within the Laezonia Agricultural Holdings area, west of the R511. Figure 79 below provides an approximate location of the incidences of settlement within the servitude (indicated by red arrows).

FIGURE 79: AREAS OF SETTLEMENT WITHIN SERVITUDE ON THE SECTION BETWEEN THE LULUMISA AND MINERVA SUBSTATIONS

On the section through Olievenhoutbosch, a total of either 106 or 83 residential houses were observed within the proposed new servitude, depending on whether the proposed new transmission power line would be to the north or to the south of the existing transmission power line. If the new line is located to the north of the existing line, a total of 83 residential houses would be affected, whereas a total of 106 residential houses would be affected if the new line is located south of the existing line. However, on the northern side of the existing line, an informal settlement was observed that encroached upon the servitude. A further 7 structures were observed either within or in very close proximity to the proposed servitude, as reflected in Figure 80.

FIGURE 80: AREAS OF SETTLEMENT WITHIN SERVITUDE ON THE SECTION BETWEEN MINERVA SUBSTATION AND THE APOLLO CONVERTER STATION

A total of 28 structures were observed either within or in close proximity to the proposed servitude on the **northern alternative** section between the Apollo Converter Station and the Bravo Power Station. Most of these structures (25 residential houses) are located in the Tierpoort Small Holdings area, which is located east of the R50 and west of the R515. The approximate location of the affected structures on the northern alternative is as per Figure 81 below.

FIGURE 81: AREAS OF SETTLEMENT WITHIN SERVITUDE ON THE NORTHERN ALTERNATIVE SECTION BETWEEN THE APOLLO CONVERTER STATION AND THE BRAVO POWER STATION

On the **central alternative** section between the Apollo Converter Station and the Bravo Power Station, a total of 7 structures were observed. However, as this is mostly a 'greenfields' alternative, it is believed that all these structures could be avoided by amending the alignment slightly. The approximate location of the affected structures on the central alternative is as per Figure 82 below.

FIGURE 82: AFFECTED STRUCTURES ALONG THE CENTRAL ALTERNATIVE.

A total of 11 structures have been observed either in or in close proximity of the servitude on the **southern alignment** section between the Apollo Converter Station and the Bravo Power Station. The approximate location of the affected structures on the southern alternative is as per Figure 83 below.

FIGURE 83: AREAS OF SETTLEMENT WITHIN SERVITUDE ON THE SOUTHERN ALTERNATIVE SECTION BETWEEN THE APOLLO CONVERTER STATION AND THE BRAVO POWER STATION

In all instances it is not foreseen that these households would necessarily have to be resettled as it might also be possible to fine-tune the alignment that is preferred in the end to avoid such households.

Furthermore, the possibility cannot be ruled out that some areas will not be inhabited by the time construction commences, notably where the alignment comes in close proximity to the informal settlement at Olievenhoutbosch. In the past, there have been incidences where households have deliberately settled in an area that is known to be earmarked as a servitude. Such households then claim to have been living in that area for an extended period of time. Such claims are motivated by the fact that they might be able to claim compensation from Eskom for having to be resettled.

Furthermore, the uncontrolled development of informal settlements could lead to a situation where Eskom does not have unrestricted access to their servitudes. In such an instance, Eskom would not be able to reach the transmission power line in the event of either routine maintenance or an emergency (malfunctioning) on the line. This could cause severe delays on maintenance being carried out. People settling within the servitude would also impact on their own health and safety.

As the impact of relocation depends on the level of attachment to a place, which in turn is informed by variables such as age and number of years spent in that particular area, it is believed that if the servitude is inspected for settlement on a regular basis, Eskom would be able to remove people and/or households from the servitude without causing severe negative impacts. The sooner that people are removed from the servitude, the less likely it becomes that they have become attached to the area, as they have only been living there for a short space of time. The impact is therefore not viewed as purely negative due to the fact that Eskom would have unrestricted access to their servitude in case of emergency. The safety of the relocated party would also be enhanced if they are removed from the servitude.

An assessment of this category 2 impact, which is those impacts that are expected to cause significant changes between the proposed alternatives, was conducted through the use of the assessment criteria to determine the significance of the impact per site, as per Table 68 below.

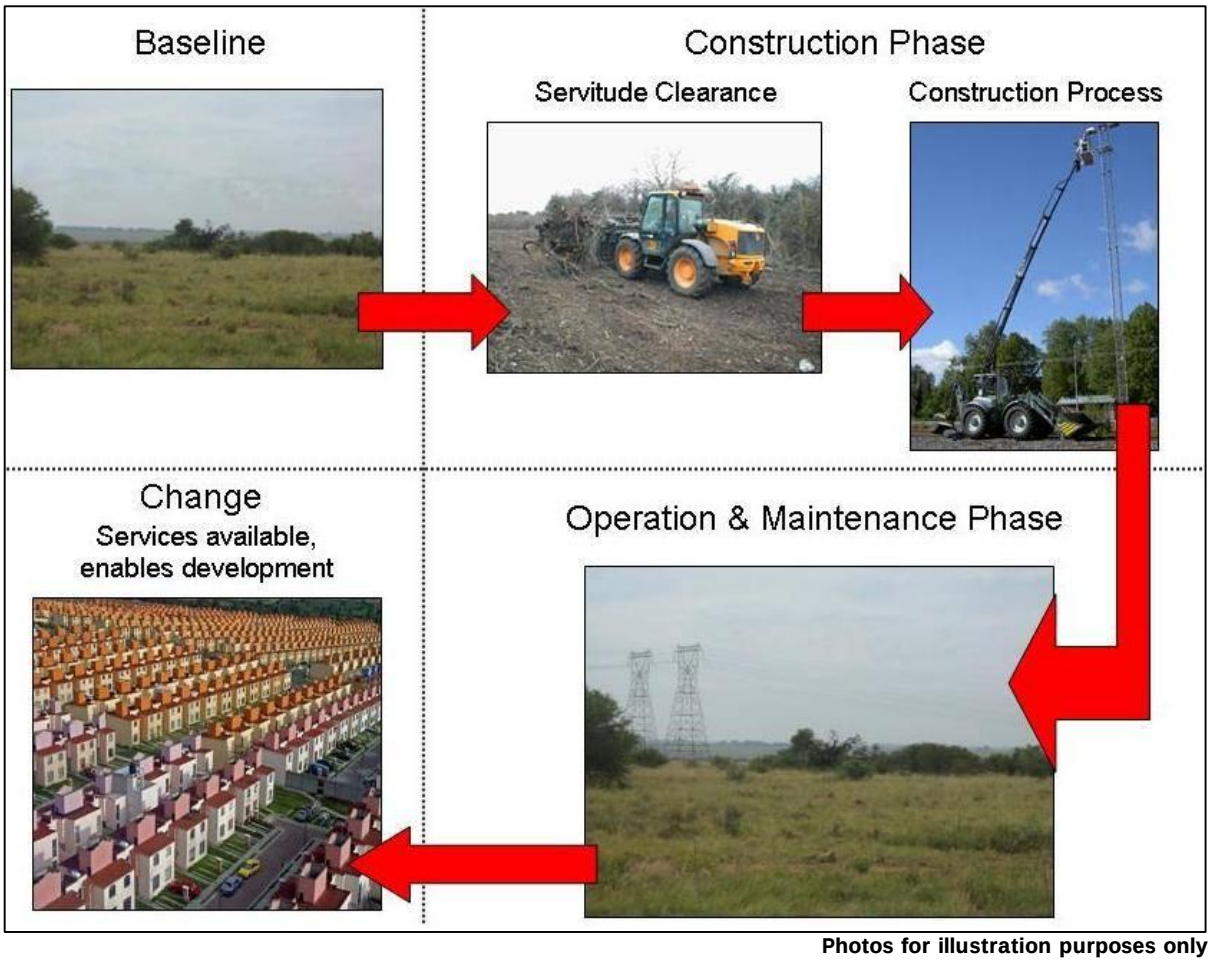
TABLE 68: CONSTRUCTION & DECOMMISSIONING PHASES: DEMOGRAPHIC CHANGE PROCESSES CATEGORY 2 IMPACT ASSESSMENT: RELOCATION OF HOUSEHOLDS AND/OR POPULATION SEGMENT

	Lulumisa – Minerva Section	*Minerva – Apollo Section*	*Apollo – Bravo Section*		
			Northern Alternative	*Central Alternative*	*Southern Alternative*
PRE-MITIGATION					
Significance	*High 4*	*High 4*	*High 4*	*High 4*	*High 4*
Spatial	*Study area 2*	*Study area 2*	*Study area 2*	*Study area 2*	*Study area 2*
Duration	*Permanent 5*	*Permanent 5*	*Permanent 5*	*Permanent 5*	*Permanent 5*
Degree of Probability	*Very likely 4*	*Going to happen 5*	*Very likely 4*	*Could happen 3*	*Very likely 4*
Degree of Certainty	*Probable*	*Definite*	*Probable*	*Possible*	*Probable*
Risk	*2.96 Moderate*	*3.7 High*	*2.96 Moderate*	*2.22 Moderate*	*2.96 Moderate*
Status	*Negative*	*Negative*	*Negative*	*Negative*	*Negative*
POST-MITIGATION					
Significance	*Moderate 3*	*Moderate 4*	*Moderate 3*	*Moderate 3*	*Moderate 3*
Spatial	*Isolated 1*	*Isolated 1*	*Isolated 1*	*Isolated 1*	*Isolated 1*
Duration	*Permanent 5*	*Permanent 5*	*Permanent 5*	*Permanent 5*	*Permanent 5*
Degree of Probability	*Very likely 4*	*Very likely 4*	*Very likely 4*	*Could happen 3*	*Very likely 4*
Degree of Certainty	*Probable*	*Probable*	*Definite*	*Possible*	*Probable*
Risk	*2.4 Moderate*	*2.64 Moderate*	*2.4 Moderate*	*1.8 Low*	*2.4 Moderate*
Status	*Negative*	*Negative*	*Negative*	*Negative*	*Negative*
MITIGATION MEASURES					
• *Avoid the resettlement and/or displacement of households as far as possible by realigning sections of the preferred route corridor to avoid areas of human settlement – this is especially required in Olievenhoutbosch. If technically feasible, it is suggested that the transmission power line exit the Minerva substation to the south and continue in a southerly direction past Olievenhoutbosch after which it can turn in a easterly direction.* • *If resettlement is unavoidable, residents should be sufficiently compensated and assisted with the relocation process.* • *A form of compensation should also be granted to individuals who are residing in informal settlements within the servitude.* • *A formal grievance procedure should be implemented and communicated to landowners to ensure a fair and transparent process.* • *Eskom (or its appointed contractor) should monitor areas where people gather in the field on a regular basis as this is normally the first indication that settlement might take place in the area. These people should be removed in co-operation with the local SAPS to prevent the formation and/or expansion of informal settlements in such an area, especially if it encroaches upon the servitude.* • *The servitude should be inspected on a regular basis to determine whether any settlement has taken place, either within the servitude, or encroaching upon the servitude.* • *Households that encroach upon or settle within the servitude have to be relocated as soon as possible. Eskom or its appointed contractors should assist these households with the relocation process.* • *In some way, a barrier (psychological and/or physical) should indicate that no structures should be built in the servitude. One way of achieving such a barrier is to educate community leaders on the health and safety aspects of the servitude, who then in turn can ensure that settlement does not take place within the servitude.*					
PREFERRED ALIGNMENT					
The central alternative affects the least amount of households, followed by the southern alternative. The western alternative affects the greatest amount of households.					

Expected Geographical Change Processes

Geographical change processes refer changes in land use, whether it is on a temporary or permanent basis. The construction and operation of a transmission power line will lead to a change in the land use, mostly as a result of the surface infrastructure. The assessment of a land use change process from a social perspective takes into account how the proposed transmission power lines might affect the behaviour and/or lives of landowners and/or land users in the area.

In light of the above, potential geographical impacts from a social perspective are considered within the context of change processes in the use of the land. An example of how the presence of a transmission power line could lead to land use changes is illustrated in Figure 84.



Photos for illustration purposes only

FIGURE 84: LAND USE CHANGE PROCESS

Table 69 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 69: GEOGRAPHICAL CHANGE PROCESSES

GEOGRAPHICAL CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
Access to environ-mental resources	***Will the development impact on people's access to environmental resources, such as water, wood, medicinal plants etc?***		***X***	***No impact foreseen.***
Change in access to resources that sustain livelihoods	***Will the development impact on people's (legal or illegal, formal or informal) access to environmental resources that help to sustain their livelihoods, e.g. grazing land for their cattle; wood for heat/cooking/selling, etc.?***	***X***		***Temporary loss of cultivated and grazing land due to construction activities, leads to a decreased area for cultivation and grazing, resulting in an economic impact. Also permanent loss of cultivated and grazing land through the land acquisition process.***
Land acquisition and disposal, including availability of land	***Will the development contribute to or directly impact on the ability of local residents to keep or acquire property/land?***	***X***		***Permanent servitude of 55m will restrict access to that portion of land, although certain land uses will still be permitted within the servitude.***
	Will the development set a precedent for change in land use in the area?		***X***	***No impact foreseen.***
	Are there any potential land-claims for the area?		***X***	***No impact foreseen.***
	Will the development affect the claims process?	***-***	***-***	***Not applicable.***

This sub-section deals with the expected geographical change processes and resultant impacts that can be expected with the introduction of the proposed project to the affected areas. The geographical change processes that can be expected during this phase of the project relate to the following land uses:

- Cultivated land; and
- Grazing land.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change process taking place. The change processes during the construction and decommissioning phases are expected to result in Category 1 impacts, which are

defined as those impacts that are not expected to differ between the proposed alternatives, as all of the corridor alternatives pass through agricultural land at same stage, either in whole or in part.

Cultivated land

A temporary loss of cultivated land can be expected during the construction of the proposed Transmission power line due to the physical space needed for these construction activities. This would mean that a farmer would not have access to a part of his/her land for the cultivation and/or harvesting of crops for the duration of the construction activities, which in turn would result in a temporary loss of income for that portion of the land. Where crops are cleared for the servitude, this would have an economic impact on the farmer as a result of a reduced harvest. However, normally the loss of cultivated land is considered during the negotiation process and included in the compensation amount payable to the landowner.

Grazing land

As is the case with cultivated land, a temporary loss of grazing land can also be expected during the construction phase due to the physical space needed for the construction activities. This would mean that a farmer would not have access to a part of his/her grazing land for the duration of the construction activities, which might have planning and economic implications.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 70 below.

TABLE 70: CONSTRUCTION & DECOMMISSIONING PHASES: GEOGRAPHICAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance		*Spatial*		*Duration*		*Degree of Probability*		*Degree of Certainty*	*Risk*		*Status*
PRE-MITIGATION												
Temporary loss of cultivated land	*High*	*4*	*Study area*	*2*	*Short term*	*2*	*Very likely*	*4*	*Probable*	*2.16*	*Moderate*	*Negative*
Temporary loss of grazing land	*Moderate*	*3*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Probable*	*1.38*	*Low*	*Negative*
POST MITIGATION												
Temporary loss of cultivated land	*Moderate*	*3*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Probable*	*1.38*	*Low*	*Negative*
Temporary loss of grazing land	*Low*	*2*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Probable*	*1.2*	*Low*	*Negative to Neutral*
MITIGATION MEASURES												
Cultivated Land: • ***Compensation for the temporary loss of cultivated land should be included in the negotiation process with the landowner.*** • ***Initial servitude clearing on the farmland should take place after the harvesting season, as far as possible. Landowners should be compensated for the loss of cultivated land.*** • ***The area should be rehabilitated upon completion of the construction activities to ensure that the land is returned in the same condition as prior to the construction activities.***							***Grazing Land:*** • ***Mitigation measures should be implemented to avoid any negative impact on animals (e.g. fencing off the construction area).*** • ***Eskom or its appointed contractor(s) should assist with the temporary relocation of livestock during construction, as well as relocating cattle back to their original grazing area once construction in an area is completed.*** • ***Grazing areas should be rehabilitated to their original grazing conditions to ensure that cattle can continue to graze in the area once they are returned to that area.*** • ***Where the area cannot be rehabilitated to its original condition within a reasonable period of time, Eskom or its appointed contractor(s) should provide funding to obtain alternative food sources to the farmer for the time period required for natural rehabilitation to occur within the grazing area.***				

Expected Economical Change Processes and Resultant Impacts

Economical change processes relate to the changes brought about to the employment and general economic profile of the area as a result of the introduction of any development. Employment creates a source of income, which in turn enables the employed individual to access services and a support mechanism for his/her family, thereby enhancing not only the individual's quality of life, but also that of his/her household.

Table 71 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 71: ECONOMICAL CHANGE PROCESSES

ECONOMIC CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
Increase in division between rich and poor	***Will the development exacerbate class equalities?***		***X***	***No impact foreseen.***
Enhanced / reinforced economic inequities	***Will the development enhance or enforce class inequality?***		***X***	***No impact foreseen.***
	Will the development deny or enhance economic opportunities for vulnerable communities?	***X***		***Unskilled labour, such as bush clearance, might be sourced from the local area thereby creating job and income opportunities.***
	Will the project create different levels of economic opportunity?	***X***		***Depending on the skills levels required, it is believed that different skills levels will have differently structured salary packages, thereby creating lower income to higher income opportunities.***
	Will the employment opportunities created by the development be sustainable?		***X***	***It is believed that most of the employment opportunities would be restricted to the construction phase.***
Change in the commercial / industrial focus of the community	***Will the development change the income generating focus of the community?***		***X***	***No impact foreseen.***
	Do residents have the required skills, life experience and		***X***	***No impact foreseen.***

ECONOMIC CHANGE PROCESSES				
Expected Change Process		**Yes**	**No**	**Expected Impact**
	contextual understanding to benefit from the proposed development?			
	Will a change in economic focus associated with the development have repercussions for social cohesion?		***X***	***No impact foreseen.***
Change in employment equity of vulnerable groups	***Are vulnerable groups able to take advantage of changed employment opportunities associated with the development?***	***X***		***Unskilled labour, such as bush clearance, might be sourced from the local area thereby creating job and income opportunities.***
	Will vulnerable groups have to compete with more appropriately qualified applicants from elsewhere?	***X***		***The required skills might not be available in the local area, which means that the appropriate skills might have to be 'imported', thereby causing a reduction in the job and income opportunities available to local residents.***
Change in occupational opportunities	***Will the development lead to an increase or decrease in employment opportunities?***	***X***		***An increase in employment opportunities is expected.***
	Will the development create different levels and types of employment?	***X***		***Employment opportunities will range from unskilled to highly skilled positions.***
	What types of skills will the development require?			***Skilled workers would be required.***
Land acquisition and disposal, including cost of land	***Will the development lead to a significant increase in the cost of land/property in the area?***	***X***		***Visibility of transmission line could affect the property value in some areas, although a decrease is expected as opposed to an increase in property value.***
	Will the development result in an increase of land/property prices?	***X***		***No impact foreseen.***

ECONOMIC CHANGE PROCESSES				
Expected Change Process		**Yes**	**No**	**Expected Impact**
	Will the increase in land/property prices exacerbate class and race inequity?		**X**	**No impact foreseen.**

The economical change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Compensation for servitude;
- Direct formal employment opportunities to local individuals; and
- Indirect formal and/or informal employment opportunities to local individuals.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place. No category 2 impacts are foreseen during this stage of the project.

Compensation for servitude

Eskom pays a once-off amount to landowners for right of way in the servitude of 55m per 400 kV line. Compensation is also paid for the potential loss of livelihood as a result of the servitude. Normally compensation is calculated based on current market related land values, after which Eskom would offer 100% of the value of the land. Should the lines take up more than 50% of the land, Eskom will offer to buy the farm out (personal communication, Eskom). The value of the servitude to be negotiated is calculated by multiplying the area of the servitude required from the land owner with the valuator's unit price. The impact of financial gain should be long-term, because although a once-off amount is paid, this amount is deemed to reflect the lifelong economic effect. However, land owners are increasingly insisting on an annual access fee, which should be revised annually.

The financial gain is seen as a positive impact. The servitude is negotiated within a corridor (of up to 500 m wide) approved by the DEAT. Some modification of the proposed line alignment is possible within this approved corridor, but significant modification in the alignment will be subject to additional environmental review. Effective mitigation measures could result in a servitude which satisfies both parties.

However, the final status of the impact is dependant on the negotiation process. A transparent negotiation process that leads to a positive outcome (i.e. both parties are satisfied with the agreement) will have a positive impact. A breakdown in negotiations would lead to a negative impact in terms of a lengthy legal process that can either lead to an alternative route for the Transmission power line or the expropriation of land for the servitude. In this instance the project will be severely delayed. If

there is a breakdown in the negotiation process, the potential impact would be high levels of frustration as a result of the litigation process and the resultant delay in construction, as well as the potential for a perceived economic loss for both parties.

It is furthermore difficult to determine the significance post mitigation as Eskom has no control over how a particular landowner would invest the money and therefore a post-mitigation assessment has not been conducted.

Direct formal employment opportunities to local individuals

It is believed that only a very limited number of local individuals within the study area could potentially be employed during construction. This is due to the fact that mostly skilled or semi-skilled labour is required during construction. Due to the skills levels required for the actual construction of the Transmission power lines, it is not foreseen that a large number of local labourers will be engaged in the construction phase.

However, if more than one construction team is utilised on various sections of the Transmission power lines, it is believed that more people will benefit from the employment opportunities created through this process, albeit on a shorter term. It is highly recommended that local individuals should be employed for work components that do not require a substantial amount of skill, e.g. foundation excavation, vegetation clearance, erection of gates, cleaning services, and security guards.

In construction projects commissioned by government, employment requirements usually include gender quotas, youth quotas and quotas for local labour to be employed during the project. In addition, a certain proportion of time for which construction workers are paid should be spent on skills development initiatives. According to the Human Resource Manager of the South African Federation of Civil Engineering Contractors (SAFCEC), the current norm in this industry is to use between 50–70% local labour during construction. This should be used as a guideline by Eskom as far as possible.

Although job opportunities are viewed as a positive impact, the fact that the job opportunities are only temporary in nature limits the extent of such a positive impacts in view of the fact that the economic relief and the associated impacts would only be temporary in nature. This impact also depends on the timeframe of the project.

Indirect formal and/or informal employment opportunities to local individuals

Indirect informal job opportunities mainly relate to services that are not directly linked with the construction activities, e.g. domestic services, food stalls, etc., either at the construction village or the construction site. However, the size, nature and location of the construction village (if used) as well as the construction site, together with the number of construction workers and other employees at either the construction village or the construction site respectively, will determine the extent of the services required. In general, informal job opportunities are expected to be limited.

Another potential opportunity is the rental of land for the accommodation of the construction workers and storage of equipment in return for financial compensation, albeit confined to the landowner. Housing construction workers within local communities and the use of local contractors to supply material should be considered as this increases the economic investment into the affected area.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 72 below.

TABLE 72: CONSTRUCTION & DECOMMISSIONING PHASE: ECONOMICAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance	Spatial		Duration		Degree of Probability		Degree of Certainty		Risk		Status
PRE-MITIGATION												
Compensation for servitude	***Moderate***	***3***	***Isolated***	***1***	***Incidental***	***1***	***Going to happen***	***5***	***Definite***	***1.7***	***Low***	***Positive***
Direct formal employment opportunities to local individuals	***Low***	***2***	***Local***	***3***	***Short term***	***2***	***Could happen***	***3***	***Possible***	***1.38***	***Low***	***Positive***
Indirect formal and/or informal employment opportunities to local individuals	***Low***	***2***	***Local***	***3***	***Short term***	***2***	***Could happen***	***3***	***Possible***	***1.38***	***Low***	***Positive***
POST MITIGATION												
Compensation for servitude	***-***	***-***	***-***	***-***	***-***	***-***	***-***	***-***	***-***		***-***	***-***
Direct formal employment opportunities to local individuals	***Moderate***	***3***	***Local***	***3***	***Short term***	***2***	***Could happen***	***3***	***Possible***	***1.62***	***Low***	***Positive***
Indirect formal and/or informal employment opportunities to local individuals	***Moderate***	***3***	***Local***	***3***	***Short term***	***2***	***Could happen***	***3***	***Possible***	***1.62***	***Low***	***Positive***

MITIGATION MEASURES		
Compensation: • ***Compensation (not necessarily in the form of monetary compensation) to individuals who are residing in informal settlements within the servitude should be considered. However, this issue should be approached with caution as this might set a precedent for future projects (people might deliberately move onto the servitude for***	***Direct formal employment:*** • ***Unskilled job opportunities should be afforded to local residents. Local trade unions could assist with the recruitment process to counteract the potential for social mobilisation.*** • ***Equal opportunities for employment should be created to ensure that the local female population also have access to***	***Indirect formal and/or informal employment:*** • ***Where possible, formalise informal job opportunities (e.g. the provision of services such as food) at the construction site and/or camp. The formalisation process could include issuing permits to vendors and removing non-permitted individuals as a way to reduce the potential for conflict amongst vendors and to curb loitering at the site and/or camp.***

the purpose of receiving compensation). • *The land valuator should be experienced in valuating the land in question.* • *The process should be conducted with the necessary respect, and the negotiator should be transparent about the process and expectations (do not engage in "empty promises").* • *The negotiation should be done for the whole servitude and not part of the servitude.* • *Contracts should be reviewed by an independent body.* • *Land owners should be made aware that a pre- and post evaluation of their land value is possible.* • *In the case of tribal authorities, Eskom should consider establishing a trust fund in consultation with the tribal authority (as a form of compensation) for the community that is jointly administrated by Eskom and the tribal authority. Community development projects can then be funded from the trust fund, which would aid sustainable development in the area.*	*these opportunities. Females should be encouraged to apply for positions.* • *Individuals with the potential to develop their skills should be afforded training opportunities. Eskom or its appointed contractors should be involved in this process.* • *Mechanisms should be developed to provide alternative solutions for creating job security upon completion of the project. This could include formal and/or informal training on how to look for alternative employment, information on career progression, etc. to ensure that people are equipped to seek other jobs with the skills that they have gained.* • *Payment should comply with applicable Labour Law legislation in terms of minimum wages.* • *Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the Unemployment Insurance Fund (UIF), Pay as You Earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.* • *Avoid employing foreign labour on the project. Immigrants are seen to be "taking" jobs or trading opportunities needed by South Africans - often at lower rates of pay or by evading trading regulations.*	• *Identify the segment of the local community that might benefit from informal indirect opportunities, and assist them with skills development and subsidise sustainable initiatives.* • *Encourage construction workers to use local services.* <

Expected Empowerment and Institutional Change Processes

Negotiation for land is a change process on legal and empowerment level. The same applies to the stakeholders that will be involved in the public participation process. The EIA process is an opportunity for these stakeholders to give input into the process and project. However, stakeholders would have to offer up their time to become actively involved in the process and they should clearly understand their rights in terms of the process to enable them to use these rights.

Attitude formation may start during the EIA process. Attitude formation is a change process, and not an impact. Attitude formation might result in delays in project implementation, which might result in secondary impacts such as economic impacts.

Table 73 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 73: INSTITUTIONAL & EMPOWERMENT CHANGE PROCESSES

INSTITUTIONAL AND EMPOWERMENT CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
Change in / disruption of power relationships	***Will the development impact on the levels of power, opportunity and access of individuals or sections of the community, e.g. during the negotiation process?***	***X***		***A breakdown in the negotiation process could severely delay the project and result in an economic impact on both the landowner as well as on Eskom.***
	Is the development being used for the political gain of a section of the community, and what are the implications for the larger social environment?		***X***	***No impact foreseen.***
Exclusivity	***Will the development contribute to the culture of exclusivity?***		***X***	***The development would create economic growth through the availability of electricity, which has been assessed in table 8b.***
Inequality	***Will the development increase unequal access to opportunities or resources?***		***X***	***The development will enhance more equal opportunities to resources as services become available, as assessed in table 8b.***
Change in community	***Will the development change any aspect of community infrastructure,***		***X***	***No impact foreseen.***

INSTITUTIONAL AND EMPOWERMENT CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
infrastructure	***such as crèches, clinics, schools, churches, formal or informal sports fields, open areas, dumping grounds etc?***			
	Will the development create increased demand for basic services, e.g. water, electricity, sewerage, roads?	***X***		***Additional demand on municipal services could impact on health if such services are not available.***
	Will the existing access of the community to basic services be impacted by the development?	***X***		***Additional demand on municipal services could impact on health if such services are not available.***
Change in housing needs / demands	***Will the development create a housing need, e.g. due to the in-migration of construction workers?***		***X***	***No impact foreseen.***
	Has the need for more housing been addressed by the development and or the authorities?			***Not applicable.***

The economical change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Negotiation process; and
- Additional demand on municipal services.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place. No category 2 impacts are foreseen during this stage of the project.

Negotiation process

The negotiation process is undertaken directly by Eskom and is independent of the EIA process. Eskom should determine in consultation with the landowners who should form part of this process and then ensure that all the relevant parties are present. Important points relating to the negotiation process are discussed in Appendix Q.

The results of a study conducted by MasterQ Research (2007) identified the differences amongst landowners in negotiation skills and knowledge as one of the weaknesses in the negotiation process. In addition, it seemed that the perception amongst certain stakeholders who participated in the study

was that landowners with more money had more negotiating power. For example, during the negotiations for the Matimba-Witkop Nr. 2 400 kV transmission power line, one landowner managed the moving of an existing line to the edge of his land before he agreed to the construction of the second line. However, this landowner was held responsible for the financial implications of the moving of the line.

If negotiations are not handled with the necessary sensitivity the impact of this process can be severely negative, i.e. a deadlock in negotiations resulting in an indefinite delay of the project. It would normally be preferable that the negotiation process begins after the EIA has been completed. At this stage there is greater confidence in the appropriateness of the site, and it would be supported by environmental authorisation. Although Eskom has the right to engage with any landowner at any time, they do so at risk if environmental authorisation has not been awarded.

Additional demand on municipal services

Additional municipal services will be required at the construction site and the construction village during the construction phase. The additional demand on municipal services causes a slight concern as it would appear that, in some cases, the supply of these services are lacking, e.g. electricity is not well supplied throughout the area.

If a construction village is not managed properly, it may lead to a lack of adequate water as well as unhygienic conditions in the case of waste and sanitation services. This in turn could lead to waterborne diseases that will not only affect the construction worker, but could also spread to the local community.

An assessment of this category 1 impact was conducted through the use of the assessment criteria to determine the significance of the identified issue, as per table 11a below.

TABLE 74: CONSTRUCTION & DECOMMISSIONING PHASE: INSTITUTIONAL & EMPOWERMENT CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance		*Spatial*		*Duration*		*Degree of Probability*		*Degree of Certainty*	*Risk*		*Status*
PRE-MITIGATION												
Negotiation process	*High*	*4*	*Study area*	*2*	*Short term*	*2*	*Going happen*	*5*	*Possible*	*2.7*	*Moderate*	*Depends on the outcome of the negotiation process*
Additional demand on municipal services	*Moderate*	*3*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Possible*	*1.38*	*Low*	*Negative*
POST MITIGATION												
Negotiation process	*High*	*4*	*Study area*	*2*	*Short term*	*2*	*Going happen*	*5*	*Possible*	*2.7*	*Moderate*	*Positive*
Additional demand on municipal services	*Low*	*2*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Possible*	*1.2*	*Low*	*Negative*
MITIGATION MEASURES												
Negotiation Process: • **The implementation of a fair and transparent negotiation process, as discussed under Section 2.4.** • **Negotiations in should be approached with the necessary cultural sensitivity.** • **Eskom should consider making use of an approved interpreter during the negotiation process to ensure that there are no misunderstandings as a result of language barriers.**							***Additional demand on municipal services:*** • ***Construction workers should be made aware of the limited capacity of the municipal services network.*** • ***Negotiations with the affected local municipalities must be conducted and a "demand-side management" should be implemented.*** • ***Sufficient portable chemical toilets should be provided on site and at the construction village. These must be regularly maintained and serviced.*** • ***Contractors should ensure adequate sanitation services (e.g. showers) at the construction village with effective drainage facilities to ensure that used water is appropriately treated and carried away from the site.*** <					

Expected Social-Cultural Change Processes and Resultant Impacts

Socio-cultural change processes that are associated with the construction and operation of the proposed project include changes to aspects such as health and safety and sense of place. In a social sense, it should be noted that the concept of 'health' is not only limited to physical health (i.e. the absence of ailments or illness), but also includes mental and social health. The expected changes that can occur in relation to health and safety aspects can be as a result of the presence of the proposed transmission power line and its associated infrastructure during operation, as well as the presence of construction workers and/or job seekers during construction.

The significance of the impacts of socio-cultural changes is difficult to determine on a prospective basis and are dependent on the demographic profile of, for example, construction workers and whether or not such differences affected local residents. For example, if construction workers were from a different cultural background than locals, conflict can be expected is such different cultural backgrounds are not respected. Conflict as a result of cultural differences or community disintegration as a result of the acceptance of construction workers' culture might occur – should the demographic profile of these construction workers be different, and should it matter to the communities involved.

Table 75 below provides an overview of the expected change process as well as the expected impacts that might occur as a result of the change process taking place.

TABLE 75: SOCIO-CULTURAL CHANGE PROCESSES

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		***Yes***	***No***	***Expected Impact***
Disruption of social networks	***Will the development impact on existing social networks?***		***X***	***No impact foreseen.***
Disruption in daily living and movement patterns	***Will the development change the lifestyle of residents?***		***X***	***No impact foreseen.***
	Will the development impact on access to facilities and resources, such as schools, hospitals, fields, forests, etc?		***X***	***No impact foreseen.***
	Will it impact on movement patterns, such as pedestrians crossing roads?	***X***		***Impact of construction activities on movement patterns of local communities, potentially impacting on safety and ease of movement.***
	Will it divide communities physically (e.g. through the		***X***	***No impact foreseen.***

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		**Yes**	**No**	**Expected Impact**
	building of a highway)?			
Dissimilarity in social practices	***Do new residents have dissimilar social practices to current residents?***		***X***	***No impact foreseen.***
	Do the new residents have different values, religious practices, social standard, etc?		***X***	***No impact foreseen.***
Alteration in family structure	***Could the development threaten family cohesiveness?***	***X***		***Socially acceptable integration, including the risk of spreading STIs and HIV/AIDS with an impact on health. The spread of STI and HIV is a matter of great concern, also in view of the light that construction workers move out of the area into another area where the spread of these STI and HIV continues. Apart from the obvious health implications, HIV infection in particular also has an economic impact.***
	Could it impact on immediate or extended family networks?	***X***		
	Could it impact on the traditional roles played by members of the family?	***X***		
Conflict	***Will the development lead to conflict between sectors of the social environment?***	***X***		***If social integration between newcomers and residents is hindered, it can lead to conflict, which in turn delays the construction process and has economic implications for the developer.***
	Is there conflict between the developer and the public?		***X***	***No impact foreseen.***
	Is this conflict being addressed?			***Not applicable.***
Safety and crime impacts	***Will the development impact on existing crime and safety patterns?***	***X***		***Presence of construction workers and job seekers leads people to believe that there will be an increase in crime, which impacts on surrounding landowners' sense of safety and security.***
Change in sense of place	***Will the development impact on people's "sense of place", e.g. through the large scale development of a rural community?***	***X***		***As the transmission power line might impact on people's perception of safety, these people might now feel unsafe in the area knowing that such infrastructure***

SOCIO-CULTURAL CHANGE PROCESSES				
Expected Change Process		**Yes**	**No**	**Expected Impact**
	Will the change "in sense of place" impact on people's relationship to the environment?	***X***		***is in close proximity to their houses. The presence of such a line also has a visual impact, changing the landscape from unspoilt to 'spoilt'.***
Implications for social history	***Does the development have any implications for the social history of affected communities?***		***X***	***No impact foreseen.***
	Will the development further marginalise communities that have been relocated during apartheid?		***X***	***No impact foreseen.***
	Will the development affect processes, structures or patterns that are valued as part of the social history of an area?		***X***	***No impact foreseen.***
Change in leisure opportunities	***Will the development impact on access to existing leisure opportunities?***	***X***		***Linked to 'sense of place'.***

The socio-cultural change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Integration with local community;
- Health;
- Safety and security; and
- Construction noise.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place. No category 2 impacts are foreseen during this stage of the project.

Integration with local community

This change process relates to the ease with which construction workers integrate into the local community and the ease with which the local community accepts the presence of the construction workers. If integration is hindered, it can lead to conflict, e.g. due to cultural differences.

Conflict can take place on multiple levels. Firstly, inter-conflict between the construction workers and the local community in terms of job opportunities and where the local community perceives the construction workers as competing for housing opportunities. Secondly, intra-conflict between construction workers themselves in terms of housing offered, and potentially in terms of salary packages. In a construction village conflict might be more intense due to the concentrated living and working conditions of the construction workers.

Where conflict is not resolved quickly and efficiently, it could give rise to labour strikes, site lock-outs, etc, which in turn delays the construction process and has clear economic implications for the developer. Not only does the contractor have to pay for the labour during the days of a legal strike, but they might also be required to acquire the services of a mediator in an attempt to resolve the issues.

Health

Construction workers form part of a significant section of the population known as migratory workers. The social cultural issues associated with this section of the population have been thoroughly researched. Due to their unique situation, construction workers engage in behaviour that makes them vulnerable, such as risky sexual behaviour (e.g. unprotected sex) and destructive behaviour (e.g. alcohol abuse, damaging the environment), which could be explained by their migratory status. When they are separated from their homes, they are also distanced from traditional norms, prevailing cultural traditions and support systems that normally regulate behaviour within a stable community. In addition, it might also be that construction workers who are faced with dangerous working conditions and the risk of physical injury might be more preoccupied by immediate (direct) risks and therefore tend to disregard salient (more indirect) risks, such as HIV infection. Again, it is likely that HIV transmission occurs, as the local population might be uneducated about the risk and transmission of HIV and would therefore more easily engage in risky behaviour as a result of ignorance.

Construction workers' situations seem to make them vulnerable to high-risk sexual behaviour. There are ample research results to indicate that there is a direct link between temporary migration and HIV infection. Research also seems to indicate that construction workers might be more at risk of contracting HIV from members of local communities, as opposed to transmitting the infection to community members.

In this context health impacts focus mainly on the spread of certain sexually transmitted infections (STI), including HIV/AIDS. It is not uncommon for construction workers who are separated from their families for a period of time to establish temporary sexual relationships with members of the local community. It can also be expected that sex workers might visit the construction workers at their place of residence. The spread of STI and HIV then becomes a matter of great concern, also in view of the light that construction workers move out of the area into another area where the spread of these STI and HIV continues.

Apart from the obvious health implications, HIV infection in particular also has an economic impact, not only on the local area, but extending to the regional and national context. If viewed within the

context of an increase in HIV/AIDS related deaths amongst the economically active individuals, it becomes clear that the workforce might potentially be reduced and that this in turn will affect basic services, as well as the smooth running of an economy.

It is a complex task to understand the macro-economic impact of HIV/AIDS on a country or region. Not only should one consider the direct and indirect costs, but also the loss of human capital and the natural system of developing a generation through the transference of knowledge and skills necessary for development.

Safety and security

Not only do health issues impact on communities, but the physical safety of communities can also be endangered as a result of the influx of job seekers and construction workers (e.g. potential increase in crime). There is perception that crime increases in an area the moment that construction workers arrive on site. Because of this perception, occurrences of crime during the time of the project are likely to be ascribed to the construction workers. This has a mental health impact, such as fear. However, it should be noted that in most instances it is not the actual construction worker who engage in criminal activities but more likely job seekers who loiter at the site in search of employment.

Construction noise

A constant high level of noise has a prolonged detrimental effect on a person's general well-being and functioning. People living in close proximity to a construction site will be exposed to such a constant level of noise generated by the construction activities taking place.

The experience of the increase in noise levels because of the construction village will differ from person to person. Griffiths (1983) is of the opinion that as long as a stimulus remains the same, the impact of noise would not decrease. He referred to studies on noise pollution where habituation (people getting used to the noise in an area) had not taken place approximately 2 years after a new road had been opened. De Jong (1990) is further of the opinion that people's resistance to noise levels seems to be decreasing, despite the fact that there was no change in their environment that could add to the noise levels. He termed this finding "psychological sensitisation".

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 76 below.

TABLE 76: CONSTRUCTION & DECOMMISSIONING PHASE: SOCIO-CULTURAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

<	Significance		Spatial		Duration		Degree of Probability		Degree of Certainty	Risk		Status
PRE-MITIGATION												
Integration with local community	*Moderate*	*3*	*Local*	*3*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*1.38*	*Low*	*Negative*
Health	*High*	*4*	*National*	*5*	*Long term*	*4*	*Could happen*	*3*	*Possible*	*2.58*	*Moderate*	*Negative*
Safety and security	*Low*	*2*	*Local*	*3*	*Short term*	*2*	*Could happen*	*3*	*Possible*	*1.38*	*Low*	*Negative*
Construction noise	*Moderate*	*3*	*Study area*	*2*	*Short term*	*2*	*Could happen*	*3*	*Possible*	*1.38*	*Low*	*Negative*
POST MITIGATION												
Integration with local community	*Low*	*2*	*Local*	*3*	*Incidental*	*1*	*Unlikely*	*2*	*Possible*	*0.8*	*Very low*	*Negative to Neutral*
Health	*Moderate*	*3*	*National*	*5*	*Long term*	*4*	*Could happen*	*3*	*Possible*	*2.4*	*Moderate*	*Negative*
Safety and security	*Low*	*2*	*Local*	*3*	*Short term*	*2*	*Unlikely*	*2*	*Possible*	*0.92*	*Very low*	*Negative*
Construction noise	*Low*	*2*	*Study area*	*2*	*Short term*	*2*	*Unlikely*	*2*	*Possible*	*0.8*	*Very low*	*Negative*

MITIGATION MEASURES			
Integration with local community: • ***The community should be informed in advance of the influx of construction workers and the time they will spend in the community as well as the activities they will be involved in. This will enable the community to prepare for a possible (temporary) change in functioning.***	***Health:*** • ***An aggressive STI and HIV/AIDS awareness campaign should be launched, which is not only directed at construction workers but also at the community as a whole.*** • ***Condoms should be distributed by placing them at centrally located points and by ensuring that construction workers and***	***Safety and Security:*** • ***Construction workers should be clearly identifiable. Overalls should have the logo of the construction company on it and/or construction workers should wear identification cards.*** • ***The construction site should be fenced and access should be controlled by means of a security***	***Construction noise:*** • ***Construction activities should be restricted to daytime hours between 06:00 and 18:00.*** • ***Adjacent property owners should be consulted and notified of any construction activities that could lead to excessive noise levels.*** • ***Adjacent property owners should also be consulted if any night time construction activities were to take***

• *A code of conduct should be established for construction workers in their dealings with the local community. Creating of awareness on both sides (community and outsiders) is crucial for the success of the project.* • *Potential conflict situations can be reduced beforehand using a transparent recruitment process, i.e. where labourers would be sourced from the local community.* • *A labour desk should be implemented where the local community members could register. A rotary system could be used for unskilled labour to ensure that all job seekers have an equal opportunity to employment.* • *Potential conflict situations within the construction village itself can be managed by means of weekly forum meetings. During these meetings residents should have the opportunity to raise any problems experienced and make suggestions in terms of their living space. Where feasible, these problems and suggestions should be addressed as soon as possible to ensure a conflict-free environment.*	*community members are aware of the availability and location of condoms. The distribution of condoms should be approached with the necessary cultural sensitivity.* • *Access at the construction site should be controlled to prevent sex workers from either visiting and/or loitering at the construction village.* • *Local women should be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability.*	*access point.* • *Loitering of outsiders at the either the construction site or at the construction village should not be allowed. Loiterers at the site should be removed in cooperation with the local branch of the South African Police Service (SAPS).*	*place.*

10.2 Operational Phase

The main impacts during the operatational phase are the electro magnetic field associated with the power lines and the occurrence of the physical structures in the landscape. See *Electric and Magnetic Fields – A summary of Technical and Biological Aspects* (2006). for a detailed discussion regarding the impact of electro magnetic fields.

10.2.1 Geology

Once the power lines are constructed there should be no further impact to geology.

10.2.2 Topography

Once the power lines are constructed there should be no further impact to topography.

10.2.3 Soils, Land Capability and Land Use

The impact assessment does not change from that of the construction phase, refer to section 10.1.3 above.

10.2.4 Surface water

Once the power lines are constructed there should be no further impact to surface water.

10.2.5 Flora

Once the power lines are constructed there should be no further impact to flora.

10.2.6 Fauna

Initial impact

The initial impact remains the same as that calculated for the construction phase in section 10.1.6 above.

Additional impact

While there appears to be no negative impacts associated with electro magnetic fields in Eskom's document, *Transmission Bird Collision Prevention Guideline* (Ref. no.: TGL41-335), the major impact to birds or avi-fauna is in the form of collisions with power lines. In in Eskom's document, *Transmission Bird Collision Prevention Guideline* (Ref. no.: TGL41-335), it was found that the

majority of birds affected are large flighted birds, which are also often endangered or threatened species.

These large flighted birds are also long lived, with low breeding rate and often mate for life. Therefore, a single mortality due to a collision with a power line should be viewed as a high impact.

The study area provides habitat or is potential to a number of mammals, birds, reptiles, amphibians and athropods. The initial impact to fauna is due to the loss of habitat and the region also contains threatened bird species such as Blue Crane, White-Bellied Korhaan and Secretary Birds.

TABLE 77: FAUNA ADDITIONAL IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	HIGH	*Regional / Provincial*	Long Term	*Could happen*	Moderate
	4	***4***	**4**	**3**	**2.4**

The additional impact to fauna is HIGH, occurs at *Regional / Provincial* spatial scale and will be Long Term and *Could happen*. This results in a rating of 2.4 and a Moderate impact class.

Cumulative impact

During the operational phase the proposed development will add approximately 100 km of high voltage power lines to the existing network of power lines in the area. The addition is relatively small in consideration of the approximately of existing high voltage power lines in the area. The cumulative impact to fauna remains a High impact as assessed in the initial impact assessment.

Residual impact

In order to prevent power line collisions from birds, anti-collision devices can be installed to the power lines. These include static, dynamic, reflective and illuminated devices. As mentioned in (Ref bird collision) these devices have however only been reasonably successful and will not complete eliminate the impact or the risk to birds. If the mitigation measures in the reference can be implemented not only on the new lies but also on the existing lines, then the impact can be rated as illustrated in the table below.

TABLE 78: FAUNA RESIDUAL IMPACT RATING SCALE

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	HIGH	*Regional / Provincial*	Long Term	*Unlikely*	Moderate
	4	***4***	**4**	**2**	**2.6**

The residual impact as calculated in Table 78 above, will be HIGH, impact that occurs in the ***Regional / Provincial*** scale and will be Long Term and is ***Unlikely*** to occur. A rating of 2.6 is a Moderate impact class.

Once again it must be emphasised the the residual impact is most likely going to be high. Only if the proposed mitigation measures can be implemented on the existing as well as the new power lines will the impact reduce to Moderate.

10.2.7 Visual

If Alternative 1 or 3 are chosen the power lines will form part of the existing visual disturbance in the region. The impact will therefore remain as assessed above in Section 10.1.7. If Alternative 2 is chosen this will be a new impact to a large portion of the route, as the route does not have existing power lines. If this is the case the impact would also be rated as a high impact but the percieved impact would be higher than the other two alternatives.

10.2.8 Archaeology and Cultural Historical Sites

The archaeological and cultural history during the operational phase of the development remains as assessed in Section 10.1.9.

10.2.9 Socio-Economic Environment

The following changes are expected during the operational phase of the proposed project:

- Demographic change;
- Geographic change;
- Economic change;
- Institutional and empowerment change; and
- Socio-cultural change.

The expected changes are discussed below.

Demographic Change Process

The size and composition of the maintenance team will depend on the type of maintenance that would be required on the transmission power line. Maintenance on the servitude involves teams who clear the servitude of any vegetation and/or other structures which may impede on the operation of the transmission power line. Prior to servitude maintenance, the servitude is inspected, either by a ground servitude inspection team or by flying over the servitude. Again the size of the maintenance team is

dependant on the actual clearing that has to be done. It is however assumed that, because of the fact that bush clearance is viewed as unskilled labour, local residents could be employed on the bush clearance teams.

In any event it is not foreseen that the presence of maintenance teams would lead to the large scale influx of people to the area as maintenance teams are normally small groups. Therefore, no demographic change processes are foreseen during the operation and maintenance phases.

Expected Geographical Change Processes

The geographical change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Grazing land;
- Spatial development (future land use); and
- Presence of the transmission power line.

In addition, the following change process that would result in a Category 2 impact, which are those impacts that are expected to cause significant changes between the proposed alternatives, are as follows:

- Cultivated land (including irrigation); and
- Mining.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place.

Grazing land

The presence of towers and Transmission power lines on grazing land pose fewer problems, as cattle can move around towers and therefore less land is lost. The portion of land that was used for construction activities is handed back to the landowner upon completion of these activities. Cattle can move freely under Transmission power lines and around towers to graze. The permanent loss of grazing land is therefore not regarded as significant.

Spatial development (future land use)

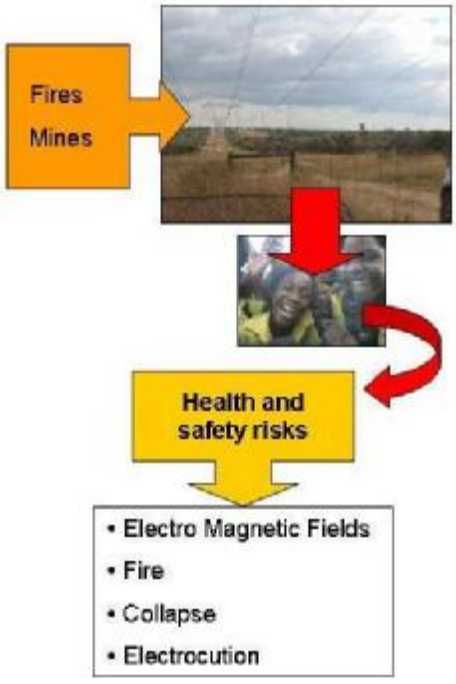
Transmission power lines may impact on the development patterns in an area, because structures are not allowed within the servitude. Once a transmission power line is operational, development may occur towards and into the servitude because of normal growth, merging of villages/developments,

lack of alternative space, municipal development plans or job expectations because of a project (such as the construction of a transmission power line).

The presence of towers and Transmission power lines could restrict the development plans of local municipalities, as no structures are allowed within the servitude. This would impact on the planning process as development plans would have to be revised to accommodate the presence of a Transmission power line, which would have an economic impact on the municipality. The revision of development plans would also delay developments.

Presence of the Transmission power line

The main social concerns which arise when considering the presence of a transmission power line close to human settlement and potential settlement in the servitude are health and safety aspects as illustrated in the diagram that follows. The intention is that the servitude mitigates these potential health and safety related impacts. Risks are related to Electro and Magnetic Fields (EMF), electrocution, fire and collapse. A line could cause fatal/traumatic accidents because of collapse of a tower and/or lines because of mechanical failure, fire and mining activities. Fire can be caused by of electrical malfunction or human error.



Utilities in South Africa involved in the generation and distribution of electrical energy, are bound by the Occupational Health and Safety (OHS) Act (Act 85 of 1993) to provide such services in a safe manner. There are currently no regulations (under the Hazardous Substances Act) in terms of exposure to power frequency EMF in South Africa and the International Commission for Non-

Ionising Radiation Protection (ICNIRP) guidelines are used for assessing human exposure to these fields. The guidelines for electric and magnetic field exposure set by the ICNIRP, an organisation linked to the World Health Organisation (WHO), receive world-wide support (Pretorius 2006). To manage the risks, the line runs in a servitude in which buildings, and crops higher than 2-4 meters are not allowed (depending on voltage of the line).

The results of a study commissioned by Eskom Holdings Limited (Pretorius 2006) on the possible health effects of EMF noted the following:

- The main focus of research has been on a possible association between long term exposure to magnetic fields and childhood leukaemia.
- Based on the epidemiological findings, the risk of EMF being a health hazard is small.
- Based on current understanding of the topic, EMF is regarded a possible but not proven cause of cancer.
- The suggestion for this health outcome stems mainly from a fairly consistent pattern of the increased but small risk observed from some epidemiological studies. This finding has not been confirmed by (notably all) controlled laboratory studies.
- No evidence of a causal relationship between magnetic field exposure and childhood leukaemia has been found and no dose-response relationship has been shown to exist between EMF exposure and biological effects.
- A possible explanation for the epidemiological findings may be confounding (a factor other than EMF) or bias (subjects studied are not representative of the target population for which conclusions are drawn) which render the data inconclusive and prevent resolution of the inconsistencies in the epidemiologic data.
- In general, studies of animal reproductive performance, behaviour, milk production, meat production, health and navigation have found minimal or no effects of EMF. The literature published to date has shown little evidence of adverse effects of EMF from overhead power lines on farm animals and wildlife.

It was concluded that electric and magnetic fields with levels typical of a power line environment, complying with the requirements for proper servitude management as prescribed by the electric utility, are unlikely to affect plants in terms of growth, germination and crop production.

Considering electrocution, transmission lines could pose a safety risk. Induced charges can build up on fence wires mounted on wood posts near power lines.[10] This phenomenon is generally restricted to

[10] www.greatriverenergy.com/community/power_line_safety.html

higher voltage lines (200 kV or greater). The magnitude of the build-up depends on a variety of factors:

- The size of the power line;
- The length of fence paralleling the line;
- The distance between the line and the fence;
- The amount of moisture in the fence posts and the ground; and
- The presence of grounding devices such as metal fence posts or weeds growing next to the fence.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 79 below.

TABLE 79: OPERATION & MAINTENANCE PHASE: GEOGRAPHICAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance		*Spatial*		*Duration*		*Degree of Probability*		*Degree of Certainty*	*Risk*		*Status*
PRE-MITIGATION												
Permanent loss of grazing land	*Low*	*2*	*Isolated*	*1*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.6*	*Very low*	*Negative to Neutral*
Spatial development (future land use)	*High*	*4*	*Isolated*	*1*	*Long term*	*4*	*Could happen*	*3*	*Possible*	*1.8*	*Low*	*Negative*
Presence of the transmission power line	*Moderate*	*3*	*Study area*	*2*	*Long term*	*4*	*Very likely*	*4*	*Possible*	*2.4*	*Moderate*	*Negative*
POST MITIGATION												
Permanent loss of grazing land	*Very low*	*1*	*Isolated*	*1*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.6*	*Very low*	*Neutral*
Spatial development (future land use)	*Moderate*	*3*	*Isolated*	*1*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*0.78*	*Very low*	*Negative*
Presence of the transmission power line	*Low*	*2*	*Study area*	*2*	*Long term*	*4*	*Could happen*	*3*	*Possible*	*1.62*	*Low*	*Negative to Neutral*
MITIGATION MEASURES												
Grazing land: • ***Where possible, towers should be located on the boundary of the farmland to lessen the loss of grazing land.***			***Spatial development:*** • ***Route alignment should avoid both existing and planned settlements, where possible.*** • ***Route alignment should take cognisance of local development plans.***						***Presence of the transmission power line:*** • ***Education local residents on the real and perceived dangers of living close to a Transmission power line.*** • ***Maintenance of the servitude in terms of restrictions associated with residences within this area.***			

Cultivated land (including irrigation)

Although it is still possible to cultivate land around towers, the presence of a tower does complicate the cultivation process which in some instances could lead to a loss of available land for cultivation.

The presence of a Transmission power line complicates crop spraying by aeroplane and in some instances makes crop spraying from the air impossible due to the fact that the Transmission power lines are in the way.

Furthermore, Electromagnetic Fields (EMF) seems to interfere with Global Positioning System (GPS) equipment and other advanced electronic equipment that is used when ploughing. It has also been reported that Transmission power lines or the resultant EMF interferes with two-way radio systems when these are used in the vicinity of a power line.

In terms of crop irrigation, it is preferable that 400 kV lines do not cross centre pivots, because of the proximity of the water to the Transmission power line. Also, the towers might interfere with sub surface irrigation pipes, and the space needed for the centre pivot. Centre pivots are mostly concentrated around the western alignment, with the closest centre pivot located to the south of the western alignment where the corridor exited the Kendal Power Station. The edge of this irrigated area is approximately 35m south of the southern edge of the western alignment. In all other instances, the centre pivots and irrigated areas are located at a distance of at least 800m or more away from the alignment.

Figure 85 below gives an indication of the location of the centre pivots. However, it should be noted that this image is *not to scale* and therefore it might appear that the some of the alignments cross through centre pivot areas, which is not the case.

FIGURE 85: LOCATION OF IRRIGATION POINTS (CENTRE PIVOTS) IN RELATION TO CORRIDOR ALTERNATIVES

An assessment of this category 2 impact was conducted through the use of the assessment criteria to determine the significance the impact per alignment, as per Table 80 below.

TABLE 80: OPERATION & MAINTENANCE PHASE: GEOGRAPHICAL CHANGE PROCESSES CATEGORY 2 IMPACT ASSESSMENT: CULTIVATED LAND (INCLUDING IRRIGATION)

	Lulumisa – Minerva Section		*Minerva – Apollo Section*		*Apollo – Bravo Section*					
					Northern Alternative		*Central Alternative*		*Southern Alternative*	
PRE-MITIGATION										
Significance	***Moderate***	***3***	***No impact***	***0***	***Moderate***	***3***	***Moderate***	***3***	***No impact***	***0***
Spatial	***Isolated***	***1***	***n/a***		***Isolated***	***1***	***Isolated***	***1***	***n/a***	
Duration	***Medium term***	***3***	***n/a***		***Medium term***	***3***	***Medium term***	***3***	***n/a***	
Degree of Probability	***Could happen***	***3***	***n/a***		***Could happen***	***3***	***Could happen***	***3***	***n/a***	
Degree of Certainty	***Possible***		***n/a***		***Possible***		***Possible***		***n/a***	
Risk	***1.62***	***Low***		***n/a***	***1.62***	***Low***	***1.62***	***Low***		***n/a***
Status	***Negative***		***n/a***		***Negative***		***Negative***		***n/a***	
POST-MITIGATION										
Significance	***Low***	***2***	***No impact***	***0***	***Low***	***2***	***Low***	***2***	***No impact***	***0***
Spatial	***Isolated***	***1***	***n/a***		***Isolated***	***1***	***Isolated***	***1***	***n/a***	
Duration	***Medium term***	***3***	***n/a***		***Medium term***	***3***	***Medium term***	***3***	***n/a***	
Degree of Probability	***Unlikely***	***2***	***n/a***		***Unlikely***	***2***	***Unlikely***	***2***	***n/a***	
Degree of Certainty	***Possible***		***n/a***		***Possible***		***Possible***		***n/a***	
Risk	***0.48***	***Very low***		***n/a***	***0.48***	***Very low***	***0.48***	***Very low***		***n/a***
Status	***Negative***		***n/a***		***Negative***		***Negative***		***n/a***	

	Lulumisa – Minerva Section	*Minerva – Apollo Section*	*Apollo – Bravo Section*		
			Northern Alternative	*Central Alternative*	*Southern Alternative*
MITIGATION MEASURES					
• ***Consultation should take place between the landowner and Eskom to determine the extent of permanent loss of land for cultivation due to the presence of the tower(s).*** • ***Upon agreement between the landowner and Eskom, landowners should be compensated for the permanent loss of portions of the land that is unreachable due to the presence of the tower(s).*** • ***Where possible, pylons should be located on the border of the farmland to lessen the potential loss of cultivated land.*** • ***Alignment should be done in such a way that it is located a safe distance away from centre pivots.***					
PREFERRED ALIGNMENT					
< ***At the time of the study, no irrigation schemes were observed along the southern alternative. There is also only one existing transmission power line along this corridor alternative, which means that less land would be lost than with the northern alternative where there are already two existing transmission power lines.***					

Mining

Transmission power lines should avoid mining activities due to the possibility of slumping and underground fires. Also, towers pose a risk to mining activities in the form of towers falling over, with health and safety as well as economic impacts as a result. In turn, the mining activities might also pose a risk to the safety of the Transmission power line; if for example, blasting takes place at the mining operation.

At least 6 existing mining operations have been identified within the study area, which includes the following operations (depicted in Figure 86):

Name of Mining Operation	*Type of Operation*	*Closest Alignment*
Unknown	***Open cast***	***Northern portion of mining operation within servitude of section between Lulumisa and Minerva substations***
Unknown	***Open cast***	***Approximately 1.4 km east and 1.2km south of section between Lulumisa and Minerva substations***
Unknown	***Open cast***	***Entire operation located within servitude of section between Lulumisa and Minerva substations***
Unknown	***Open cast***	***Approximately 460m north of section between Minerva substation and Apollo converter station***
Unknown	***Open cast colliery***	***Approximately 240m south of northern alignment***
Unknown	***Open cast***	***Approximately 680m south of northern alignment and approximately 360m north of central alignment***

FIGURE 86: LOCATION OF MINING OPERATIONS IN RELATION TO CORRIDOR ALTERNATIVES

Mineral rights holders have rights to the surface area as well as far as they need the surface area to exercise their right to extract minerals. Therefore, any structures on the mineral rights surface areas have to be approved by the holders of these rights.

Blasting takes place on a regular basis at open cast mining areas, as is associated with many of the mines in the area. Therefore mining operations could have a negative impact on the Transmission power line itself due to blasting (i.e. flying rocks that could potentially hit the Transmission power line, leading to breakdowns and an interruption in electricity supply).

An assessment of this category 2 impact was conducted through the use of the assessment criteria to determine the significance the impact per alignment, as per Table 81 below.

TABLE 81: OPERATION & MAINTENANCE PHASE: GEOGRAPHICAL CHANGE PROCESSES CATEGORY 2 IMPACT ASSESSMENT: MINING OPERATIONS

<	*Lulumisa – Minerva Section*	*Minerva – Apollo Section*	*Apollo – Bravo Section*		
<			*Northern Alternative*	*Central Alternative*	*Southern Alternative*
PRE-MITIGATION					
Significance	***High 4***	***Moderate 3***	***Moderate 3***	***Moderate 3***	***No impact 0***
Spatial	***Isolated 1***	***Isolated 1***	***Isolated 1***	***Isolated 1***	***n/a***
Duration	***Medium term 3***	***Medium term 3***	***Medium term 3***	***Medium term 3***	***n/a***
Degree of Probability	***Going to happen 5***	***Could happen 3***	***Could happen 3***	***Could happen 3***	***n/a***
Degree of Certainty	***Probable***	***Possible***	***Possible***	***Possible***	***n/a***
Risk	***2.7 Moderate***	***1.62 Low***	***1.62 Low***	***1.62 Low***	***- n/a***
Status	***Negative***	***Negative***	***Negative***	***Negative***	***n/a***
POST-MITIGATION					
Significance	***Moderate 3***	***Low 2***	***Low 2***	***Low 2***	***No impact 0***
Spatial	***Isolated 1***	***Isolated 1***	***Isolated 1***	***Isolated 1***	***n/a***
Duration	***Medium term 3***	***Medium term 3***	***Medium term 3***	***Medium term 3***	***n/a***
Degree of Probability	***Very likely 4***	***Unlikely 2***	***Unlikely 2***	***Unlikely 2***	***n/a***
Degree of Certainty	***Probable***	***Possible***	***Possible***	***Possible***	***n/a***
Risk	***1.84 Low***	***0.48 Very low***	***0.48 Very low***	***0.48 Very low***	***- n/a***
Status	***Negative***	***Negative***	***Negative***	***Negative***	***n/a***

<	***Lulumisa – Minerva Section***	***Minerva – Apollo Section***	***Apollo – Bravo Section***		
<			***Northern Alternative***	***Central Alternative***	***Southern Alternative***
MITIGATION MEASURES					
• ***Realignment on the Lulumisa-Minerva section to bypass mining operations, notably where the alignment crosses right over an open cast mining area.***					
PREFERRED ALIGNMENT					
During the time of the study, no mining operations were observed along the southern alternative.					

Expected Economic Change Process

The economical change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Direct formal employment opportunities to local individuals;
- Electricity supply and economic growth; and
- Property values.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place. In addition, the following change process that would result in a Category 2 impact, which are those impacts that are expected to cause significant changes between the proposed alternatives, are as follows:

Direct formal employment opportunities to local individuals

It is unlikely that maintenance workers will be sourced from within the local community, due to the skilled nature of the job requirements. Also, it is more likely that Eskom would employ a maintenance team that will cover the entire length of the transmission power lines instead of fragmented maintenance teams that only cover a certain section of these lines. Furthermore, transmission power line maintenance is a highly skilled job seeing as maintenance is normally carried out on live lines to prevent a disruption in the supply.

However, some local individuals may be employed on servitude maintenance teams, but that would to a large extent depend on the appointed servitude maintenance contractor. The number of people involved in a maintenance team depends on the type of maintenance that has to be conducted.

Due to the fact that local community members are unlikely to be employed as transmission power line maintenance team members, no tangible economic impacts are foreseen. Where local community members are used as servitude maintenance workers, this could lead to an economic impact and local social upliftment.

Electricity supply and economic growth

Resources and infrastructure, such as electricity, water and fuel, enables normal economic growth as most economic activities are dependant on a sufficient and steady supply of electricity. Normal economic activities, e.g. industry and businesses, are affected when electricity is not available. The economic impact on such services increases the longer services such as electricity is unavailable.

The proposed transmission power line would enhance the electricity supply to the local area, thereby stimulating economic growth through the establishment and/or expansion of businesses and

industries. This in turn creates additional employment opportunities, which further enhances economic growth, permitting a positive economic impact to filter down to a more grassroots level.

Property Values

When considering the impact of a transmission power line on property values, the following must be considered:

- The location of the transmission power line (e.g. on the border, through the middle, or cutting a corner of a property);
- The location of transmission power line towers;
- The type of towers used;
- The presence of existing transmission power lines; and
- The presence of any visual mitigation.

In the case of the section between the Minerva substation and the Apollo converter station, the proposed transmission power line will follow an existing corridor that currently contains either 5 existing transmission power lines depending on location along the route. The corridor runs between residential property estates, but it is however, envisaged that lines will not cross properties and that there is no requirement for towers to be located on residential properties. The current proximity of transmission power lines also means that the value implications of their presence will in general already be reflected in values for residential properties in proximity to the transmission power line.

An exception may be applied to a number of properties bordering the corridor on the south as the proposed transmission line will be placed on the southern side of the corridor. This will decrease the distance between a transmission power line and adjacent properties from approximately 100-60m to approximately 60-30m, which may cause a slight decrease in property value for the bordering properties of approximately 5-10%.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of the identified issue, as per Table 82 below.

TABLE 82: OPERATION & MAINTENANCE PHASE: ECONOMICAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

	Significance		Spatial		Duration		Degree of Probability		Degree of Certainty	Risk		Status
PRE-MITIGATION												
Direct formal employment opportunities to local individuals	*Low*	*2*	*Study area*	*2*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*1.02*	*Low*	*Positive*
Electricity supply and economic growth	*High*	*4*	*Regional*	*4*	*Medium term*	*3*	*Very likely*	*4*	*Probable*	*2.96*	*Moderate*	*Positive*
Property values	*High*	*4*	*Study area*	*2*	*Medium term*	*3*	*Very likely*	*4*	*Probable*	*2.4*	*Moderate*	*Negative*
POST MITIGATION												
Direct formal employment opportunities to local individuals	*Moderate*	*3*	*Study area*	*2*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*1.2*	*Low*	*Positive*
Electricity supply and economic growth	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*	*-*
Property values	*Moderate*	*3*	*Isolated*	*1*	*Medium term*	*3*	*Could happen*	*3*	*Probable*	*1.38*	*Low*	*Negative*
MITIGATION MEASURES												
Employment opportunities: • ***Individuals with the potential to develop their skills should be afforded training opportunities. Eskom should be involved in this process.*** • ***Make use of local labour on unskilled maintenance components, such as servitude***	***Electricity supply and economic growth:*** < ***None.***						***Property values:*** • ***Implementation of visual mitigation measures as proposed in the Visual Impact Assessment.***					

maintenance. • ***Where local labourers are employed on a more permanent basis, cognisance should be taken of the Labour Law in terms of registering the worker with the Unemployment Insurance Fund (UIF), Pay as you earn (PAYE), workman's compensation and all other official bodies as required by law. This would enable the worker to claim UIF as a means of continuous financial support when the worker's position on the construction team has either become redundant or once the construction phase comes to an end.***		

Expected Institutional and Empowerment Change Process

An increase in the availability of electricity to the local area has been identified as an institutional and empowerment change process that can be expected during the operational and maintenance phase of the project. This issue has been assessed under "electricity supply and economic growth".

Expected Socio-cultural Change Process

The geographical change processes that are expected to result in Category 1 impacts, which are defined as those impacts that are not expected to differ between the proposed alternatives, during this phase of the project are as follows:

- Movement of maintenance workers;
- Physical splintering; and
- Third party tampering.

In addition, the following change process that would result in a Category 2 impact, which are those impacts that are expected to cause significant changes between the proposed alternatives, are as follows:

- Sense of place.

These change processes will be discussed separately together with a detailed assessment of the expected impact as a result of the change processes taking place.

Movement of maintenance workers

As is the case with construction workers, a lack of control over the movement patterns of maintenance workers is a source of concern to landowners. Furthermore, landowners are concerned about the fact that they seem to lose control over who has access to their property and who has not. Again, there is perception that crime increases in an area the moment that maintenance workers arrive on site, more so in terms of servitude maintenance workers as with actual Transmission power line maintenance workers. Because of this perception, occurrences of crime during the operational lifetime of the project are likely to be ascribed to the maintenance workers.

Physical splintering

It is unlikely that the presence of a Transmission power line would splinter communities, seeing as people can still move freely underneath a Transmission power line. However, the perception that a Transmission power line is dangerous might prohibit people from moving around or underneath the line, but it is foreseen that this would mostly be on an individual basis based on personal perception and would therefore not affect the collective community.

Third party tampering

If third party tampering occurs, it would most probably be in the form of cable theft, which is an extremely high risk criminal activity with the probability and occurrences of accidental electrocution. Although cable theft, from a technical point of view, is not possible on a 400 kV line, the possibility that someone would attempt cable theft out of ignorance cannot be excluded. An uninformed person only sees a Transmission power line and does not necessarily take cognisance of the size of the Transmission power line.

According to the Opportunity Model of Cohen, Kleugel and Land (in Snyman, 2007), there are five factors that indicate the probability of risk of victimisation. The basic underlying principle of the Opportunity Model is that the daily operations and physical location of the Transmission power line not only brings it into direct contact with potential offenders, but that capable guardians are also absent. To curb such vulnerability it is further important that Eskom establish a trusting relationship with residents as these residents can act as informants and social protectors of the Transmission power line.

The Opportunity Model moves away from the characteristics of the potential offender and his/her motivation, to the characteristics of the situation in which the crime may occur. The risk rate is not dependent on the number of factors that are present or absent, but rather on the combination of factors that are present or absent. The five factors are:

- **Exposure**: The physical visibility and accessibility of the Transmission power lines to persons who may vandalise or sabotage it. On the other hand the Transmission power line is also visible to informers and social protectors (residents).
- **Proximity**: The physical distance between the Transmission power line and potential offenders. Some sections of the Transmission power line on the western alternative pass in close proximity to settlements, both formal and informal.
- **Guardianship**: Guardianship is determined by the number of persons and devices that prevent contact between the Transmission power line and potential offenders. However, it is important to note that guardianship does not relate to the quantity of the guardian elements, but to the quality and surety of response. Again it is not only important for Eskom to have a fully operational and effective Disaster Management Plan, but also to establish a trusting relationship with the residents to act as “informal” guardians of the Transmission power lines.
- **Target attractiveness**: The inherent value and symbolism of the target have a direct bearing on the risk of the target.
- **Property of committing the offence**: The specialisation in skills level to commit the crime decreases the risk of victimisation. Despite this, it does not decrease the risk of an opportunistic (or ignorant) offender to attempt cable theft.

Any third party tampering on the Transmission power lines could increase the vulnerability of communities in close proximity to the Transmission power lines, which in turn would impact on their health and safety. Sabotage will have an immediate impact on safety and security as it is a wilful act intended to deliberately damage or destroy the Transmission power line. Cable theft will also compromise the functionality of the Transmission power line, resulting in power failures possibly at a national level.

Apart from the impact on safety on the surrounding area, there will also be an immediate safety impact on the offender, resulting in possible death as a result of high voltage electrocution.

An assessment of these category 1 impacts was conducted through the use of the assessment criteria to determine the significance of each of the identified issues, as per Table 83 below.

TABLE 83: OPERATION & MAINTENANCE PHASE: SOCIO-CULTURAL CHANGE PROCESSES CATEGORY 1 IMPACT ASSESSMENT

<	*Significance*		*Spatial*		*Duration*		*Degree of Probability*		*Degree of Certainty*	*Risk*		*Status*
PRE-MITIGATION												
Movement of maintenance workers	*Moderate*	*3*	*Isolated*	*1*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*1.02*	*Low*	*Negative*
Physical splintering	*Low*	*2*	*Isolated*	*1*	*Incidental*	*1*	*Unlikely*	*2*	*Possible*	*0.52*	*Very low*	*Negative*
Third party tampering	*Moderate*	*3*	*Isolated*	*1*	*Incidental*	*1*	*Could happen*	*3*	*Possible*	*1.02*	*Low*	*Negative*
POST MITIGATION												
Movement of maintenance workers	*Low*	*2*	*Isolated*	*1*	*Incidental*	*1*	*Unlikely*	*2*	*Possible*	*0.52*	*Very low*	*Negative to Neutral*
Physical splintering	*Very low*	*1*	*Isolated*	*1*	*Incidental*	*1*	*Unlikely*	*2*	*Possible*	*0.4*	*Very low*	*Negative to Neutral*
Third party tampering	*Low*	*2*	*Isolated*	*1*	*Incidental*	*1*	*Unlikely*	*2*	*Possible*	*0.52*	*Very low*	*Negative to Neutral*

MITIGATION MEASURES

Movement of maintenance workers:

- ***Maintenance workers should be clearly identifiable, either by wearing overalls and/or identification cards.***
- ***Consult with local landowners prior to maintenance work taking place, to inform them of when the maintenance team will be on site, for how long, and approximately how many persons the team will consist of.***
- ***Supply landowners with a contact number to report suspicious persons or persons who loiter around the maintenance team, but that does not form part of the maintenance team. (For example: If Eskom indicated that the maintenance team would consist of 20 people, but the landowner notices that there are 30 people on his property, he should be able to inform Eskom of this fact.)***

Physical splintering:

- ***Community awareness on the safety mechanisms of a Transmission power line and potential dangers.***
- ***Such an awareness campaign should be based on and address Frequently Asked Questions (FAQs) regarding a Transmission power line, e.g. is it safe to walk underneath a Transmission power line if the surrounding area is wet or it is raining?***
- ***The awareness campaign should also focus on standard operating procedures when there is a breakdown in the line, e.g. people should steer clear of the area, who to contact, etc.***

Third party tampering:

- ***Conduct a vulnerability assessment to identify essential portions and dimensions of the Transmission power line that is particularly vulnerable to wilful damage.***
- ***Ensure that physical security systems and emergency tactical response measures are adequate and effective.***
- ***Increase random aerial and ground surveillance of the entire length of the Transmission power line or sections thereof.***
- ***Fence off and control access to towers and other key facilities on the Transmission power line.***

Sense of place

Much of what is valuable in a culture is embedded in place, which cannot be measured in monetary terms. It is because of a sense of place and belonging that some people loath to be moved from their dwelling place, despite the fact that they will be compensated for the inconvenience and impact on their lives.

The potential impact on socio-cultural behaviour and the related perception of environmental changes could either have a positive or a negative impact on sense of place (i.e. peace of mind or frustration/anger). It could be viewed as a positive impact if people perceive the project as a means of job creation, which is true in the case of the tribal authorities, and infrastructural and/or economic development, which is not intrusive on their lives and do not cause them immediate danger. Potential negative impacts include the visual impact and the resultant intrusion on sense of place.

Research on the psychological experience of sense of place suggests that people rapidly discount a landscape as soon as the first scar occurs, rather like a stain ruining a favourite garment (Petrich 1993). Thereafter, any additional impacts on the landscape have a correspondingly smaller effect. Hence, the aesthetic impact of placing a transmission line in a landscape that already bears the marks of development would be less than that of placing it in a relatively unspoilt environment. People overwhelmingly prefer “nature scenes” to urban and built environments, according to research. Zadik (1985) explains "people seem to respond to environments as natural if the areas are predominantly vegetation and do not contain human artefacts such as roads or buildings (Relf 1992)."

Steven Kaplan (1992) attributes the restorative value of participation with nature, particularly wilderness experiences, to the ability to fulfil several criteria: Being away, Extent, Fascination, and Compatibility which is established by an environment that is conducive to meeting personal goals; that is, in a compatible environment, what you want to do and are inclined to attempt are needed and feasible.

In some instances the potential presence of the Transmission power lines might affect residents’ sense of place. In the past they might have felt safe and secure in the area and therefore stayed in the area for those specific reasons. As the proposed Transmission power lines might impact on people’s *perception* of safety, these people might now feel unsafe in the area knowing that the lines are located within the area. Furthermore, the visibility of the transmission power line might impact on people’s quality of life in terms of the aesthetics of the area that they have grown accustomed to.

It is important to note that sense of place has been assessed from a social point of view, which relates to people’s perception of the project in relation to the area. Due to the fact that large segments of the affected area live in poverty, have fairly low educational levels coupled with unemployment, it is expected that their expectation of the project would mostly relate to positive impacts (the expectation of being employed), whereas the private landowners (farmers) are more aware of the potential negative impacts that the installation might have on their current and future land use. Private landowners have described the area as ‘pristine’ and ‘unique’ and therefore a change in the

environment brought about by the introduction of the proposed project might influence this perception. People who are, for example, unemployed and living in poverty have different needs than preserving the area or the environment and are therefore less likely to oppose the proposed project as they believe it will bring about change in the area in terms of employment and upliftment.

Lulumisa to Minerva section: In addition to scattered households, the closest human settlements to this section of the corridor include the following areas:

Settlement	***Proximity of proposed transmission line to settlement***	***Potential changes***
Diepsloot	***Approximately 80m west***	***Might limit future development towards the line***
Laezonia AH	***Encroachment upon servitude to north and south***	***Might limit future development towards the line***
Olievenhoutbosch	***Approximately 80m west***	***Might limit future development towards the line***

Minerva to Apollo section: In addition to scattered households, the closest human settlements to this corridor include the following areas:

Settlement	***Proximity of proposed transmission line to settlement***	***Potential changes***
Olievenhoutbosch	***Encroachment upon servitude to north and south***	***Might limit future development towards the line***
Mountain Farm AH	***Approximately 280m north***	***Might limit future development towards the line***
Randjesfontein AH	***Encroachment upon servitude to north***	***Might limit future development towards the line***
Elandsfontein development	***Approximately 200m to the south***	***Might limit future development towards the line***

Apollo to Bravo section: In addition to scattered households, the closest human settlements to this corridor include the following areas:

Settlement	***Proximity of proposed transmission line to settlement***	***Potential changes***

Settlement	*Proximity of proposed transmission line to settlement*	*Potential changes*
Balhewa AH	***Approximately 120m south of northern alternative and approximately 140m east of southern alternative***	***Might limit future development towards the line***
Tierpoort AH	***Approximately 140m north of northern alternative***	***Might limit future development towards the line***

An assessment of this category 2 impact was conducted through the use of the assessment criteria to determine the significance the impact per alignment, as per Table 84 below.

TABLE 84: OPERATION & MAINTENANCE PHASE: SOCIO-CULTURAL CHANGE PROCESSES CATEGORY 2 IMPACT ASSESSMENT: SENSE OF PLACE

<	*Lulumisa – Minerva Section*	*Minerva – Apollo Section*	*Apollo – Bravo Section*		
<			*Northern Alternative*	*Central Alternative*	*Southern Alternative*
PRE-MITIGATION					
Significance	*Moderate* *3*	*High* *4*	*Moderate* *3*	*High* *4*	*Low* *2*
Spatial	*Study area* *2*	*Study area* *2*	*Study area* *2*	*Local* *3*	*Study area* *2*
Duration	*Long term* *3*	*Long term* *3*	*Long term* *3*	*Long term* *3*	*Long term* *3*
Degree of Probability	*Very likely* *4*	*Very likely* *4*	*Could happen* *3*	*Very likely* *4*	*Could happen* *3*
Degree of Certainty	*Probable*	*Probable*	*Probable*	*Probable*	*Probable*
Risk	*2.16* *Moderate*	*2.4* *Moderate*	*1.62* *Low*	*2.64* *Moderate*	*1.38* *Low*
Status	*Negative*	*Negative*	*Negative*	*Negative*	*Negative*
POST-MITIGATION					
Significance	*Low* *2*	*Moderate* *3*	*Low* *2*	*Moderate* *3*	*Very low* *1*
Spatial	*Study area* *2*	*Study area* *2*	*Study area* *2*	*Local* *3*	*Study area* *2*
Duration	*Long term* *3*	*Long term* *3*	*Long term* *3*	*Long term* *3*	*Long term* *3*
Degree of Probability	*Could happen* *3*	*Could happen* *3*	*Could happen* *3*	*Could happen* *3*	*Could happen* *3*
Degree of Certainty	*Probable*	*Probable*	*Probable*	*Probable*	*Probable*
Risk	*1.38* *Low*	*1.62* *Low*	*1.38* *Low*	*1.8* *Low*	*0.72* *Very low*

<	***Lulumisa – Minerva Section***	***Minerva – Apollo Section***	***Apollo – Bravo Section***		
<			***Northern Alternative***	***Central Alternative***	***Southern Alternative***
Status	***Negative to Neutral***	***Negative to Neutral***	***Negative to Neutral***	***Negative to Neutral***	***Negative to Neutral***
MITIGATION MEASURES					
• ***Sufficient and transparent information should be supplied to local residents within the area to enhance their sense of safety and thereby reducing the negative impact on sense of place.*** • ***Due consideration should be given to any visual screening mitigation measures identified and suggested by the Visual Impact Assessment.***					
PREFERRED ALIGNMENT					
< ***The southern alternative, followed by the northern alternative.***					

10.3 Decommissioning Phase

During the decomissioning phase the power lines will be removed from the servitude. For the sake of the assessment it is assumed that the exisitng power lines will remain.

10.3.1 Geology

There will be no impacts to geology during the decomissioning phase.

10.3.2 Topography

The impacts to topography during the decomissioning phase of the development remain as assessed in the construction phase in Section 7.1.2 above.

10.3.3 Soils, Land Capability and Land Use

The impacts to soils, land capability and land use during the decomissioning phase of the development remain as assessed in the construction phase in Section 7.1.3 above.

10.3.4 Surface water

The impacts to surface water during the decomissioning phase of the development remain as assessed in the construction phase in Section 7.1.4 above.

10.3.5 Flora

The impacts to flora during the decomissioning phase of the development remain as assessed in the construction phase in Section 7.1.5 above.

10.3.6 Fauna

Even though the removal of the 100 km of proposed power lines will reduce the number of power lines in the area that could impact on fauna, the impact after decomissioning will remain as assessed in Section 6.2.6 above due to the remaining network if high voltage power lines.

10.3.7 Visual

Even though the removal of the 100 km of proposed power lines will reduce the number of power lines in the area that impact on the visual landscape, the impact after decomissioning will remain as assessed in Section 6.2.7 above due to the remaining network if high voltage power lines.

10.3.8 Archaeological and Cultural Historical Sites

The archaeological and cultural history during the decommissioning phase of the development remains as assessed in Section 10.1.9.

10.3.9 Socio – Economic Environment

The socio-economic environment remains as assessed in Section 10.1.10.

10.4 Impact Assessment Summary

The environmental impacts for each phase of the proposed 400 kV overhead power line from Bravo to Lulamisa have been summarised in Table 85 and Table 86. The following broad conclusions can be drawn from the impact assessment.

- Sections of the current baseline environment at the site earmarked for development is highly impacted by the Bravo Power Station construction;
- The receiving environment is not of a sensitive nature with the exception of the wetlands and seepage zones.
- There are sensitive fauna, flora and wetlands on site.
- The most significantly impacted baseline elements in the area are Fauna, Flora, Visual aspects and Wetlands depending on the Alternative utilised.
- During the Construction Phase of the power line the impacts will range from VERY LOW to HIGH. The most significant impacts will be to soil, vegetation, fauna, flora as well visually. Mitigation measures employed will adequately reduce the significance of impacts that may be sustained by the by-pass lines construction activities.
- Additional impacts sustained during the construction phase will not result in a more significant cumulative impact to the environment.
- During the operational phase negative impacts sustained will be in the VERY LOW to HIGH range. The most significant impact will be to fauna.

Cumulative negative impacts to the physical environment are nominal, and with proper mitigation it is possible to minimise impacts.

TABLE 85: SUMMARY OF THE CONSTRUCTION PHASE IMPACTS

		Construction Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
GEOLOGY	Significance	-	Very Low			Very Low	Very Low		-	1			1	1
	Spatial	-	Isolated Sites			Isolated Sites	Isolated Sites		-	1			1	1
	Temporal	-	Long Term			Long Term	Long Term		-	4			4	4
	Probability	-	Probability			Probability	Probability		-	4			4	4
	CLASS	-	**Low**			**Very Low**	**Low**		-	**1.6**			**0.8**	**1.6**
TOPOGRAPHY	Significance	-	Very Low			Very Low	Very Low			1			1	1
	Spatial	-	Isolated Sites			Isolated Sites	Isolated Sites			1			1	1
	Temporal	-	Long Term			Long Term	Long Term			4			4	4
	Probability	-	Practically impossible			Unlikely	Practically impossible			1			2	1
	CLASS	-	**Very Low**			**Very Low**	**Very Low**		-	**0.4**			**0.8**	**0.4**
			Alt 1	**Alt 2**	**Alt 3**					**Alt 1**	**Alt 2**	**Alt 3**		
SOILS & LAND CAPABILITY	Significance	Moderate	Very Low	Moderate	Very Low	Moderate	Moderate		3	1	3	1	3	3
	Spatial	Study Site	Isolated Site	Study Site	Isolated Site	Study Site	Study area		2	1	2	1	2	2
	Temporal	Long Term	Long Term	Long Term	Long Term	Long Term	Long Term		4	4	4	4	4	4
	Probability	Is occurring	Its going to happen	Its going to happen	Its going to happen	Is occurring	Its going to happen		5	5	5	5	5	5
	CLASS	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**		**3**	**2**	**3**	**2**	**3**	**3**
VEGETATION	Significance	Moderate	Low	Low	Low	Very Low	Low		3	2	2	2	1	2
	Spatial	Study Site	Study Site	Study Site	Study Site	Study Site	Study area		2	2	2	2	2	2
	Temporal	Long Term	Short Term	Long Term	Short Term	Medium Term	Long Term		4	2	4	2	3	5
	Probability	Is occurring	Its going to happen	Its going to happen	Its going to happen	Unlikely	Its going to happen / has occurred		5	5	5	5	2	5
	CLASS	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Very Low**	**Moderate**		**3**	**2**	**2.6**	**2**	**0.8**	**3**
FAUNA	Significance	High	Moderate			High	High		4	3			4	4
	Spatial	Region	Isolated Site			Region	Region		4	1			4	4
	Temporal	Long Term	Short Term			Long Term	Long Term		4	2			4	4
	Probability	Likely	Will occur			Likely	Likely		4	5			4	4
	CLASS	**High**	**Low**			**High**	**High**		**3.2**	**2**			**3.2**	**3.2**
SURFACE WATER	Significance	Very low	Very low			Very low	Low		1	1			1	2
	Spatial	Study Site	Study Site			Study Site	Study area		1	1			1	2
	Temporal	Medium Term	Mediumt Term			Medium Term	Long Term		3	3			3	4
	Probability	Could happen	Could happen			Could happen	Could happen		3	3			3	3
	CLASS	**Very Low**	**Very Low**			**Very Low**	**Low**		**1**	**1**			**1**	**1.6**
			Alt 1	**Alt 2**	**Alt 3**					**Alt 1**	**Alt 2**	**Alt 3**		
CULTURAL HISTORICAL	Significance	-	Very Low	-	Very Low	-	Very Low		0	1		1	0	1
	Spatial	-	Isolated Sites	-	Isolated Sites	-	Isolated Sites		0	1		1	0	1
	Temporal	-	Long Term	-	Long Term	-	Long Term		0	2		2	0	2
	Probability	-	Unlikely	-	Unlikely	-	Unlikely		0	2		2	0	2
	CLASS	**No Impact**	**Very Low**	**-**	**Very Low**	**No Impact**	**Very Low**		**0**	**0.5**		**0.5**	**0**	**0.5**
VISUAL	Significance	High	Low			High	High		4	2			4	4
	Spatial	Local	Local			Local	Local		3	3			3	3

		Construction Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
	Temporal	Long Term	Short Term			Long Term	Long Term		4	2			4	4
	Probability	Has occurred	Is going to happen			Has occurred	Has occurred		5	5			5	5
	CLASS	High	Low			High	High		3.6	2			3.6	3.6
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOCIO-ECONOMIC	Significance	Moderate	Low	Low	Low	Moderate	Moderate		3	2	2	2	3	3
	Spatial	Study Site	Study Site	Study Site	Study Site	Study Site	Study Site		2	2	2	2	2	2
	Temporal	Long Term	Short Term	Short Term	Short Term	Long Term	Long Term		4	2	2	2	4	4
	Probability	Is occurring	Its going to happen	Its going to happen	Its going to happen	Is occurring	Is occurring		5	5	5	5	5	5
	CLASS	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate		3	2	2	2	3	3

TABLE 86: SUMMARY OF THE OPERATIONAL PHASE IMPACTS

		Construction Phase												
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
GEOLOGY	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
TOPOGRAPHY	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOILS & LAND CAPABILITY	Significance	Moderate	Very Low	Moderate	Very Low	Moderate	Moderate		3	1	3	1	3	3
	Spatial	Study Site	Isolated Site	Study Site	Isolated Site	Study Site	Study area		2	1	2	1	2	2
	Temporal	Long Term	Long Term	Long Term	Long Term	Long Term	Long Term		4	4	4	4	4	4
	Probability	Is occurring	Its going to happen	Its going to happen	Its going to happen	Is occurring	Its going to happen		5	5	5	5	5	5
	CLASS	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**		**3**	**2**	**3**	**2**	**3**	**3**
VEGETATION	Significance	-	-	-	-	-	-		-	-	-	-	-	-
	Spatial	-	-	-	-	-	-		-	-	-	-	-	-
	Temporal	-	-	-	-	-	-		-	-	-	-	-	-
	Probability	-	-	-	-	-	-		-	-	-	-	-	-
	CLASS	-	-	-	-	-	-		-	-	-	-	-	-
FAUNA	Significance	High	High			High	High		4	4			4	4
	Spatial	Region	Region			Region	Region		4	4			4	4
	Temporal	Long Term	Long Term			Long Term	Long Term		4	4			4	4
	Probability	Likely	Could happen			Unlikely	Likely		4	3			2	4
	CLASS	**High**	**Moderate**			**High**	**High**		**3.2**	**2.4**			**2.6**	**3.2**
SURFACE WATER	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
CULTURAL HISTORICAL	Significance	-	-			-			-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
VISUAL	Significance	High	Low			High	High		4	2			4	4

		Construction Phase								
		Initial	Additional	Residual	Cumulative		Initial	Additional	Residual	Cumulative
	Spatial	Local	Local	Local	Local		3	3	3	3
	Temporal	Long Term	Short Term	Long Term	Long Term		4	2	4	4
	Probability	Has occurred	Is going to happen	Has occurred	Has occurred		5	5	5	5
	CLASS	**High**	**Low**	**High**	**High**		**3.6**	**2**	**3.6**	**3.6**
SOCIO-ECONOMIC	**Significance**	-	-	-	-		0	0	0	0
	Spatial	-	-	-	-		0	0	0	0
	Temporal	-	-	-	-		0	0	0	0
	Probability	-	-	-	-		0	0	0	0
	CLASS	**No Impact**	**No Impact**	**No Impact**	**No Impact**		**0**	**0**	**0**	**0**