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;
- Visual Assessment
- Heritage; and
- Social.

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. 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 on rocky ridges or places of shallow geology. The impact would be limited to the construction of the pylon footings, and should be a maximum of $8m^3$ of geological strata per footing. It should be noted that the erection of the pylons require a firm foundation, and this is achieved by casting a concrete slab under the soil surface. This VERY LOW impact **could** *probably* occur in *isolated sites* over the long term. This results in a final impact class of **Low** as rated in the table below.

TABLE 33: 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

- No blasting is undertaken on site without a suitable blast design, compiled in line with relevant SANS codes and approved by an appropriately qualified professional.

Residual Impact

Although mitigation measures will not reduce the significance of impact to geology they will ensure that the impacts are contained. Mitigation measures will ensure that the likelihood of secondary

impacts occurring is significantly reduced. The residual impact to geology at the completion of the construction phase will be the same as for the additional impact assessment.

10.1.2 Topography

Initial Impact

The topography throughout the site has been left relatively unimpacted. The only impacts to topography were the establishment of mine dumps at the gold mining activities south of Kinross and the coal mining activities throughout the site. Please refer to the figure below for an illustration of the mine dump. This impact is limited to a very small area of the site, and as such is too small to be rated. Therefore the initial impact is rated as **no impact.**

FIGURE 58: MINE DUMP ON SITE

Additional Impact

The construction of the power lines should not impact on the topography and therefore there is no additional impact.

Cumulative Impact

The cumulative impact is the same as assessed for the initial impact.

Mitigation Measures

No mitigation measures are required as there is no impact to topography from the proposed development.

Residual Impact

The residual impact remains **no impact** as assessed for the initial impact.

10.1.3 Soils, Land Capability and Land Use

Initial Impact

The bulk of the study area comprises agricultural and transitional soils. These soils can and in most cases are used for agricultural activities. The areas with existing power lines are usually on soils that are not suitable for agriculture, thereby ensuring that optimal land use is practised. The farming and especially ploughing of the soils breaks down the soil structure and increases the potential for erosion, which in turn could reduce the land capability.

The initial impact to soils and land capability is **probably** a LOW negative impact acting over the long term, and is *presently occurring* in the *study area*. As indicated in Table 34 below the impact rating class is a Moderate Impact.

TABLE 34: SOIL AND LAND CAPABILITY INITIAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soils	LOW	*Study Site*	Long Term	*Is occurring*	Moderate
	2	**2**	**4**	**5**	**2.67**

Additional Impact

The additional impact from the new power lines will mainly be as a result of the construction of the power line pylons and their footings. The route alternatives are approximately 70 km in length and each will have a double power line. Therefore if using the average pylon distance of 300 m it can be assumed that there would be 467 pylons constructed. At the time of writing this report, the proponent has not determined which of the various pylon designs will be utilised, and therefore the actual impact could vary. For this analysis it is assumed that pylons similar to the existing power lines will be utilised. This will result in 4 footings impacting on the soils per pylon.

In addition to the pylon footings the soils will also be disturbed by the establishment of a construction road as well as the movement of construction vehicles. The impact from each of the routes are summarised below.

TABLE 35: SOIL IMPACT

Soil Type	Alternative 1 (km)	Alternative 2 (km)	Alternative 3 (km)
Clay	35.2	40.1	31.8
Transitional	21.7	18	11.9
Disturbed	1.5	1.5	0.5
Agricultural	12.2	13.6	19

As indicated in Table 35 above, Alternatives 1 and 2 crosses more sensitive soils than Alternative 3. That said, the impact rating class between the two alternatives differ and is therefore rated separately.

For Alternative 3 the additional impact to soils and land capability is **probably** a LOW negative impact acting over the long term, and *will definitely occur* at *isolated sites*. As indicated in **Error! Reference source not found.** below the impact rating class is a Moderate Impact.

TABLE 36: SOIL AND LAND CAPABILITY ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 1

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soils	Low	*Isolated Site*	Long Term	*Will occur*	Moderate
	2	**1**	**4**	**5**	**2.3**

For Alternatives 1 and 2 the additional impact to soils and land capability is **probably** a MODERATE negative impact acting over the long term, and *will definitely occur* at *isolated sites*. As indicated in Table 37 below the impact rating class is a Moderate Impact.

TABLE 37: SOIL AND LAND CAPABILITY ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVES 2 AND 3

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Soils	Moderate	*Isolated Site*	Long Term	*Will occur*	Moderate
	3	**1**	**4**	**5**	**2.67**

Cumulative Impact

Due to the fact that the two impacts (power station and the power lines) are in adjacent locations, the cumulative impact remains as rated for the initial impact i.e. a High impact class.

Mitigation Measures

- Take land use into consideration when choosing pylon types, it is recommended that smaller footprint pylons be used in cultivated areas;
- Avoid placement of pylon footings in the clay soils;
- Spread absorbent sand on areas where oil spills are likely to occur, such as the refuelling area in the hard park;
- Oil-contaminated soils are to be removed to a contained storage area and bio-remediated or disposed of at a licensed facility;
- If soils are excavated for the footing placement, ensure that the soil is utilised elsewhere for rehabilitation/road building purposes; and
- Ensure that soil is stockpiled in such a way as to prevent erosion from storm water.

Residual Impact

The residual impact remains a Moderate Impact, as the mitigation measures will not reduce the overall impact of the power station construction.

10.1.4 Surface Water

Initial Impact

Due to the size of the site and the numerous drainage lines and streams on site, the estimation of the potential initial impact to surface water is almost impossible. That said, all the watercourses observed on site was in good health. The largest potential impact in the area is the industrial complex of Secunda as well as the open cast coal mines near Kendal. The impact to surface water would be limited to contaminated storm water runoff and sediment entering the streams. This is also the case for the various towns in the district, that discharge their stormwater runoff into the natural systems. The impact is assessed in Table 38 below.

TABLE 38: SURFACE WATER INITIAL IMPACT RATING

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	LOW	*Study Site*	Medium Term	*Could happen*	Low
	2	***2***	**3**	**3**	**1.4**

The initial impact to surface water is 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 1.4 or a Low impact class.

Additional Impact

During the construction phase there should be limited impacts to surface water features as the placement of the pylons will be done in such a way as to avoid the surface water features on site.

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.

Impacts will be felt as wide as the *study area* when storm-water flows from the power line sites into the study area. The impact to the surface water will **probably** be of a VERY LOW negative significance, and will act in the short-term. This impact *could happen*. This results in a Very Low impact class as assessed in Table 39.

TABLE 39: SURFACE WATER ADDITIONAL IMPACT RATING

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	VERY LOW	*Study area*	Short Term	*Could happen*	Very Low
	1	***2***	**2**	**3**	**1.0**

Cumulative Impact

The cumulative impact of the current activities and the future activities will not increase the impact rating from a Low Impact as rated in the initial impact assessment.

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;
- When adequate volumes of wastes (not more than 1 month) have accumulated, all waste is to be removed from site and disposed of at a licensed facility;
- 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;
- No construction vehicles or activities will be allowed to work within 100 m of any of the streams or wetlands on site; and
- If possible utilise Alternative 3 as the preferred alternative.

Residual Impact

The mitigation measures proposed will reduce the risk of the additional impact occurring, but it will not reduce the residual impact class, which remains at a Low impact as rated in the initial impact assessment.

10.1.5 Flora

Initial Impact

The initial impacts to flora include extensive grazing, cultivation and within the mines and towns, large areas of vegetation have also been cleared. Of the total area on site only an estimated 30 % of natural vegetation remains. The initial impact to flora is **probably** a HIGH negative impact acting over the long term, and is ***presently occurring*** in the *study area*. As indicated in Table 40 below the impact rating class is a High Impact.

TABLE 40: FLORA INITIAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Flora	HIGH	*Study Site*	Long Term	*Is occurring*	High
	4	**2**	**4**	**5**	**3.33**

Additional Impact

The additional impact to flora during the construction phase will be as a result of vegetation clearance for access roads and the removal of vegetation in the areas of the pylon footings. Table 41 below illustrates the length that each route alternative will cross the vegetation types identified. Alternatives 1 and 2 traverse a much longer section of the sensitive moist grassland and seepage area vegetation units when compared to Alternative 3.

TABLE 41: FLORA IMPACT

Soil Type	Alt 1 (km)	Alt 2 (km)	Alt 3 (km)
Cultivated Fields	22.4	29.2	27.2
Moist Grassland and Drainage areas*	22	24.7	13.5
Eastern Highveld Grassland	7.3	7.3	4.7
Rand Highveld Grassland	3.3	3.3	1.5
Soweto Highveld Grassland	19.5	14.8	18.9
Disturbed Grassland	2	1.5	0.5

* Indicates sensitive vegetation types

The additional impact from the Alternative 3 alignment to flora is **probably** a MODERATE negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 42 below the impact rating class is a Low Impact.

TABLE 42: FLORA ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 3

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

Due to the alignment of Alternatives 1 and 2 in line with the sensitive vegetation types, the impact is higher and will be active for a longer period. As there is sensitive species along this alignment the additional impact from the Alternatives 1 and 2 to flora is **probably** a HIGH negative impact acting over the long term, and *will occur* in *isolated sites*. As indicated in Table 43 below the impact rating class is a Moderate Impact.

TABLE 43: FLORA ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVES 1 AND 2

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Flora	High	*Isolated Site*	Long Term	*Will occur*	Moderate
	4	**1**	**4**	**5**	**3**

Cumulative Impact

The cumulative impact to flora will remain as assessed for the initial impact assessment with a High 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);
- The sensitive vegetation unit should be avoided and construction limited to 100 m from the edge of the wetlands and streams;
- Alternative 3 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; and
- Adhere to the Eskom vegetation management guideline (Appendix N).

Residual Impact

If the mitigation measures are implemented and Alternative 3 is constructed then the residual impact to flora is **probably** a MODERATE negative impact acting over the medium term, and *will occur* in the *study area*. As indicated in Table 44 below the impact rating class is a Moderate Impact.

TABLE 44: FLORA RESIDUAL IMPACT ASSESSMENT

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Flora	MODERATE	*Study Site*	Medium Term	*Will happen*	Moderate
	3	**2**	**3**	**5**	**2.33**

10.1.6 Fauna

Initial Impact

As described in the habitat assessment in Section 7.1.9 the site is relatively disturbed with the Soweto, Rand and Eastern Highveld grasslands, the moist grassland and the drainage areas the main habitat still available for fauna. The site is 61.7 % disturbed and the habitat available for fauna is limited. The suitable habitats did show low species diversity, indicating that the impact of cultivation has limited faunal activity throughout the site. The bulk of the faunal species observed were limited to a game farm to the north of the Zeus Sub Station.

The study area is criss crossed with existing high voltage power lines that could potentially impact on the faunal life. 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. As shown in Figure 41 above, several birds have been found dead under the exisitng power lines.

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 45: 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. Once again Alternatives 1 and 2 are significantly closer to the habitat for the sensitive species and therefore the impacts are assessed separately.

The additional impact from the Alternative 3 alignment to fauna is **probably** a MODERATE negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 46 below the impact rating class is a Low Impact.

TABLE 46: FAUNA ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 1

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

The additional impact from the Alternative 1 and 2 alignments to fauna is **probably** a HIGH negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 47 below the impact rating class is a Moderate Impact.

Table 47: Fauna Additional Impact Assessment – Alternative 1

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	High	*Isolated Site*	Short Term	*Will occur*	Moderate
	4	**1**	**2**	**5**	**2.3**

Cumulative Impact

The cumulative impact to fauna should remain 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 3 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 N);
- Install power lines according to the Eskom bird collision prevention guideline;
- Demarcate the sections of line that need to be mitigated once the alignment has been finalize;
    - only through a combination of physical inspection of the entire length of the final alignment,
    - detailed analysis of high resolution satellite imagery; and
    - It is standard procedure by the Eskom Transmission Group to perform this procedure with the help of a suitably experienced ornithologist once the line has been pegged.
- All construction and maintenance activities should be undertaken in accordance with Eskom Transmission's environmental best practice standards;
- Care should be taken not to unnecessarily disturb any birds along the servitude;
- The Environmental Control Officer should identify any breeding birds along the servitude, particularly large terrestrial species such as cranes, korhaans or Secretary birds and notify the avifauna specialist of these so that advice can be given on how to best deal with the situation;
- The construction of new access roads in particular should be limited to a minimum; and

- All vehicle and pedestrian movement should be restricted to the actual construction site and, in the case of maintenance patrols, to the actual servitude.

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 assessed for the surface water component in Section 7.1.10.

10.1.8 Visual Impact

Initial Impact

At present the viewers in the viewshed are seeing the Zeus Sub Station, Kendal Power Station, coal mines and cultivated fields. In addition to the abovementioned impacts 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*.

TABLE 48: VISUAL IMPACT ASSESSMENT – INITIAL IMPACT

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

As illustrated in Table 48 above the initial impact to the visual environment is rated as a High impact.

Additional Impact

The additional impact from the power lines as described in Section 4.4 indicated that the additional impact to the visual environment is **probably** a LOW negative impact acting in the short term and impacting on the *local region*. This impact *will definitely occur*.

Table 49: Visual Impact Assessment – Additional Impact

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Visual	Low	*Local*	Short Term	*Will occurr*	Moderate
	2	**3**	**2**	**5**	**2.3**

From Table 49 above it is clear that the additional impact from the construction of the power lines will be a Moderate impact. It should be noted that Alternative 3 has the least number of existing lines in the vicinity and therefore could be perceived as a higher impact by a observer.

Cumulative Impact

There are a high number of existing industrial and agricultural activities present on site as well as a high number of power lines on site. The cumulative impact from the developments will remain as assessed for the initial impact above; therefore the impact remains a High negative 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; and
- Access roads should be minimised to prevent unnecessary dust.

Residual Impact

The mitigation measures proposed above will ensure that the construction of the proposed power line remains a High impact to the visual environment.

10.1.9 Archaeology and Cultural Historical Sites

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

- Houses and structures older than sixty years with historical significance.
- Graveyards, some older than sixty years and therefore also with historical significance.

Thee graveyards were geo-referenced and mapped in this report. A number of the graveyards are discussed in detail whilst others are merely mentioned and listed (Appendix N). The significance of the graveyards is indicated and mitigation measures are outlined should they be affected by the project.

Historical structures in close proximity of the proposed power line corridors were not geo-referenced. These structures are not directly threatened by the project as Eskom does not demolish structures in order to make way for new power lines. However, the historical significance of these structures is indicated and mitigation measures are outlined should any historical structures be affected by the project.

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

The significance of the heritage resources

It is possible that some of the graveyard may be impacted by the project. Consequently, the significance of the graveyards is indicated while mitigation measures are outlined for those graveyards which may be affected by the proposed project.

Graveyards

At least twenty-two graveyards were observed in and near the project area. These graveyards were geo-referenced (Appendix R). A number of graveyards close to the project area are also pointed out by Arch View (Appendix R).

It is highly likely that more graveyards may exist but that they were not observed during this survey as a result of no-access to certain stretches of the proposed new power line corridors or that that graveyards may be obscure or inconspicuous as a result of negligence and abandonment.

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

Houses and structures older than sixty years or which are approaching this age are protected by Section 34 of the National Heritage Resources Act (No 25 of 1999).

The significance of each and every historical house, whenever these structures are to be affected by the project, can further be determined according to criteria such as the following: the cultural-historical background of these structures; their scientific or architectural value; their use in the field of tourism, museums or education as well as their aesthetic appearance; their repeatability (scarcity/abundance), or their emotional (ideological) value.

Mitigating the heritage resources

The following mitigation measures have to be followed whenever graveyards or historical structures may be affected by the project.

Graveyards

Graveyards can be mitigated by following one of the following strategies, namely:

- Graveyards can be demarcated with brick walls or with fences and 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 the latter. 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 houses

Houses older than sixty years may not be affected (demolished, renovated, altered) by the Eskom 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) prior to any of these structures been affected or altered as a result of the Eskom Project

10.1.10 Socio-Economic Environment

The change processes are grouped per project phase in Table 50 (expected category 1 impacts) and in Table 51 (expected category 2 impacts) with an indication of the significance of these potential impacts before and after mitigation. The significance of potential category 1 impacts is then grouped per change process in Table 52, while Table 53 reflects a summary of the potential category 2 impacts per change process.

TABLE 50: SUMMARY OF CATEGORY 1 IMPACTS PER PROJECT PHASE

CHANGE PROCESS	*ASSESSMENT AREA*	*SIGNIFICANCE (pre-mitigation)*	*SIGNIFICANCE (post-mitigation)*
< *CONSTRUCTION & DECOMMISSIONING*			
Demographic	Influx of construction workers	Very Low -	Very low ±
	Influx of job seekers	Low -	Very low ±
Geographic	Temporary loss of cultivated land	Moderate -	Low -
	Temporary loss of grazing land	Low -	Low – to ±
Economic	Compensation for servitude	Low +	n/a
	Direct formal employment opportunities to local individuals	Low +	Low +
	Indirect formal and/or informal employment opportunities to local individuals	Low +	Low +
Institutional and Empowerment	Negotiation process	Moderate	Moderate +
	Additional demand on municipal services	Low -	Low -
Socio-Cultural	Integration with local community	Low -	Very low -
	Health	Moderate -	Moderate -
	Safety and security	Low -	Very low -
	Construction noise	Low -	Very low -
< *OPERATION & MAINTENANCE*			
Demographic	None	n/a	n/a
Geographic	Permanent loss of grazing land	Very low – to ±	Very low ±
	Spatial development	Low -	Very low -
	Presence of transmission power line	Moderate -	Low – to ±
Economic	Direct formal employment opportunities to local individuals	Low +	Low +
	Electricity supply and economic growth	Moderate +	n/a
Institutional and Empowerment	None	n/a	n/a
Socio-Cultural	Movement of maintenance workers	Low -	Very low -
	Physical splintering	Very low -	Very low -

TABLE 51: SUMMARY OF CATEGORY 2 IMPACTS PER PROJECT PHASE

Change Process	*Assessment Area*	*Western Alternative*		*Eastern Alternative*		*Western Sub-Alternative*	
< *CONSTRUCTION & DECOMMISSIONING*							
Demographical	*Relocation*	*Low -*	*Low -*	*Moderate -*	*Low -*	*Low -*	*Low -*
Geographical	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Economical	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Empowerment and Institutional	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Socio-Cultural	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
< *OPERATION & MAINTENANCE*							
Demographical	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Geographical	*Cultivated land and irrigation*	*Low -*	*Low – to ±*	*Low -*	*Low – to ±*	*Low -*	*Low – to ±*
	Mining	*Moderate -*	*Low – to ±*	*Low -*	*Low – to ±*	*Low -*	*Low – to ±*
Economical	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Empowerment and Institutional	*None*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Socio-Cultural	*Sense of place*	*Low -*	*Low -*	*Moderate -*	*Low -*	*Moderate -*	*Low -*
	Third party tampering	*Low -*	*Low -*	*Low -*	*Low -*	*Low -*	*Low -*

The pre-construction and construction phase of the proposed project is characterised by a number of negative impacts. This is mainly due to the nature of the activities that take place during these phases. The same holds true for the operational phase of the proposed project. Most of the negative impacts within these various phases can be mitigated successfully.

There are also a number of positive impacts, which could be further enhanced if managed effectively (as outlined in the enhancement measures for the various impacts and summarised in section 5). These impacts mostly relate to a temporary change in the employment and economic profile of the local area by means of employment opportunities, which in turn leads to a positive economic impact on local households.

TABLE 52: SUMMARY OF CATEGORY 1 IMPACTS PER CHANGE PROCESS

CHANGE PROCESS	*ASSESSMENT AREA*	*SIGNIFICANCE (pre-mitigation)*	*SIGNIFICANCE (post-mitigation)*
< ***DEMOGRAPHICAL***			
Construction & De-commissioning	Influx of construction workers	Very Low -	Very low ±
	Influx of job seekers	Low -	Very low ±
Operation & Maintenance	None	n/a	n/a
< ***GEOGRAPHICAL***			
Construction & De-commissioning	Temporary loss of cultivated land	Moderate -	Low -
	Temporary loss of grazing land	Low -	Low – to ±
Operation & Maintenance	Permanent loss of grazing land	Very low – to ±	Very low ±
	Spatial development	Low -	Very low -
	Presence of transmission power line	Moderate -	Low – to ±
< ***ECONOMICAL***			
Construction & De-commissioning	Compensation for servitude	Low +	n/a
	Direct formal employment opportunities to local individuals	Low +	Low +
	Indirect formal and/or informal employment opportunities to local individuals	Low +	Low +
Operation & Maintenance	Direct formal employment opportunities to local individuals	Low +	Low +
	Electricity supply and economic growth	Moderate +	n/a

CHANGE PROCESS	*ASSESSMENT AREA*	*SIGNIFICANCE (pre-mitigation)*	*SIGNIFICANCE (post-mitigation)*
< ***EMPOWERMENT & INSTITUTIONAL***			
Construction & De-commissioning	Negotiation process	Moderate	Moderate +
	Additional demand on municipal services	Low -	Low -
Operation & Maintenance	None	n/a	n/a
< ***SOCIO-CULTURAL***			
Construction & De-commissioning	Integration with local community	Low -	Very low -
	Health	Moderate -	Moderate -
	Safety and security	Low -	Very low -
	Construction noise	Low -	Very low -
Operation & Maintenance	Movement of maintenance workers	Low -	Very low -
	Physical splintering	Very low -	Very low -

TABLE 53: SUMMARY OF CATEGORY 2 IMPACTS PER PROJECT PHASE

Change Process	*Assessment Area*	*Western Alternative*		*Eastern Alternative*		*Western Sub-Alternative*	
< ***DEMOGRAPHICAL***							
Construction & De-commissioning	Relocation	Low -	Low -	Moderate -	Low -	Low -	Low -
Operation & Maintenance	None	n/a	n/a	n/a	n/a	n/a	n/a
< ***GEOGRAPHICAL***							
Construction & De-commissioning	None	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	Cultivated land and irrigation	Low -	Low – to ±	Low -	Low – to ±	Low -	Low – to ±
	Mining	Moderate	Low – to ±	Low -	Low – to ±	Low -	Low – to ±
< ***ECONOMICAL***							
Construction & De-commissioning	None	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	None	n/a	n/a	n/a	n/a	n/a	n/a
< ***EMPOWERMENT & INSTITUTIONAL***							
Construction & De-commissioning	None	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	None	n/a	n/a	n/a	n/a	n/a	n/a
< ***SOCIO-CULTURAL***							
Construction & De-commissioning	None	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	Sense of place	Low -	Low -	Moderate	Low -	Moderate -	Low -
	Third party tampering	Low -	Low -	Low -	Low -	Low -	Low -

The geographic, demographic and socio-cultural processes all have a number of negative impacts. However all of these impacts can be mitigated successfully if effectively managed. Economic impacts as a result of the project are for the most part positive in nature, which is mainly due to the economic investment and development that will take place in the community as a result of the project.

Although the expected construction impacts across all the change processes are mostly negative, these impacts are for the most part only temporary in nature and only expected to last over the construction period. In comparison, operational impacts are expected to last over the longer term and therefore would have a prolonged effect on especially the geographical environment in terms of the presence of the Transmission power lines in the area. People are more inclined to get "used" to the infrastructure in their area if servitude and line maintenance are applied effectively and with due diligence. The regular monitoring and evaluation of the Transmission power lines as a whole would also ensure that corrective measures can be taken immediately to prevent adverse effects either on the infrastructure itself, or on the local area.

Preferred Route Corridor

To come up with a preferred corridor, a comparison among the alternative corridor alignments was conducted by assessing all of the category 2 impacts identified with a certain change process. A summary of the outcome of this brief assessment is as per Table 54 below, where:

<	***Sensitive area, not recommended from a social perspective (high to very high significance impact rating prior to mitigation).***
<	***Acceptable area neither ideal nor flawed from a social perspective (moderate significance impact rating prior to mitigation).***
<	***Ideal area, from a social perspective (low to very low significance impact rating prior to mitigation).***

Please note that a 'red site' does not constitute a fatal flaw, but does however imply that careful consideration should be given to the development and implementation of mitigation measures in the event that such a site is selected.

Also note that category 1 impacts have not been included in this table, as it is believed that these impacts would occur regardless of which site is selected in the end.

TABLE 54: SUMMARY OF ASSESSMENTS (CATEGORY 2 IMPACTS)

Process	Change Process	Western	Eastern	Western Sub
Demographical	*Relocation of households and/or population segments*	*1.48*	*2.22*	*1.48*
Geographical	*Permanent loss of cultivated land (including irrigation)*	*1.84*	*1.6*	*1.6*
	Mining operations	*2.16*	*1.98*	*1.98*

Economical	***No category 2 impacts***	*-*	*-*	*-*
Institutional & Empowerment	***No category 2 impacts***	*-*	*-*	*-*
Socio-Cultural	***Sense of place***	*1.8*	*2.96*	*2.96*
	Third party tampering	*1.38*	*1.62*	*1.62*
TOTAL		***8.66***	***10.38***	***9.64***

Based on the comparison of category 2 impacts prior to mitigation, overall the **western alternative** emerged as the preferred route corridor from a social perspective. This is based on the fact that the potential impacts as a result of the expected change process taking place, significantly decreases as outlined below:

- **Inhabited areas**: The eastern alternative passes in close proximity to inhabited formal and informal settlements, which in some cases (such as eMbalahle) have high population densities. It is believed that, as the western alternative is located further away from such areas, the expected impact on the demographic change process would be less.
- **Irrigation (centre pivots):** Although the current alignments are all located a safe distance away from centre pivots, the western alternative encroaches upon a number of irrigation schemes, which would be further compounded if transmission power lines are placed in parallel. Also, transmission power lines in parallel on the western alternatives would mean that farmers along this corridor would lose more land (most of these farms already have registered servitudes due to the existing transmission power line) – and in some cases an additional 110m of servitude might render some of these farms economically unviable.
- **Mining operations:** Again the western alternative pass in close proximity to open cast mining areas (collieries), which would be further compounded if more than one transmission power line is placed in parallel to the existing transmission power line. If this alternative is chosen as the preferred alignment, it is believed that some realignment would be required to bypass the open cast mining areas to ensure the safe operation of both the transmission power lines as well as that of the mining operation itself.
- **Sense of place**: The area surrounding the eastern alternative is still quite pristine and unspoilt, whereas the area surrounding the western alternative is regarded as 'spoilt' due to the presence of the existing transmission power line.
- **Third party tampering**: Reflecting on the Opportunity Model of Cohen, Kleugel and Land (in Snyman, 2007), the basic underlying principle of the Opportunity Model is that the daily operations and physical location of the Transmission power line brings it into direct contact with potential offenders, more so on the eastern alternative that is located in close proximity to human settlements where unemployment and poverty is rife. This increases the risk for victimisation, even though it has been stated that it is technically not possible for cable theft to occur on a 400 kV Transmission power line – the risk still exists as a result of ignorance or the attempt at an

opportunistic crime. The risk of third party tampering significantly decreases with the use of the western alignment as this alternative is located away from human settlement.

Recommendations

Based on the findings of this report, it can be concluded that the social environment in general pose no fatal flaws to the development of the proposed transmission power lines known as Bravo 4, under the condition that the identified mitigation measures in this document and as recommended for inclusion in the EMP, are implemented and adhered to, particularly where construction activities either takes place in close proximity to or passes through residential areas that could affect the quality of live of these households in terms of noise, dust, safety and security.

This recommendation was based on the specialist's:

- Understanding of the proposed project, including the alternative route alignments and the nature and timeframe of the proposed activities;
- Assessment of the affected communities, settlements and institutions in terms of:
  - Demographic processes: the number and composition of people;
  - Geographical processes: land use patterns – including tourism;
  - Economic processes: the way in which people make a living and the economic activities in society – including tourism;
  - Institutional and Empowerment processes: the ability of people to be involved and influence decision making processes; and the role, efficiency and operation of governments and other organisations; and
  - Socio-cultural processes: the way in which humans behave, interact and relate to each other and their environment and the belief and value systems which guide these interactions, including physical and mental health processes.
- Assessment of potential change processes that might occur as a result of the project.

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)[15] for a detailed discussion regarding the impact of electro magnetic fields (Appendix S).

[15] *Electric and Magnetic Fields – A summary of Technical and Biological Aspects*, Empetus cc, 2006.

10.2.1 Geology

The impact assessment does not change from that of the construction phase, refer to Section 10.1.1 above.

10.2.2 Topography

The impact assessment does not change from that of the construction phase, refer to Section 10.1.2 above.

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

The impact assessment does not change from that of the construction phase, refer to Section 10.1.4 above.

10.2.5 Vegetation

The impact assessment does not change from that of the construction phase, refer to Section 10.1.5 above.

10.2.6 Fauna

Initial impact

The initial impact remains as assessed in Section 10.1.6, a High impact.

Additional impact

During the operational phase the proposed development will add approximately 70 km of high voltage power lines to the existing network of power lines in the area. Sensitive avifauna were identified right under the potential alignments and a single death of one of these protected species would be seen as a high impact.. The additional impact to faune will **probably** be a HIGH negative impact, acting in the long term, and affected the *local area* and this impact *could occur*. This calculates to a Moderate impact class as illustrated in Table 55 below.

TABLE 55: FAUNA ADDITIONAL IMPACT RATING – OPERATIONS

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	HIGH	*Local*	Long Term	*Could occur*	Moderate
	4	***3***	**4**	**3**	**2.2**

Cumulative impact

During the operational phase the proposed development will add approximately 70 km of high voltage power lines to the existing network of power lines in the area. The addition is moderate in comparison with the approximately 300 km 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.

Mitigation Measures

- The sensitive habitat should be avoided and power lines limited to 50 m from the edge of the wetlands and streams;
- Adhere to the construction phase mitigation measures;
- Alternative 3 should be considered as the preferred alternative;
- Adhere to the Eskom vegetation management guideline (Appendix N); and
- Install power lines according to the Eskom bird collision prevention guideline.

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 **Error! Reference source not found.** these devices have resulted in a 60% reduction in bird collisions but they will not completely eliminate the impact risk to birds. In addition this reduction will only be effective if the anti-collision devices are installed on all the power lines in the region. If the anti collision devices are only installed for the proposed 70 km of new power line, the impact would remain a High impact. If the devices are to be installed on all the regional power lines the impact to fauna would **prabably** be a HIGH negative impact, acting on the *regional scale* in the long term. The prabability would however be reduced to ***unlikely***.

TABLE 56: FAUNA RESIDUAL IMPACT RATING

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Fauna	HIGH	*Regional / Provincial*	Long Term	*Unlikely*	Low
	4	***4***	**4**	**2**	**1.6**

The residual impact to fauna as calculated in Table 56 above has a rating of 1.6 and a Low impact class.

10.2.7 Visual

The impact assessment does not change from that of the construction phase, refer to Section 10.1.7 above.

10.2.8 Archaeology and Cultural Historical Sites

The impacts to the archaelolgy and cultural historical sites during the operational phase of the development remain as assessed in the construction phase in Section 10.1.9 above.

10.2.9 Socio-Economic Environment

The impacts to socio-economic environment during the operational phase of the development remain as assessed in the construction phase in Section 10.1.10 above.

10.3 Decommisioning Phase

10.3.1 Geology

The impacts to geology during the decomissioning phase of the development remain as assessed in the construction phase in Section 10.1.1 above.

10.3.2 Topography

The impacts to topography during the decomissioning phase of the development remain as assessed in the construction phase in Section 10.2.2 above.

10.3.3 Soils, Land Capability and Land Use

The impacts to soils during the decomissioning phase of the development remain as assessed in the construction phase in Section 10.2.3 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 10.2.4 above.

10.3.5 Vegetation

The impacts to vegetation during the decomissioning phase of the development remain as assessed in the construction phase in Section 10.2.5 above.

10.3.6 Fauna

Even though the removal of the 70 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 7.2.6 above due to the remaining network if high voltage power lines.

10.3.7 Visual

Even though the removal of the 70 km of proposed power lines will reduce the number of power lines in the area that could impact on the visual environment, the impact after decomissioning will remain as assessed in Section 10.2.7 above due to the remaining network if high voltage power lines.

10.3.1 Archaeology and Cultural Historical Sites

The impacts to the archaelolgy and cultural historical sites during the decommissioning phase of the development remain as assessed in the construction phase in Section 10.1.9 above.

10.3.2 Socio-Economic Environment

The impacts to socio-economic environment during the decommissioning phase of the development remain as assessed in the construction phase in Section 10.1.10 above.

10.4 Impact Assessment Summary

The environmental impacts for each phase of the proposed 400 kV overhead power line from Kendal to Zeus have been summarised in Table 57 and Table 58. The following broad conclusions can be drawn from the impact assessment.

- 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 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 57: 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**			**Low**	**Low**		-	**1.6**			**1.6**	**1.6**
TOPOGRAPHY	Significance	-	-			-	-			-			-	-
	Spatial	-	-			-	-			-			-	-
	Temporal	-	-			-	-			-			-	-
	Probability	-	-			-	-			-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	**Alt 2**	**Alt 3**					**Alt 1**	**Alt 2**	**Alt 3**		
SOILS & LAND CAPABILITY	Significance	Low	Low	Moderate	Moderate	Low	Low		2	2	3	3	2	2
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Study Site	Study Site		2	1	1	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	Will occur	Will occur	Will occur	Is occurring	Is occurring		5	5	5	5	5	5
	CLASS	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**	**Moderate**		**2.67**	**2.3**	**2.67**	**2.67**	**2.67**	**2.67**
VEGETATION	Significance	High	High	High	Moderate	High	High		4	4	4	3	4	4
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Isolated Site	Study Site		2	1	1	1	1	2
	Temporal	Long Term	Long Term	Long Term	Short Term	Long Term	Long Term		4	4	4	2	4	4
	Probability	Is occurring	Will occur	Will occur	Will occur	Will occur	Is occurring		5	5	5	5	5	5
	CLASS	**High**	**Moderate**	**Moderate**	**Low**	**Moderate**	**High**		**3.33**	**3**	**3**	**2**	**3**	**3.33**
FAUNA	Significance	High	High	High	Moderate	High	High		4	4	4	3	4	4
	Spatial	Region	Isolated Site	Isolated Site	Isolated Site	Region	Region		4	1	1	1	4	4
	Temporal	Long Term	Short Term	Short Term	Short Term	Long Term	Long Term		4	2	2	2	4	4
	Probability	Likely	Will occur	Will occur	Will occur	Likely	Likely		4	5	5	5	4	4
	CLASS	**High**	**Moderate**	**Moderate**	**Low**	**High**	**High**		**3.2**	**2.3**	**2.3**	**2**	**3.2**	**3.2**
SURFACE WATER	Significance	Low	Very low			Low	Low		2	1			2	2
	Spatial	Study Site	Study Area			Study Site	Study area		2	2			2	2
	Temporal	Medium Term	Short Term			Medium Term	Medium Term		3	2			3	3
	Probability	Could happen	Could happen			Could happen	Could happen		3	3			3	3
	CLASS	**Low**	**Very Low**			**Low**	**Low**		**1.4**	**1**			**1.6**	**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**

		Construction Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
VISUAL	Significance	High	Low			High	High		4	2			4	4
	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	Will occur			Has occurred	Has occurred		5	5			5	5
	CLASS	**High**	**Moderate**			**High**	**High**		**3.6**	**2.3**			**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 58: SUMMARY OF THE OPERATIONAL PHASE IMPACTS

		Operational 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			Low	Low		-	1.6			1.6	1.6
TOPOGRAPHY	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOILS & LAND CAPABILITY	Significance	Low	Low	Moderate	Moderate	Low	Low		2	2	3	3	2	2
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Study Site	Study Site		2	1	1	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	Will occur	Will occur	Will occur	Is occurring	Is occurring		5	5	5	5	5	5
	CLASS	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate		2.67	2.3	2.67	2.67	2.67	2.67
VEGETATION	Significance	High	High	High	Moderate	High	High		4	4	4	3	4	4
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Isolated Site	Study Site		2	1	1	1	1	2
	Temporal	Long Term	Long Term	Long Term	Short Term	Long Term	Long Term		4	4	4	2	4	4
	Probability	Is occurring	Will occur	Will occur	Will occur	Will occur	Is occurring		5	5	5	5	5	5
	CLASS	High	Moderate	Moderate	Low	Moderate	High		3.33	3	3	2	3	3.33
FAUNA	Significance	High	High			High	High		4	4			4	4
	Spatial	Region	Local			Region	Region		4	3			4	4
	Temporal	Long Term	Long Term			Long Term	Long Term		4	4			4	4
	Probability	Likely	Could occur			Unlikely	Likely		4	3			2	4
	CLASS	High	Moderate			Low	High		3.2	2.2			1.6	3.2
SURFACE WATER	Significance	Low	Very low			Low	Low		2	1			2	2
	Spatial	Study Site	Study Area			Study Site	Study area		2	2			2	2
	Temporal	Medium Term	Short Term			Medium Term	Medium Term		3	2			3	3
	Probability	Could happen	Could happen			Could happen	Could happen		3	3			3	3
	CLASS	Low	Very Low			Low	Low		1.4	1			1.6	1.6
CULTURAL HISTORICAL	Significance	-	-			-			-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-

		Operational Phase								
		Initial	Additional	Residual	Cumulative		Initial	Additional	Residual	Cumulative
VISUAL	**Significance**	High	Low	High	High		4	2	4	4
	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	Will occur	Has occurred	Has occurred		5	5	5	5
	CLASS	**High**	**Moderate**	**High**	**High**		**3.6**	**2.3**	**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**