10 IMPACT ASSESSMENT

The impact assessment was undertaken for the construction, operation and decommissioning phases. Impacts to each environmental element documented in the baseline are described under initial assessment, additional impact, cumulative impact, mitigation measures and residual impact. The initial assessment outlines the existing level of impact by current activities. The additional impact assesses the potential impact of the development on a criterion. Mitigation measures for the additional impact are then prescribed and a residual impact is calculated. The residual impact and initial impacts are then combined to describe the cumulative impact to the environment.

The Impact Assessment will highlight and describe the impacts 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;
- Social Impacts; and
- Heritage.

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. It is assumed at this stage that the Self-supporting strain and suspension tower type would be used, however during the design phase other tower types will be considering taking into consideration the environment, financial implication and visual aspects. 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 4 x 4 x 4 m (area = 16 m^2 and volume = 64 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 occur as a result of the following construction activities associated with the erection of the power lines and include, amongst others, heavy vehicle movement, excavation of the power line footings, 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

There is no additional impact resulting from the power line construction since there are no significant geological features on site. The impact would be limited to the construction of the pylon footings, and should be a maximum of three pylons and therefore 12 footings. The 12 footings will disturb a combined area of 96 m^3 of geological strata. 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 36: 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

There are no present indications that any existing impacts to topography have ocurred and therefore there is no initial impact rating.

Additional Impact

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

Cumulative Impact

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

Mitigation Measures

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

Residual Impact

There is no residual impact to topography from the proposed development.

10.1.3 Soils, Land Capability and Land Use

Initial Impact

The study site has predominantly been used for grazing of livestock and some agricultural uses. The section of soils that will be crossed by the power line alternatives are presently not impacted upon, but

in the near future the construction of the new power line will impact the soils. Other existing impacts are the existing pylon footings and cultivation of soils.

The initial impact to soils and land capability is **definitely** a HIGH negative impact acting over the long term, and is *presently occurring* in the *study area*. As indicated in Table 37 below the impact rating class is a High Impact.

TABLE 37: SOIL AND LAND CAPABILITY INITIAL IMPACT ASSESSMENT

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

Additional Impact

The additional impact from the new power line will mainly be as a result of the construction of the power line pylons and their footings. Alternatives 1, 2 and 3 are approximately 7.4, 10.5 and 9.5 km in length respectively 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 56 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 38: SOIL IMPACT

Soil Type	Alternative 1 (km)	Alternative 2 (km)	Alternative 3 (km)
Katspruit	0.4 km	6.6 km	2.5 km
Mispah	2.75 km	0.25 km	1.5 km
Clovelly/Hutton	2.85 km	3.65 km	5.0 km

As indicated in Table 38 above, Alternatives 2 and 3 cross more sensitive soils than Alternative 1. That said, the impact rating class between the two alternatives differ and is therefore rated separately.

For Alternative 1 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 Table 39 below the impact rating class is a Moderate Impact.

TABLE 39: 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 2 and 3 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 40 below the impact rating class is a Moderate Impact.

TABLE 40: 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

The cumulative impact remains as rated for the initial impact i.e. a High impact class.

Mitigation Measures

- Avoid placement of pylon footings in the clay soils on site;
- 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 High Impact, as the mitigation measures will not reduce the overall impact.

10.1.4 Surface Water

Initial Impact

The surface water features on site constitute sensitive surface water features. The Witbank Dam and Olifants River constitute senstive surface water features on site. The impact is assessed in Table 41 below.

TABLE 41: SURFACE WATER INITIAL IMPACT RATING

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Surface water	VERY LOW	*Study Site*	Medium Term	*Could happen*	Low
	1	***2***	**3**	**3**	**1.2**

The initial impact to 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 1.2 or a Low impact class.

Additional Impact

During the construction phase there should be limited impacts to surface water features as all the wetlands and riparian zones have been declared no-go zones that should be avoided. It is anticipated that the placement of the pylons will be done in such a way as to avoid the surface water features on site. Note that the wetlands are assessed separately below.

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 42.

Table 42: 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 (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 50 m of any of the streams or wetlands on site.
- If possible utilise Alternative 1 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 alien invasive colonisation. The initial impact to flora is **definitely** a MODERATE negative impact acting over the long term, and is *presently occurring* in the *study area*. As indicated in Table 43 below the impact rating class is a Moderate Impact.

TABLE 43: FLORA INITIAL IMPACT ASSESSMENT

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**

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 44 below illustrates the length that each route alternative will cross the vegetation types identified.

TABLE 44: FLORA IMPACT

Soil Type	Alternative 1	Alternative 2	Alternative 3
Undisturbed/Natural Grassland	1.37 km	3.52 km	3.6 km
Disturbed/Grazed Grassland	4.2 km	0.2 km	2.76 km
Wetland and Riparian Zones*	0.45 km	6.45 km	1.7 km

* Indicates sensitive vegetation types

The additional impact from the Alternative 1 alignment to flora is **probably** a VERY LOW negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 45 below the impact rating class is a Low Impact.

TABLE 45: FLORA ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 1

Impact	Significance	Spatial Scale	Temporal Scale	Probability	Rating
Impact to Flora	Very Low	*Isolated Site*	Short Term	*Will occur*	Low
	1	**1**	**2**	**5**	**1.33**

Due to the alignment of Alternatives 2 and 3 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 2 and 3 to flora is **probably** a HIGH negative impact acting over the long term, and ***will occur*** in *isolated sites*. As indicated in Table 46 below the impact rating class is a Moderate Impact.

TABLE 46: FLORA ADDITIONAL IMPACT ASSESSMENT – ALTERNATIVE 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 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);
- The sensitive vegetation unit 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 N).

Residual Impact

If the mitigation measures are implemented and Alternative 1 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 47 below the impact rating class is a Moderate Impact.

TABLE 47: 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, 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 34.7 % 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 48: 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 2 and 3 are significantly closer to the habitat for the sensitive species and therefore the impacts are assessed separately.

The additional impact from the Alternative 1 alignment to fauna is **probably** a MODERATE negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 49 below the impact rating class is a Low Impact.

TABLE 49: 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 2 and 3 alignments to fauna is **probably** a HIGH negative impact acting over the short term, and *will occur* in *isolated sites*. As indicated in Table 50 below the impact rating class is a Moderate Impact.

TABLE 50: 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 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 N); 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 assessed for the surface water component in Section 7.

10.1.8 Visual Impact

Initial Impact

At present the viewers in the viewshed are seeing the Duvha Power Station and the various mining activities including the Corobrik works and the various 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*.

TABLE 51: 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 51 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 7 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 52: 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 52 above it is clear that the additional impact from the construction of the power lines will be a Moderate impact.

Cumulative Impact

There are a high number of existing visual impacts on site as well as a high number of power lines. 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;
- 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

Types and ranges of heritage resources

The Phase I HIA study for the proposed Eskom 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:

- Two graveyards (GY01, GY02).
- Remains from the recent past.

The graveyards were geo-referenced, mapped and discussed in this report (Table 53). Their significance is indicated and mitigation measures are outlined should they be affected by the Eskom Project.

The remains from the recent past have no significance. The Phase I HIA study is now briefly discussed and illustrated with photographs.

TABLE 53: SIGNIFICANCE AND CO-ORDINATES OF THE GRAVEYARDS IN THE PROJECT AREA.

Heritage resources	Coordinates	Significance
Graveyard 01	25º 56.846' 29º 19.168'	**HIGH**
Graveyard 02	25º 57.191' 29º 19.127'	**HIGH**
Remains from the recent past	Across a wide area	**LOW**

The Graveyards

Two graveyards (GY01, GY02) were observed in the eastern part of the project area, namely:

Graveyard 01

GY01 is located within an area which is demarcated with a fence and which also holds remains from the recent past. At least thirteen white painted graves are demarcated within the confines of a fence in this area. All the graves are fitted with cement tombstones and are edged with cement strips.

At least two of the tombstones bear inscriptions, namely:

- 'Shabangu Pietland Mashete Died on 24 August 1958'
- 'Shabangu Zenani Wynand Died 14 July 1956'

Graveyard 02

GY02 holds the remains of approximately 36 individuals. At least 16 are fitted with cement headstones and are edged with cement strips. As many as twenty graves may be covered with cement slabs and with piles of brick and stone.

Three graves are fitted with granite headstones. Two have the following inscriptions:

- 'Mr Jim Ngwenyane. You will always be remembered by your family 1880-05-28 1972-05-28'
- 'Norman Dubazane Sindane'

Two graves with cement headstones bear the following inscriptions:

- 'Martha Sindane 1959'
- 'David Maile Sindane'

Remains from the recent past

Remains consisting of dilapidated dwellings which date from the recent past occur in the project area. Although these remains have been geo-referenced they hold little significance and are not discussed further.

The significance of the graveyards

It is possible that the graveyards may be impacted by the Eskom Project. The significance of the graveyards therefore is indicated by means of stipulations derived from the National Heritage Resources Act (No 25 of 1999) and other legislation.

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).

Mitigating the graveyards

GY01 and GY02 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. Conserving graveyards *in situ* in mining areas create the risk and responsibility that they may be damaged, accidentally, that the mine remains responsible for its future unaffected existence, maintenance and that controlled access must exist for any relatives or friends who wish to visit the deceased.
- 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.

10.1.10 Socio-Economic Environment

The construction process follows on negotiations with landowners in which the servitude is secured.

There are a number of variables determining the sequence of events in the construction process, the number of people involved in each activity and the time spent on an activity. These variables include the timeframes for completion of the line, the natural environment and other local conditions. Some activities could happen simultaneously.

When the construction of the line starts, each activity will follow the previous one, so that a chain of events, with different teams involved will happen over time. On average, there are some 35 active days of construction at any point. However, this may take place over a period of up to two years.

At the EIA phase, prior to negotiations, the route of the line is investigated for approval by DEAT. Once approval is obtained, the following steps represent the process of construction:

1. The route is surveyed. This is done by air as well as by walking the route.
2. A profile of the line is designed based on soil conditions and other factors. At this stage decisions are made on conductor types, towers, insulators and foundations to be used.
3. Environmental review stage – a "walk-through" survey of the route is undertaken in order to determine any site-specific sensitivities which must be taken into account during the final placement of the towers and the construction and operational phases.
4. A final design of the line is made and placement of towers determined.
5. Tenders are issued and awarded to one or more construction companies.
6. Negotiations with landowners regarding access to the servitude during the construction phase are started. Access plans are drafted and signed by Eskom, the contractor and the landowner. At these discussions, the parties agree on rehabilitation measures to be implemented after construction. Photographs of the applicable infrastructure or land is taken beforehand to ensure that rehabilitation is done to the agreed upon standard. Access roads are established through recurring use – blading or scraping of a new road should not be expected, but this is site dependent.
7. The centre line is pegged. At this stage requirements and locations of new gates are recorded.
8. Bush clearance is done along the centre line. The width of the line to be cleared differs depending on the vegetation and the landscape of the area as well as on landowners' requirements. At each tower position, four strips are cleared (size depends on the type of tower to be erected) for assembly and erection of the tower. The bush clearance team(s) move through the whole length of the line. However, the time needed to finish this activity depends on the vegetation of the area. During bush clearance protected species are identified and appropriately handled. Certain plants could be salvaged and relocated while alien species are eradicated. Cut material is cleared from the servitude and appropriately disposed of.
9. New gates are often installed when bush clearance is done.
10. Before the contractor starts with the foundations of the towers, the towers should have been pegged. A surveyor is appointed to do this. When pegging is being done, the footing of the tower is set out. Any obstacles or potential problems with the tower positions and the consequent moving of tower positions are reported.

11. The first step in putting the foundations for the towers in place is in establishing foundation nominations. At this stage, soil types are checked to determine foundation requirements. Trial foundations are dug at the main foundation points. This is done through mechanical back-actor / auger methods. However, in certain circumstances manual labour is used.

12. Foundations are excavated mechanically with a back-actor where possible. At this stage it looks like a square pit of up to 4mx4m in areas and 4m deep, depending on soil conditions. The pit will be covered up or fenced off after it has been dug until the foundation is cast. This is done to prevent livestock from falling into these pits.

13. The foundation steelwork is fitted into the foundation pit not too long after it has been dug. This is done to reinforce the foundations. The steelwork is made up at base camp and brought to site by truck. However, all fitting and wiring is done on site.

14. The concrete for the foundations is poured after the steelwork has been fitted. Shuttering (which is a structure generally made of timber in which liquid concrete is placed, compacted, and allowed to harden) is done and a standard concrete truck used to cast the concrete. A 28-day period is required for curing after concrete has been laid. Where access problems exist, concrete may need to be mixed on site. Helicopters may need to be used in exceptional circumstances. During this stage, access or service roads will be used extensively.

15. Tower steelwork is delivered in sections by long trucks and assembled on site. One truck transports one tower section directly from the factory to site. Access roads are clearly marked to ensure that the correct tower is delivered to site.

16. Towers are assembled on site by an assembly team. The steelwork is fitted and assembled on the ground using a crane – thereby necessitating the area to be cleared of vegetation around the tower. At the time of the study it was not clear if a lay-down area would be required and if such a lay-down area would be cleared of any vegetation. These areas will be considered from an environmental perspective during the walk-through survey (refer to point 3). Once the nuts are punched, non corrosive paint is placed on the nuts.

17. Towers are erected with cranes. The size of these cranes starts at 50 tons. It is presumed that a flat area is required from which the crane could be operated. However, it was not clear if vegetation clearance would be required.

18. After towers have been erected, the stringing of the cables begins. Cable drums are placed next to each other and stringing takes place in both directions from the drum stations. Up to 4 km can be strung from one station in each direction. The working area at each drum station can be as long as 130m but will be confined to the servitude width. Intensive vehicle movement may take place within this working area. A pilot tractor places the pilot cable on the ground, which is pulled up through the use of a pulley. Conductors must not touch the ground as this will result in damage which will impact on the operation of the line. In mountainous areas, a helicopter can be used for stringing or the pilot rope can be shot across valleys.

19. The line is tensioned from each cable station to ensure minimum ground clearance heights required for the particular power line in question are achieved.
20. Rehabilitation of the construction site (mainly the servitude) is a continuous process. However, final rehabilitation starts after about 100 towers have been strung. The contractor is required to give one year's guarantee on their work, in which time rehabilitation must be concluded. Each landowner has to sign a release form once their area has been rehabilitated, indicating that they are satisfied that everything has been left as agreed. Quotations are sourced and a proposal prepared to reimburse landowners for damages, if required. The proposal goes through a tender committee at which the payment is approved. All damages, including damages to crops must be paid and also signed off by the landowner.
21. A final inspection is done by Eskom together with the affected landowner to determine whether rehabilitation has taken place to the satisfaction of the landowner.

Some of the initial activities only involve a limited number of specialised people that moves through the servitude. It is only when bush clearance starts that larger numbers of construction workers come onto site. The following teams are active on site:

- **Bush clearance team**: Consisting of between 10–20 people, depending on local conditions (e.g. less people would be needed in the Karoo than in the bushveld). This team could also be involved in erecting gates. If a separate team put up gates, a team size of around 5 people could be expected. The potential for recruiting local labour for these teams is extensive.
- **Foundations team**: Consisting of between 35–45 members per team. More than one team could be used to accelerate construction. Although there is an opportunity for local labour to be recruited in this team, it is limited to unskilled activities.
- **Assembly team**: Consisting of between 10–25 people per team. More than one team could be used to accelerate construction. Limited potential for recruitment of local labour exists as this task largely requires skilled labour.
- **Erection team**: Size 15 – 20 people per team. No potential for recruitment of local labour as highly skilled teams are required for this task.
- **Stringing team**: Consisting of approximately 120 people. Limited potential for recruiting local labour as this task largely requires skilled labour.
- **Rehabilitation team**: Consisting of between 5–15 people, depending on site conditions. These teams could be involved in different activities. Limited potential for recruiting local labour as this task largely requires skilled labour.

Summary

The following section outlines the impacts for the construction, operation and decommissioning.

The change processes are illustrated in Table 54 (expected category 1 impacts) and in Table 55 (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 55, while Table 56 reflects a summary of the potential category 2 impacts per change process.

TABLE 54: SUMMARY OF CATEGORY 1 IMPACTS PER PROJECT PHASE

CHANGE PROCESS	ASSESSMENT AREA	SIGNIFICANCE (pre-mitigation)	SIGNIFICANCE (post-mitigation)
CONSTRUCTION & DECOMMISSIONING			
Demographic	No impacts foreseen	n/a	n/a
Geographic	No impacts foreseen	n/a	**n/a**
Economic	Compensation for servitude	Low +	n/a
Institutional and Empowerment	Negotiation process	Moderate	Moderate +
Socio-Cultural	No impacts foreseen	n/a	n/a
OPERATION & MAINTENANCE			
Demographic	No impacts foreseen	n/a	n/a
Geographic	No impacts foreseen	n/a	**n/a**
Economic	No impacts foreseen	n/a	n/a
Institutional and Empowerment	No impacts foreseen	n/a	n/a
Socio-Cultural	No impacts foreseen	n/a	n/a

TABLE 55: SUMMARY OF CATEGORY 2 IMPACTS PER PROJECT PHASE

Change Process	Assessment Area	Western Alternative		Central Alternative		Eastern Alternative	
CONSTRUCTION & DECOMMISSIONING							
Demographical	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Geographical	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Economical	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Empowerment and Institutional	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	Na
Socio-Cultural	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
OPERATION & MAINTENANCE							
Demographical	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Geographical	Mining operations	No impact	No impact	No impact	No impact	Low -	Low – to ±
Economical	Property values	Low -	Very low -	Low -	Very low -	No impact	No impact
Empowerment and Institutional	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Socio-Cultural	Sense of place	Moderate -	Low -	Moderate -	Low -	Low -	Very low – to ±

The construction and decommissioning phase of the proposed project is characterised by a number of positive impacts. This is mainly due to the nature of the negotiation and economical activities that take place during these phases. The operation and maintenance phase are characterised by a number of negative impacts, which mostly relates to the visibility and the presence of the transmission power line, notably where corridors cross the Witbank Dam.

TABLE 56: SUMMARY OF CATEGORY 1 IMPACTS PER CHANGE PROCESS

CHANGE PROCESS	ASSESSMENT AREA	SIGNIFICANCE (pre-mitigation)	SIGNIFICANCE (post-mitigation)
DEMOGRAPHICAL			
Construction & De-commissioning	No impacts foreseen	n/a	n/a
Operation & Maintenance	No impacts foreseen	n/a	**n/a**
GEOGRAPHICAL			
Construction & De-commissioning	No impacts foreseen	n/a	**n/a**
Operation & Maintenance	No impacts foreseen	n/a	**n/a**
ECONOMICAL			
Construction & De-commissioning	Compensation for servitude	Low +	n/a
Operation & Maintenance	No impacts foreseen	n/a	**n/a**
EMPOWERMENT & INSTITUTIONAL			
Construction & De-commissioning	Negotiation process	Moderate	Moderate +
Operation & Maintenance	No impacts foreseen	n/a	**n/a**
SOCIO-CULTURAL			
Construction & De-commissioning	No impacts foreseen	n/a	n/a
Operation & Maintenance	**No impacts foreseen**	**Low -**	**Very low -**

TABLE 57: SUMMARY OF CATEGORY 2 IMPACTS PER CHANGE PROCESS

Change Process	Assessment Area	Western Alternative		Eastern Alternative		Western Sub-Alternative	
DEMOGRAPHICAL							
Construction & De-commissioning	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	**n/a**
GEOGRAPHICAL							
Construction & De-commissioning	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	Mining operations	No impact	No impact	No impact	No impact	Low -	**Low – to ±**
ECONOMICAL							
Construction & De-commissioning	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	Property values	Low -	Very low -	Low -	Very low -	No impact	**No impact**
EMPOWERMENT & INSTITUTIONAL							
Construction & De-commissioning	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	Na
Operation & Maintenance	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	**n/a**
SOCIO-CULTURAL							

Change Process	Assessment Area	Western Alternative		Eastern Alternative		Western Sub-Alternative	
Construction & De-commissioning	No impacts foreseen	n/a	n/a	n/a	n/a	n/a	n/a
Operation & Maintenance	**Sense of place**	**Low -**	**Low -**	**Moderate -**	**Low -**	**Moderate -**	**Low -**

The geographical, economical 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 negative 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.

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 58 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 58: SUMMARY OF ASSESSMENTS (CATEGORY 2 IMPACTS)

Process	Change Process	Western	Central	Eastern
Demographical	No category 2 impacts	-	-	-
Geographical	Mining operations	0	0	1.98
Economical	Property values	1.62	1.62	0
Institutional & Empowerment	No category 2 impacts	-	-	-
Socio-Cultural	Sense of place	2.4	2.16	1.38
TOTAL		**4.02**	**3.78**	**3.36**

Based on the comparison of category 2 impacts prior to mitigation, overall the **eastern 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:

- **Mining operations:** The eastern alternative pass in close proximity to open cast mining area. If this alternative is chosen as the preferred alignment, it is believed that some realignment would be required to bypass the open cast mining area 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 western and central alternatives is still quite pristine and unspoilt, whereas the area surrounding the eastern alternative is regarded as 'spoilt' due to the presence of the mining operation and other industries such as the Duvha Power Station.

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 bypass transmission power lines known as Bravo 3, 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)[12] for a detailed discussion regarding the impact of electro magnetic fields (Appendix S).

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 10 km of high voltage power lines to the existing network of power lines in the area. Sensitive blue cranes occur in the area and a single death of one of these protected species would be seen as a high impact.. The additional

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

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 59 below.

TABLE 59: 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 10 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 180 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;
- Alternative 1 should be considered as the preferred alternative;
- Adhere to the Eskom vegetation management guideline (Appendix Q); 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 Appendix R 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 10 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 60: 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 60 above has a rating of 1.6 and a Low impact class.

10.2.7 Wetlands

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

10.2.8 Visual

The impact assessment does not change from that of the construction phase, refer to Section 10.1.8 above.

10.2.9 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

10.2.10 Socio-Economic Environment

As indicated in Section 10.1.10, the socio-economic environment will not be impacted upon as a result of the proposed activity. This impact is therefore not assessed.

10.3 Decommissioning 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 10.1.2 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 10.1.3 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 6.2.4 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 6.2.5 above.

10.3.6 Fauna

Even though the removal of the 10 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 10.2.6 above due to the remaining network if high voltage power lines.

10.3.7 Visual

Even though the removal of the 10 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 Section10.1.8 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

As indicated in Section 10.1.10, the socio-economic environment will not be impacted upon as a result of the proposed activity. This impact is therefore not assessed.

10.4 Impact Assessment Summary

The environmental impacts for each phase of the proposed by-pass line have been summarised in Table 61 and Table 62. The following broad conclusions can be drawn from the impact assessment.

- The proposed site is located within an environment that is fairly tolerant to change;
- The receiving environment is not of a sensitive nature with the exception of the wetlands and seepage zones.
- There are sensitive fauna, flora, visual aspects and wetlands on site.
- The most significantly impacted baseline elements in the area are Fauna, Flora and Wetlands depending on the Alternative utilised.
- During the Construction Phase of the by-pass lines 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 61: SUMMARY OF THE CONSTRUCTION PHASE IMPACTS

		Construction Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
			Alt 1, 2 and 3							Alt 1, 2 and 3				
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	-	Probably			Probably	Probably		-	4			4	4
	CLASS	-	**Low**			**Low**	**Low**		-	**1.6**			**1.6**	**1.6**
			Alt 1, 2 and 3							Alt 1, 2 and 3				
TOPOGRAPHY	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOILS AND LAND CAPABILITY	Significance	High	Low	Moderate	Moderate	High	High		4	2	3	3	4	4
	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	**High**	**Moderate**	**Moderate**	**Moderate**	**High**	**High**		**3.33**	**2.3**	**2.67**	**2.67**	**3.33**	**3.33**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
FLORA	Significance	Moderate	Very Low	High	High	Moderate	High		3	1	4	4	3	4
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Study Site	Isolated Site		2	1	1	1	2	1
	Temporal	Long Term	Short Term	Long Term	Long Term	Medium Term	Long Term		4	2	4	4	3	4
	Probability	Is occurring	Will occur	Will occur	Will occur	Will happen	Will occur		5	5	5	5	5	5
	CLASS	**Moderate**	**Low**	**Moderate**	**Moderate**	**Moderate**	**Moderate**		**3.00**	**1.33**	**3**	**3**	**2.33**	**3**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
FAUNA	Significance	High	Moderate	High	High	High	High		4	3	4	4	4	4
	Spatial	Region	Isolated Site	Isolated Site	Isolated Site	Isolated Site	Region		4	1	1	1	1	4
	Temporal	Long Term	Short Term	Short Term	Short Term	Short Term	Long Term		4	2	2	2	2	4
	Probability	Likely	Will occur	Will occur	Will occur	Will occur	Likely		4	5	5	5	5	4
	CLASS	**High**	**Low**	**Moderate**	**Moderate**	**Moderate**	**High**		**3.2**	**2**	**2.3**	**2.3**	**2.3**	**3.2**
			Alt 1,2 and 3							Alt 1, 2 and 3				
SURFACE WATER	Significance	Very Low	Very Low			Very Low	Very Low		1	1			1	1
	Spatial	Study Site	Study area			Study Site	Study Site		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**		**1.2**	**1.0**			**1.2**	**1.2**

		Construction Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
			Alt 1, 2 and 3							Alt 1, 2 and 3				
CULTURAL HISTORICAL	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
VISUAL	Significance	High	Low	Low	Low	High	High		4	2	2	2	4	4
	Spatial	Local	Local	Local	Local	Local	Local		3	3	3	3	3	3
	Temporal	Long Term	Short Term	Short Term	Short Term	Long Term	Long Term		4	2	2	2	4	4
	Probability	Has occurred	Will occur	Will occur	Will occur	Has occurred	Has occurred		5	5	5	5	5	5
	CLASS	**High**	**Moderate**	**Moderate**	**Moderate**	**High**	**High**		**3.6**	**2.3**	**2.3**	**2.3**	**3.6**	**3.6**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOCIO-ECONOMIC	Significance	-	-	-	-	-	-		-	-	-	-	-	-
	Spatial	-	-	-	-	-	-		-	-	-	-	-	-
	Temporal	-	-	-	-	-	-		-	-	-	-	-	-
	Probability	-	-	-	-	-	-		-	-	-	-	-	-
	CLASS	-	-	-	-	-	-		-	-	-	-	-	-

TABLE 62: SUMMARY OF THE OPERATIONAL PHASE IMPACTS

		Operational Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
			Alt 1, 2 and 3							Alt 1, 2 and 3				
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	-	Probably			Probably	Probably		-	4			4	4
	CLASS	-	**Low**			**Low**	**Low**		-	**1.6**			**1.6**	**1.6**
			Alt 1, 2 and 3							Alt 1, 2 and 3				
TOPOGRAPHY	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOILS AND LAND CAPABILITY	Significance	High	Low	Moderate	Moderate	High	High		4	2	3	3	4	4
	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	**High**	**Moderate**	**Moderate**	**Moderate**	**High**	**High**		**3.33**	**2.3**	**2.67**	**2.67**	**3.33**	**3.33**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
FLORA	Significance	Moderate	Very Low	High	High	Moderate	High		3	1	4	4	3	4
	Spatial	Study Site	Isolated Site	Isolated Site	Isolated Site	Study Site	Isolated Site		2	1	1	1	2	1
	Temporal	Long Term	Short Term	Long Term	Long Term	Medium Term	Long Term		4	2	4	4	3	4
	Probability	Is occurring	Will occur	Will occur	Will occur	Will happen	Will occur		5	5	5	5	5	5
	CLASS	**Moderate**	**Low**	**Moderate**	**Moderate**	**Moderate**	**Moderate**		**3.00**	**1.33**	**3**	**3**	**2.33**	**3**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
FAUNA	Significance	High	High	High	High	High	High		4	4	4	4	4	4
	Spatial	Region	Local	Local	Local	Regional/ Provincial	Region		4	3	3	3	4	4
	Temporal	Long Term	Long Term	Long Term	Long Term	Long Term	Long Term		4	4	4	4	4	4
	Probability	Likely	Could occur	Could occur	Could occur	Unlikely	Likely		4	3	3	3	2	4
	CLASS	**High**	**Moderate**	**Moderate**	**Moderate**	**Low**	**High**		**3.2**	**2.2**	**2.2**	**2.2**	**1.6**	**3.2**
			Alt 1,2 and 3							Alt 1, 2 and 3				
SURFACE WATER	Significance	Very Low	Very Low			Very Low	Very Low		1	1			1	1
	Spatial	Study Site	Study area			Study Site	Study Site		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**		**1.2**	**1.0**			**1.2**	**1.2**

		Operational Phase											
		Initial	Additional			Residual	Cumulative		Initial	Additional			Residual	Cumulative
			Alt 1, 2 and 3							Alt 1, 2 and 3				
CULTURAL HISTORICAL	Significance	-	-			-	-		-	-			-	-
	Spatial	-	-			-	-		-	-			-	-
	Temporal	-	-			-	-		-	-			-	-
	Probability	-	-			-	-		-	-			-	-
	CLASS	-	-			-	-		-	-			-	-
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
VISUAL	Significance	High	Low	Low	Low	High	High		4	2	2	2	4	4
	Spatial	Local	Local	Local	Local	Local	Local		3	3	3	3	3	3
	Temporal	Long Term	Short Term	Short Term	Short Term	Long Term	Long Term		4	2	2	2	4	4
	Probability	Has occurred	Will occur	Will occur	Will occur	Has occurred	Has occurred		5	5	5	5	5	5
	CLASS	**High**	**Moderate**	**Moderate**	**Moderate**	**High**	**High**		**3.6**	**2.3**	**2.3**	**2.3**	**3.6**	**3.6**
			Alt 1	Alt 2	Alt 3					Alt 1	Alt 2	Alt 3		
SOCIO-ECONOMIC	Significance	-	-	-	-	-	-		-	-	-	-	-	-
	Spatial	-	-	-	-	-	-		-	-	-	-	-	-
	Temporal	-	-	-	-	-	-		-	-	-	-	-	-
	Probability	-	-	-	-	-	-		-	-	-	-	-	-
	CLASS	-	-	-	-	-	-		-	-	-	-	-	-