9 IMPACT ASSESSMENT

9.1 Introduction

The significant environmental impacts identified in the Scoping Phase as well as any newly identified impacts have been assessed during the EIA phase.

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed project. The process of assessing the impacts of the project encompasses the following four activities:

- Identification and assessment of potential impacts;
- Prediction of the nature, extent, duration, magnitude and probability of potentially significant impacts;
- Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity; and
- Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact.

The possible impacts associated with the proposed new Wet ash disposal facility at the Hendrina Power Station were primarily identified in the Scoping Phase through desktop study and public consultation. Additional impacts have further been identified and assessed during the Impact Assessment Phase by means of more in-depth investigations along with consultation with interested and affected parties.

9.2 EIA process and methodology

In accordance with Government Notice R. 543, promulgated in terms of section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), specialists were required to assess the significance of potential impacts in terms of the following criteria:

- Nature of the impact;
- Extent of the impact;
- Intensity of the impact;
- Duration of the impact;
- Probability of the impact occurring;
- Impact non-reversibility;
- Cumulative impacts;
- Impact on irreplaceable resources; and
- Confidence level.

Issues were assessed in terms of the following criteria:

- The **nature**, a description of what causes the effect, what will be affected and how it will be affected;
- The physical **extent**, wherein it is indicated whether:
  - 1 - the impact will be limited to the site;
  - 2 - the impact will be limited to the local area;
  - 3 - the impact will be limited to the region;
  - 4 - the impact will be national; or
  - 5 - the impact will be international;
- The **duration**, wherein it is indicated whether the lifetime of the impact will be:
  - 1 - of a very short duration (0–1 years);
  - 2 - of a short duration (2-5 years);
  - 3 - medium-term (5–15 years);
  - 4 - long term (> 15 years); or
  - 5 - permanent;
- The **magnitude of impact on ecological processes**, quantified on a scale from 0-10, where a score is assigned:
  - 0 - small and will have no effect on the environment;
  - 2 - minor and will not result in an impact on processes;
  - 4 - low and will cause a slight impact on processes;
  - 6 - moderate and will result in processes continuing but in a modified way;
  - 8 - high (processes are altered to the extent that they temporarily cease); or
  - 10 - very high and results in complete destruction of patterns and permanent cessation of processes;
- The **probability of occurrence**, which describes the likelihood of the impact actually occurring. Probability is estimated on a scale where:
  - 1 - very improbable (probably will not happen;
  - 2 - improbable (some possibility, but low likelihood);
  - 3 - probable (distinct possibility);
  - 4 - highly probable (most likely); or
  - 5 - definite (impact will occur regardless of any prevention measures);
- the **significance**, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high;
- the **status**, which is described as either positive, negative or neutral;
- the degree to which the impact can be reversed;
- the degree to which the impact may cause irreplaceable loss of resources; and
- the degree to which the impact can be mitigated.

The **significance** is determined by combining the criteria in the following formula:

S = (E+D+M)*P; where

S = Significance weighting
E = Extent
D = Duration

M = Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

Points	Significant Weighting	Discussion
< 30 points	Low	where this impact would not have a direct influence on the decision to develop in the area
31-60 points	Medium	where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	High	where the impact must have an influence on the decision process to develop in the area

The findings of the impact assessment have been consolidated into **Table 9.1** to **Table 9.12** below. The impacts are classified in terms of the phase of the development in which they are likely to occur, namely, construction phase (**Table 9.1, 9.2 and 9.3**), operational phase (**Table 9.4, 9.5 and 9.6**), decommissioning phase (**Tables 9.7, 9.8 and 9.9**) and the cumulative impacts (**Table 9.10, 9.11 and 9.12**)

Table 9.1: Detailed assessment of identified impacts for the Construction Phase – Wet ash disposal facility

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Wet ash disposal facility - Site E									
GEOLOGY									
Impact 1: Construction-related earthworks	**Nature of impact:**	Construction related earthworks may impact the local geology if not undertaken in accordance to relevant procedures.							
	with mitigation	1	3	2	2	**12**	**Low**	Neutral	High
	without mitigation	2	5	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
Impact 2: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances (including leaks from Ash pipes) during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
AGRICULTURAL POTENTIAL									
Impact 1: Loss of agricultural land	**Nature of impact:**	Adverse impact due to the loss of 209 ha of high agricultural land due to the construction of the wet ash disposal facility							
	with mitigation	1	5	10	5	**80**	**high**	-	High
	without mitigation	1	5	10	5	**80**	**high**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree to which impact can be reversed:	Low							High
	degree of impact on irreplaceable resources:	High							High
Impact 2: Loss or redistribution of top soil	**Nature of impact:**	Construction activities will require that the top soil is stripped and stored, which may result in some top soil being lost or redistributed							
	with mitigation	1	4	2	2	**14**	**Low**	-	High
	without mitigation	1	5	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Medium							High
	degree of impact on irreplaceable resources:	High							High
GROUND WATER									
Impact 1: Deterioration of groundwater quality due to leachate	**Nature of impact:**	Rainwater percolating through ash together with slurry or supernatant water will migrate downwards towards the water table and most likely lead to deterioration in local groundwater quality (likely to raise the pH and raise the TDS value, amongst other impacts)							
	with mitigation	1	2	2	5	**25**	**Low**	-	High
	without mitigation	2	4	2	5	**40**	**Medium**	-	High
	degree to which impact can be reversed:	It will be difficult to reverse this impact. It is more feasible to reduce the amount of leachate as much as possible by installing a liner systems that works as designed.							
	degree of impact on irreplaceable resources:	Since the impact is likely to be on local groundwater only, and this resource can be replaced, the degree of impact is likely to be low.							
Impact 2: Deterioration of groundwater quality due to spillages during	**Nature of impact:**	Spillages of hydrocarbons (e.g. diesel) or solvents or other pollutants during the construction phase may have an impact on the quality of local groundwater resources.							
	with mitigation	1	2	2	1	**5**	**Low**	-	Medium
	without mitigation	2	4	2	3	**24**	**Low**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
construction	**degree to which impact can be reversed:**	Once fuel, solvents or other pollutants are spilled and begin to migrate downwards, reversing the impact is difficult and expensive - i.e. the degree to which the impact can be reversed is low. However, if appropriate precautions are taken during the construction phase (e.g. the bunding of refuelling and fuel storage areas, control of all potentially polluting substances at the site), the threat of this impact can be nearly eliminated.						
	degree of impact on irreplaceable resources:	Since the impact is likely to be on local groundwater only, and this resource can be replaced, the degree of impact is likely to be low						
Impact 3: Rise in water table during initial slurry deposition	**Nature of impact:**	There is likely to be a small rise in the water table in the vicinity of the wet ash disposal facility due to water percolating downwards through the ash and soil zone into the groundwater. The liner will minimise this impact, although a certain amount of penetration is still expected.						
	with mitigation	1	1	2	4	**16**	**Low**	-	Medium
	without mitigation	2	1	2	4	**20**	**Low**	-	Medium
	degree to which impact can be reversed:	The impact can only be fully reversed once slurry deposition and percolation of extra water downwards ceases completely. Since slurry deposition and / or dry ash deposition will be carried out during the construction phase, the degree to which the impact can be reversed is thought to be low.						
	degree of impact on irreplaceable resources:	Minor						
SURFACE WATER								
Impact 1: Loss of wetland function	**Nature of impact:**	The loss of associated wetland functions which include: Nutrient removal (particularly Nitrates); trapping of pollutants, including sediment; and to a small extent flood attenuation and stream flow augmentation as the dam located to the north of alternative E with still provide these functions						
	with mitigation	2	3	4	3	**27**	**Low**	-	Medium
	without mitigation	4	5	8	5	**85**	**High**	-	High
	degree to which impact can be reversed:	The associated impacts can be reversed to an extent by fulfilling the functions (as mentioned above) that have been lost by the removal of the wetland systems.							Medium
	degree of impact on irreplaceable resources:	The degree of impact can be kept low if the run-off from the wet ash disposal facility is managed adequately and prevented from leaving the facility area, and by ensuring that the drainage system/networks are regularly maintained. This will be ensured through the Eskom zero liquid effluent discharge philosophy and will be monitored throughout the lifecycle of the facility.							Medium
Impact 2:	**Nature of**	Hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment						

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Deterioration of water quality	**impact:**	during the construction phase may have an impact on the receiving aquatic environment.							
	with mitigation	3	3	4	2	**20**	**Low**	-	Medium
	without mitigation	4	5	6	4	**60**	**Medium**	-	Medium
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (e.g. Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise.							High
	degree of impact on irreplaceable resources:	The degree of the impact will be directly related to the extent of the spill/leak. With appropriate mitigation measures in place the probability of this impact can be reduced drastically to a low impact.							High
Impact 3: Increased surface run-off within the wet ash disposal facility	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	1	2	4	2	**14**	**Low**	-	Medium
	without mitigation	3	4	6	4	**52**	**Medium**	-	Medium
	degree to which impact can be reversed:	The degree of the impact can be reversed relatively easily with the implementation of adequate mitigation measures.							Medium
	degree of impact on irreplaceable resources:	The probability of impacts resulting from surface run-off will have a low significance by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity (refer to the EMPr).							High
Impact 4: Erosion and Sedimentation	**Nature of impact:**	Alter the water quality (increased turbidity) and substrate composition of receiving aquatic environments as well as altering marginal habitats due to excessive reed growth and alien vegetation encroachment as a result of the deposited sediment.							
	with mitigation	1	2	2	1	**5**	**Low**	-	High
	without mitigation	3	3	8	4	**56**	**Medium**	-	Medium
	degree to which impact can be reversed:	The degree in which these impacts can be reversed will be low if not handled appropriately, however, if appropriate mitigation is put into place and enforced throughout the construction phase the threat of this impact can be considerably lowered.							High
	degree of impact on irreplaceable resources:	The degree of the impact will be very low if erosion control measures are put into place (silt fences, berms, etc.) before and throughout the construction phase and throughout the lifespan of the wet ash disposal facility.							Medium
Impact 5: Altered hydrology	**Nature of impact:**	The placement of the wet ash disposal facility will alter natural surface water flow paths by changing the local topography and breaking longitudinal and lateral connectivity of the drainage network. This could potentially affect surface and sub-surface flow volume by reducing base flows or augmenting streamflow.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with mitigation	2	3	4	3	**27**	**Low**	-	Medium
	without mitigation	3	4	8	5	**75**	**High**	-	Medium
	degree to which impact can be reversed:	This impact can be reversed to an extent if additional water can be discharged back into Wetland 1 in order to the supplement water that will no longer be accumulated in the catchment.							Medium
	degree of impact on irreplaceable resources:	The degree of the impact will be low-moderate if appropriate mitigation is implemented. It should however be taken into account that hydrology of the associated wetland system is already severely altered by several dams and water being decanted into the system from where?.							Medium
Impact 6: Loss of water resources downstream to downstream dam	**Nature of impact:**	The construction of the ash disposal facility may result in lowered base flows which may cause the water level in the downstream dam to lower considerably due to the loss of the catchment area to the wet ash disposal facility.							
	with mitigation	3	4	4	3	**33**	**Medium**	-	Medium
	without mitigation	3	4	6	5	**65**	**High**	-	High
	degree to which impact can be reversed:	It will be almost impossible to reverse the impact as the run-off that is accumulated at alternative E will be lost once construction activities commence.							Medium
	degree of impact on irreplaceable resources:	The degree of the impact is believed to be medium as a large proportion of the dam's catchment area will be lost during the construction of the wet ash disposal facility. However, is should be noted that the dam will still receive run-off from its catchment to the east and west.							Medium
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact due to loss of natural habitat.							
	with mitigation	2	5	2	5	**45**	**Medium**	-	high
	without mitigation	2	5	2	5	**45**	**Medium**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Direct impacts on common fauna,	**Nature of impact:**	Adverse Impact due to faunal interactions with structures, infrastructure							
	with mitigation	2	5	2	3	**27**	**Low**	-	high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
interactions with structures and personnel	**without mitigation**	2	3	4	5	**45**	**Medium**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
Impact 3: Loss or disruption of ecological connectivity	**Nature of impact:**	Adverse Impact due to disruption of ecological connectivity							
	with mitigation	2	5	2	5	**45**	**Medium**	-	high
	without mitigation	2	5	2	5	**45**	**Medium**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 4: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impact due to habitat degradation							
	with mitigation	2	3	2	4	**28**	**Low**	-	high
	without mitigation	2	5	2	5	**45**	**Medium**	-	high
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
AVIFAUNA									
Impact 1: Disturbance of avifauna	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests may be disturbed.							
	with	2	1	2	3	**15**	**Low**	-	Medium
	without	2	1	4	4	**28**	**Low**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	Partially reversible							Medium
	degree of impact on irreplaceable resources:	Low							Medium
Impact 2: Habitat destruction	**Nature of impact:**	Permanent removal of natural habitat that is used, or may be used, by avifauna.							
	with	1	5	4	5	**50**	**Medium**	-	Medium
	without	1	5	4	5	**50**	**Medium**	-	Medium
	degree to which impact can be reversed:	Irreversible							Medium
	degree of impact on irreplaceable resources:	medium							Medium
HERITAGE									
Impact 1: Destruction of heritage sites and features	**Nature of impact:**	Adverse impact on a graves on the proposed site							
	with mitigation	3	5	2	5	**50**	**Medium**	-	High
	without mitigation	3	5	10	5	**90**	**High**	-	High
	degree to which impact can be reversed:	Medium							High
	degree of impact on irreplaceable resources:	Not Applicable							High
VISUAL									
Impact 1: Potential visual impact of construction on sensitive visual	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, stockpiles, lay down areas, heavy vehicles, dust & rehabilitation failure.							
	with mitigation	4	1	6	2	**22**	**Low**	-	High
	without mitigation	4	1	6	3	**33**	**Medium**	-	High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**degree to which impact can be reversed:**	Recoverable							
	degree of impact on irreplaceable resources:	None							
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, stockpiles, laydown areas, heavy vehicles, dust & rehabilitation failure.							
	with mitigation	3	1	4	1	**8**	**Low**	-	High
	without mitigation	3	1	4	2	**16**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							
	degree of impact on irreplaceable resources:	None							
SOCIAL									
Impact 1: Economic Development through employment	**Nature of impact:**	The impact is considered to minor, although positive, as most of the work will be undertaken by internal / existing Eskom employees. However where outside contractors are required economic development will be positively impacted.							
	with mitigation	3	3	4	3	**30**	**Low**	+	Medium
	without mitigation	2	2	2	3	**18**	**Low**	+	Medium
	degree to which impact can be reversed:	Moderate							medium
	degree of impact on irreplaceable resources:	Not Applicable							-
Impact 2: Inflow of temporary	**Nature of impact:**	Any construction activity will attract those looking for work and it is considered likely that there will be an influx of temporary workers seeking employment							
	with mitigation	2	2	2	3	**18**	**Low**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
workers	**without mitigation**	2	2	2	3	**18**	**Low**	-	Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							-
Impact 3: Health Risk from elevated PM 10 Concentrations	**Nature of impact:**	The construction phase of the new wet ash disposal facility will result in increased PM10 concentrations due to groundworks							
	with mitigation	1	4	4	3	**27**	**Low**	-	Medium
	without mitigation	2	4	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	High – with the implementation of the relevant mitigation measures							Medium
	degree of impact on irreplaceable resources:	Not Applicable							-
Impact 4: Nuisance from elevated dustfall rates	**Nature of impact:**	The construction phase of the new wet ash disposal facility will result in increased dust fall rates due to groundworks							
	with mitigation	1	4	4	3	**27**	**Low**	-	Medium
	without mitigation	2	4	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	High – with the implementation of the relevant mitigation measures							Medium
	degree of impact on irreplaceable resources:	Not Applicable							-
Wet ash disposal facility - No-Go Alternative									
GEOLOGY									
In the event that the Wet ash disposal facility is not constructed, there will be no impact on the underlying geology, therefore the status quo will remain.									
AGRICULTURAL POTENTIAL									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
In the event that the Wet ash disposal facility is not constructed, there will be no impact from ashing operations on the existing agricultural potential of the land in question, therefore the status quo will remain.									
GROUND WATER									
Impact 1: No change to groundwater conditions at the site	**Nature of impact:**	If the wet ash disposal facility is not built, then it is likely that there will be no change to the groundwater conditions underlying the proposed site, both in terms of quality and groundwater quality.							
	with mitigation	2	1	4	4	**28**	**Low**	+	high
	without mitigation	2	1	4	4	**28**	**Low**	+	high
	degree to which impact can be reversed:	This positive impact (i.e. not building the wet ash disposal facility) could be reversed if some future activity affected the groundwater underlying the proposed site.							
	degree of impact on irreplaceable resources:	Groundwater resource near the proposed site is not considered to be irreplaceable, in the sense that alternative sources of water can be found if needed.							
SURFACE WATER									
Impact 1: Impacts associated with the surrounding catchment	**Nature of impact:**	The impacts associated with Alternative E in its current state include: agricultural and industrial impacts as well as severe hydrological alterations.							
	with mitigation	3	4	8	4	**60**	**Medium**	+	High
	without mitigation	3	4	8	4	**60**	**Medium**	+	High
	degree to which impact can be reversed:	The impacts associated with the wetlands in the primary study area will not be easily reversed due to their altered state							Medium
	degree of impact on irreplaceable resources:	The state of the wetlands located within the primary study area is already in an impacted state as a result of anthropogenic activities taking place in the surrounding catchment							High
BIODIVERSITY									
In the event that the wet ash disposal facility is not constructed, no biodiversity impacts are expected and the status quo will remain being driven by current drivers.									
AVIFAUNA									
In the event that the Wet ash disposal facility is not constructed, no avifauna impact can be expected and the status quo will remain being driven by current drivers.									
HERITAGE									
In the event that the Wet ash disposal facility is not constructed, no Heritage impact can be expected as the grave will not be disturbed and the status quo will remain being driven by current drivers.									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
VISUAL									
In the event that the Wet ash disposal facility is not constructed, no visual impact can be expected and the status quo will remain driven by the current drivers.									
SOCIAL									
Impact 1: Loss of economic potential	**Nature of impact:**	In the event that the Power Station should close in the future as a result of lack of ashing space, many Eskom employees may lose their jobs.							
	with mitigation	2	3	4	3	**27**	**Low**	-	Medium
	without mitigation	2	3	6	4	**44**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate – this impact can be mitigated by ensuring that the social closure objectives are implemented. Although job losses are of great concern there is an increase in mining activity in the area which could provide new employment opportunities							medium
	degree of impact on irreplaceable resources:	Not Applicable							-
Impact 2: Continued supply of electricity from Hendrina power station	**Nature of impact:**	If the wet ash disposal facility is not constructed the power station will need to be closed once the existing wet ash disposal facilities are at their full capacity, this is expected to be 2018 at the current rates of ash disposal. Such a situation will result in further shortages in power supply for the country.							
	with mitigation	No mitigation							High
	without mitigation	4	4	6	5	**70**	**High**	-	High
	degree to which impact can be reversed:	Moderate – this impact can only be avoided and reversed if the new wet ash disposal facility is constructed							High
	degree of impact on irreplaceable resources:	Not Applicable							-

Table 9.2: Detailed assessment of identified impacts for the Construction Phase – Power Lines

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Power Line Corridor 3									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
AGRICULTURAL POTENTIAL									
Impact 1: Loss or redistribution of top soil	**Nature of impact:**	Construction activities will require that the top soil is stripped and stored, which may result in some top soil being lost or redistributed							
	with mitigation	1	4	2	2	**14**	**Low**	-	High
	without mitigation	1	5	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Medium							High
	degree of impact on irreplaceable resources:	High							High
GROUND WATER									
Impact 1: Possible deterioration in local groundwater	**Nature of impact:**	It is possible that construction of the power lines could lead to local deterioration in groundwater quality if pollutants of any sort are spilled or introduced into the holes needed for the pylons during construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium
	without mitigation	2	4	4	1	**10**	**Low**	-	medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
quality	**degree to which impact can be reversed:**	Once pollutants are introduced into the ground, reversing the impact would be fairly difficult - necessitating re-excavation, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							
	degree of impact on irreplaceable resources:	The groundwater resource along the power line route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	The construction of power lines witch cross through Wetlands 1 and 2 and runs alongside Wetlands 4 creats the possibility of water contamination by hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase.							
	with mitigation	1	2	2	1	**5**	**Low**	-	Medium
	without mitigation	3	3	2	4	**32**	**Medium**	-	High
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (e.g. Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise.							High
	degree of impact on irreplaceable resources:	The significance of the impacts can be kept low if mitigation measures are strictly enforced. The probability of further water quality deterioration at Wetlands 1 and 2 are lower due to the already altered state of these wetlands.							Medium
Impact 2: Vegetation removal	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces increasing the potential velocity of surface run-off thereby increasing the erosion potential.							
	with mitigation	1	2	2	1	**5**	**Low**	-	Medium
	without mitigation	3	3	2	3	**24**	**Low**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is carried out directly following construction activities the severity of the impacts can be considerably reduced to a low significance							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	1	1	2	2	**8**	**Low**	-	Medium
	without mitigation	3	3	2	4	**32**	**Medium**	-	Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity (refer to EMPr). Due to the power line crossing several wetland systems, the mismanagement of surface run-off can lead to increased sedimentation within these systems.							High
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if appropriate mitigation measures are enforced and if the extent of the impact is limited to the site and its immediate surroundings.							Medium
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact due to loss or degradation of natural habitat							
	with mitigation	1	4	2	3	**21**	**Low**	-	high
	without mitigation	2	5	2	4	**36**	**Medium**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Direct impacts on common fauna, interactions with structures and personnel	**Nature of impact:**	Adverse Impact due to faunal interactions with structures, personnel, activities							
	with mitigation	1	2	2	3	**15**	**Low**	-	high
	without mitigation	2	3	4	3	**27**	**Low**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
AVIFAUNA									
Impact 1: Disturbance of avifauna	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests may be disturbed.							
	with mitigation	1	1	5	3	**21**	**Low**	-	Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	without mitigation	2	1	7	4	**40**	**Medium**	-	Medium
	degree to which impact can be reversed:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							
Impact 2: Habitat destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	with mitigation	1	2	4	4	**28**	**Low**	-	Medium
	without mitigation	1	2	7	5	**50**	**Medium**	-	Medium
	degree to which impact can be reversed:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							
HERITAGE									
Due to the fact that there are no heritage sites or resources along the proposed alternative (Corridor 3), no heritage impacts are foreseen.									
VISUAL									
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the power lines	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation fail							
	with mitigation	4	1	4	2	**18**	**Low**	-	High
	without mitigation	4	1	4	3	**27**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation failure.							
	with mitigation	3	1	2	1	**6**	**Low**	-	High
	without mitigation	3	1	2	2	**12**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
	with mitigation	1	5	4	3	**30**	**Low**		Medium
	without mitigation	1	5	6	4	**48**	**Medium**		Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							Medium
Power Line - Corridor 4									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
AGRICULTURAL POTENTIAL									

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impact 1: Loss or redistribution of top soil	**Nature of impact:**	Construction activities will require that the top soil is stripped and stored, which may result in some top soil being lost or redistributed							
	with mitigation	1	4	2	2	**14**	**Low**	-	High
	without mitigation	1	5	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Medium							High
	degree of impact on irreplaceable resources:	High							High
GROUND WATER									
Impact 1: Possible deterioration in local groundwater quality	**Nature of impact:**	It is possible that construction of the power lines could lead to local deterioration in groundwater quality if pollutants of any sort are spilled or introduced into the holes needed for the pylons during construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium
	without mitigation	2	4	4	1	**10**	**Low**	-	medium
	degree to which impact can be reversed:	Once pollutants are introduced into the ground, reversing the impact would be fairly difficult - necessitating re-excavation, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							
	degree of impact on irreplaceable resources:	The groundwater resource along the power line route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	The construction of power lines - witch cross through Wetland 1 and 2 and runs alongside Wetlands 4 and 6 creating the possibility of water contamination by hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase. The biggest concern is the potential contamination of Wetland 6 which has a PES of "A".							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	3	3	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (e.g. Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise							High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	The significance of the impacts can be kept low if mitigation measures are strictly enforced. The probability of further water quality deterioration at Wetlands 1 and 2 are lower due to the already altered state of these wetlands. A point of concern however is the close proximity of the power line to Wetland 6.							Medium
Impact 2: Vegetation removal	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces increasing the potential velocity of surface run-off thereby increasing the erosion potential.							
	with mitigation	2	2	2	2	**10**	**Low**	-	Medium
	without mitigation	3	3	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is carried out directly following construction activities the severity of the impacts can be considerably reduced to a low significance							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	2	1	2	2	**10**	**Low**	-	Medium
	without mitigation	3	3	4	4	**40**	**Medium**	-	Medium
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity (refer to EMPr). Due to the power line crossing several wetland systems, the mismanagement surface run-off can lead to increased sedimentation within these systems.							High
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if appropriate mitigation measures are enforced and if the extent of the impact is limited to the site and its immediate surroundings.							Medium
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact due to loss or degradation of natural habitat							
	with mitigation	1	4	4	4	**36**	**Medium**	-	high
	without mitigation	2	5	4	5	**55**	**Medium**	-	high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Direct impacts on common fauna , interactions with structures and personnel	**Nature of impact:**	Adverse Impact due to faunal interactions with structures, operations, personnel, activities							
	with mitigation	1	2	4	3	**21**	**Low**	-	high
	without mitigation	2	3	6	3	**33**	**Medium**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
AVIFAUNA									
Impact 1: Disturbance of avifauna	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests may be disturbed.							
	with mitigation	1	1	4	3	**18**	**Low**	-	Medium
	without mitigation	2	1	6	4	**36**	**Medium**	-	Medium
	degree to which impact can be reversed:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							
Impact 2: Habitat destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	with mitigation	1	2	4	4	**28**	**Low**	-	Medium
	without mitigation	1	2	6	5	**45**	**Medium**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
	degree to which impact can be reversed:	Partially reversible						
	degree of impact on irreplaceable resources:	Low						
HERITAGE								
Due to the fact that there are no heritage sites or resources along the proposed alternative (corridor 4), no heritage impacts are foreseen.								
VISUAL								
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the power line	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation failure.						
	with mitigation	4	1	4	2	**18**	**Low**	-	High
	without mitigation	4	1	4	3	**27**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable						
	degree of impact on irreplaceable resources:	None						
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation failure.						
	with mitigation	3	1	2	1	**6**	**Low**	-	High
	without mitigation	3	1	2	2	**12**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable						
	degree of impact on irreplaceable resources:	None						
SOCIAL								

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impact 1: Disruption of land use and loss of economic potential	**Nature of impact:**	Continued disruption of the existing land uses							
	with mitigation	1	5	4	3	**30**	**Low**	-	Medium
	without mitigation	1	5	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							Medium
Power Line - No-Go Alternative									
GEOLOGY									
In the event that the powerlines are not relocated, there will be no impact on the underlying geology, therefore the status quo will remain.									
AGRICULTURAL POTENTIAL									
In the event that the powerlines are not relocated, there will be no impact on the existing agricultural potential of the land in question, therefore the status quo will remain.									
GROUND WATER									
If the power line route is not changed, there is likely to be no change to existing groundwater conditions, and no potential impact.									
SURFACE WATER									
If the power line route is not changed, there is likely to be no change to existing surface water conditions, and no potential impact.									
BIODIVERSITY									
In the case of no changes to the existing powerline route, no additional impacts are anticipated and the status quo will remain									
AVIFAUNA									
If the power line route is not changed, there is likely to be no change to existing conditions, and no potential impact on the avifauna is anticipated									
HERITAGE									
In the event that the power line is not moved, the status quo shall remain.									
VISUAL									
In the event that the power line is not moved, the status quo shall remain.									
SOCIAL									

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
In the event that the power line is not moved, the status quo shall remain.								

Table 9.3: Detailed assessment of identified impact for the Construction Phase – Water supply Pipelines

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Pipeline Route 1									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
AGRICULTURAL POTENTIAL									
Impact 1: Loss or redistribution of top soil	**Nature of impact:**	Construction activities will require that the top soil is stripped and stored, which may result in some top soil being lost or redistributed							
	with mitigation	1	4	2	2	**14**	**Low**	-	High
	without mitigation	1	5	6	4	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Medium							High
	degree of impact on irreplaceable resources:	High							High
GROUND WATER									
Impact 1: Possible deterioration in local groundwater	**Nature of impact:**	It is possible that construction of the pipeline could lead to local deterioration in groundwater quality if pollutants of any sort are introduced into the trench needed for the pipeline (i.e. the trench is used to bury waste of some kind), or if fuels or solvents are spilled during pipeline construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium
	without	2	4	4	1	**10**	**Low**	-	medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
quality	**mitigation**								
	degree to which impact can be reversed:	Once pollutants are put into trench, reversing the impact would be fairly difficult - necessitating re-excavation of the trench, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							
	degree of impact on irreplaceable resources:	The groundwater resource along the pipeline route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	Hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase may have an impact on the receiving aquatic environments. Especially with regards to Wetland 6, which has an "A" PES category and to a less extent Wetland 4 (PES = C).							
	with mitigation	1	1	2	1	**4**	**Low**	-	High
	without mitigation	2	2	4	3	**24**	**Low**	-	Medium
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (e.g. Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise.							High
	degree of impact on irreplaceable resources:	The degree of the impact will be directly related to the extent of the spill etc. With appropriate mitigation measures in place the probability of this impact can be reduced drastically.							Medium
Impact 2: Vegetation removal	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces increasing the potential velocity of surface run-off thereby increasing the erosion potential.							
	with mitigation	1	2	2	1	**5**	**Low**	-	Medium
	without mitigation	3	3	6	3	**36**	**Medium**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is initiated directly following construction activities the severity of the impacts can be considerably reduced to a low significance.							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	without mitigation	3	3	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity							Medium
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if they are mitigated quickly and if the extent of the impacts is limited to the pipeline servitude.							Medium
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact due to the loss or degradation of natural habitat							
	with mitigation	1	3	2	3	**18**	**Low**	-	high
	without mitigation	2	4	2	4	**32**	**Medium**	-	high
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Direct impacts on common fauna , interactions with structures and personnel	**Nature of impact:**	Adverse Impact due to faunal interactions with structures, personnel, activities							
	with mitigation	1	2	2	3	**15**	**Low**	-	high
	without mitigation	2	3	4	4	**36**	**Medium**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
Impact 3: Loss, or disruption of ecological connectivity	**Nature of impact:**	Adverse Impact due to disruption of ecological connectivity							
	with mitigation	1	3	2	3	**18**	**Low**	-	high
	without	2	4	2	4	**32**	**Medium**	-	high

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	mitigation								
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
Impact 4: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impact resulting from the loss/ degradation of surrounding natural habitat							
	with mitigation	1	3	2	3	**18**	**Low**	-	high
	without mitigation	2	5	2	5	**45**	**Medium**	-	high
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
AVIFAUNA									
Impact 1: Disturbance of avifauna	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests may be disturbed.							
	with mitigation	2	1	2	3	**15**	**Low**	-	Medium
	without mitigation	2	1	4	4	**28**	**Low**	-	Medium
	degree to which impact can be reversed:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							
Impact 2: Habitat destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	with mitigation	1	3	2	5	**30**	**Low**	-	Medium
	without mitigation	1	3	2	5	**30**	**Low**	-	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
	degree to which impact can be reversed:	Partially reversible						
	degree of impact on irreplaceable resources:	Low						
HERITAGE								
Due to the fact that there are no heritage sites or resources along the proposed alternative, no heritage impacts are foreseen.								
VISUAL								
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the pipeline	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation failure.						
	with mitigation	4	1	4	2	**18**	**Low**	-	High
	without mitigation	4	1	4	3	**27**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable						-
	degree of impact on irreplaceable resources:	None						-
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, heavy vehicles, dust & rehabilitation failure.						
	with mitigation	3	1	2	1	**6**	**Low**	-	High
	without mitigation	3	1	2	2	**12**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable						-
	degree of impact on irreplaceable resources:	None						-
SOCIAL								
Impact 1:	**Nature of**	Continued disruption of the existing land uses						

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Disruption of land use and loss of economic potential	**impact:**								
	with mitigation	1	5	4	3	**30**	**Low**	-	Medium
	without mitigation	1	5	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							Medium

Pipeline - No-Go Alternative
GEOLOGY
In the event that the pipeline is not relocated, there will be no impact on the underlying geology, therefore the status quo will remain.
AGRICULTURAL POTENTIAL
In the event that the pipeline is not relocated, there will be no impact on the existing agricultural potential of the land in question, therefore the status quo will remain.
GROUND WATER
If the pipeline route is not changed, there is likely to be no change to existing groundwater conditions, and no potential impact.
SURFACE WATER
If the pipeline route is not changed, there is likely to be no change to existing surface water conditions, and no potential impact.
BIODIVERSITY
In the event that the pipeline is not relocated, there will be no additional impact on the biodiversity, therefore the status quo will remain.
AVIFAUNA
If the pipeline route is not changed, there is likely to be no change to existing conditions, and no potential impact on the avifauna is anticipated
HERITAGE
In the event that the pipeline is not moved, the status quo shall remain.
VISUAL
In the event that the pipeline is not moved, the status quo shall remain.
SOCIAL

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
In the event that the pipeline is not moved, the status quo shall remain.								

Table 9.4: Detailed assessment of identified impacts for the Operational Phase – Wet ash disposal facility

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Wet ash disposal facility – Site E									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
AGRICULTURAL POTENTIAL									
Impact 1: Soil Pollution	**Nature of impact:**	The transport and handling of contaminants during operation could be a risk. The primary source of contamination includes fuels, ash sludge and oils.							
	with mitigation	1	1	2	4	**8**	**Low**	-	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	High							High
	degree of impact on irreplaceable resources:	Medium							High
GROUND WATER									
Impact 1: Deterioration of groundwater quality due to ash leachate	**Nature of impact:**	Rainwater percolating through ash together with slurry or supernatant water will migrate downwards towards the water table. The HDPE liner should prevent this leachate from reaching the water table but some penetration might occur. (likely to raise the pH and raise the TDS value, amongst other impacts). This impact will increase with time, as more leachate migrates downwards.							
	with mitigation	1	1	2	4	**8**	**Low**	-	high

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	without mitigation	2	3	6	4	**44**	**Medium**	-	high
	degree to which impact can be reversed:	It will be difficult to reverse this impact during wet ash disposal facility operation. It is more feasible to reduce the amount of leachate as much as possible by ensuring that the under-drain and related systems work as designed. When deposition ceases, natural attenuation over many years is likely to slowly reverse the impact.							high
	degree of impact on irreplaceable resources:	Since the impact is likely to be on local groundwater only, and this resource can be replaced, the degree of impact is likely to be low							medium
Impact 2: Rise in local water table due to additional recharge caused by slurry deposition	**Nature of impact:**	The local water table is likely to rise beneath the wet ash disposal facility, and in the near vicinity, due to the water percolating downwards from the ash slurry. The exact volume of this water (and hence the rate and magnitude of water table rise) will depend on factors including the efficiency of the underdrain system the liner, the volumes of slurry pumped, rainfall in the area, the aquifer properties underlying the site, etc.							
	with mitigation	2	4	2	3	**24**	**Low**	-	medium
	without mitigation	2	4	2	4	**32**	**Medium**	-	medium
	degree to which impact can be reversed:	The main mitigation mechanism will be the HDPE liner system and the under-drain and penstock system. This system might not be able to completely remove the impact however. Once deposition stops, it is likely that the local water table will begin to decline again back towards natural levels.							medium
	degree of impact on irreplaceable resources:	This impact is thought to be low.							medium
Impact 3: Change in local groundwater flow directions due to rise in local water table	**Nature of impact:**	It is possible that the groundwater flow directions will be altered locally due to the rise or "mounding" of the local water table. This may affect some local springs and seeps (both in terms of volume and quality). However, since the proposed wet ash disposal facility site is already situated near to a local water divide, this impact is deemed to be relatively minor.							
	with mitigation	2	4	2	3	**24**	**Low**	-	medium
	without mitigation	2	4	2	3	**24**	**Low**	-	medium
	degree to which impact can be reversed:	This impact is only practically reversible once deposition ceases and water table conditions return to their pre-deposition state.							medium
	degree of impact on irreplaceable resources:	This impact is thought to be low.							medium
SURFACE WATER									

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impact 1: Loss of water resources downstream	**Nature of impact:**	The wet ash disposal facility may result in lowered base flows which may cause the water level in the downstream dam to lower considerably due to the loss of the catchment area to the ash dam. A large percentage of the upstream dam's catchment will be sterilised due to the significant proportion of the immediate catchment that will be affected by the placement of the proposed ash facility.							
	with mitigation	3	4	4	3	**33**	**Medium**	-	Medium
	without mitigation	3	5	6	5	**70**	**High**	-	Medium
	degree to which impact can be reversed:	It will be almost impossible to reverse the impact as the run-off that is accumulated at alternative E will be lost once construction activities commence.							Medium
	degree of impact on irreplaceable resources:	The degree of the impact is believed to be medium as a large proportion of the dam's catchment area will be lost during the construction of the wet ash disposal facility. However, is should be noted that the dam will still receive run-off from its catchment to the east and west.							Medium
Impact 2: Deterioration of water quality	**Nature of impact:**	If the leachate from the wet ash disposal facility is not adequately managed (via the drainage system) it could have a severe impact on the water quality of the receiving aquatic environment.							
	with mitigation	2	2	4	2	**16**	**Low**	-	High
	without mitigation	4	4	6	4	**56**	**Medium**	-	High
	degree to which impact can be reversed:	It would be extremely difficult to reverse the impacts of leachate contamination. Therefore it is vital that the design of the wet ash disposal facility drainage system in able to deal with the amount off leachate throughout the lifespan of the wet ash disposal facility and that a suitable liner in used during the construction of the wet ash disposal facility.							Medium
	degree of impact on irreplaceable resources:	Implementation of adequate mitigation measures and regular maintenance of the drainage network and the ash water return system will keep the significance of potential impact low.							High
Impact 3: Storm water run-off within the wet ash disposal facility.	**Nature of impact:**	If storm water run-off is not adequately managed it could results in the transport of harmful/toxic substances into the surrounding environment							
	with mitigation	1	4	4	2	**18**	**Low**	-	Medium
	without mitigation	4	4	6	4	**56**	**Medium**	-	Medium
	degree to which impact can be reversed:	The degree of the impacts can be reversed if adequate storm water management system is kept in place throughout the operational phase of the wet ash disposal facility.							Medium
	degree of impact on irreplaceable	The significance of impacts can be kept relatively low if adequate storm water management system is put into place. Storm water run-off will become more of an issue over time as the length of the							Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	resources:	slope increases after years of slurry deposition.							
Impact 4: Changes in natural surface water flow patterns	**Nature of impact:**	Natural run-off patterns will be altered as storm water run-off will be diverted around the wet ash disposal facility and the loss of the catchment area to the wet ash disposal facility.							
	with mitigation	2	4	4	3	**30**	**Low**	-	Medium
	without mitigation	3	5	8	4	**64**	**High**	-	High
	degree to which impact can be reversed:	This impact cannot be reversed once the wet ash disposal facility is constructed, however the impacts can be mitigated to reduce the significance of the impacts.							Medium
	degree of impact on irreplaceable resources:	The impact can be minimised by implementation of appropriate mitigation measures and through the design of a storm water management system. It is important to note that the catchment is already in an impacted state due to the construction of several dams.							Medium
BIODIVERSITY									
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Nature of impact:**	Adverse Impact resulting from faunal interactions with structures, activities, personnel							
	with mitigation	1	5	2	2	**16**	**Low**	-	High
	without mitigation	1	5	6	3	**36**	**Medium**	-	High
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impacts resulting from the loss/ degradation of surrounding habitat							
	with mitigation	1	4	2	2	**14**	**Low**	-	high
	without mitigation	2	5	4	4	**44**	**Medium**	-	high
	degree to which impact can be reversed:	High							high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	Moderate							high
AVIFAUNA									
Impact 1: Contamination of surrounding water	**Nature of impact:**	Leachate containing heavy metals from the ADF (if not properly contained) could result in contamination of water sources, used by water birds.							
	with mitigation	2	4	4	2	**20**	**Low**	-	Low
	without mitigation	2	4	6	3	**36**	**Medium**	-	Low
	degree to which impact can be reversed:	Reversible							
	degree of impact on irreplaceable resources:	Low							
VISUAL									
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Nature of impact:**	Visual impact due to the wet ash disposal facility and on-site ancillary infrastructure (conveyors, access roads, fencing, lighting structures)							
	with mitigation	4	4	8	3	**48**	**Medium**	-	High
	without mitigation	4	4	8	3	**48**	**Medium**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact on sensitive visual receptors (i.e.	**Nature of impact:**	Visual impact due to the wet ash disposal facility and on-site ancillary infrastructure (conveyors, access roads, fencing, lighting structures)							
	with mitigation	3	4	6	2	**26**	**Low**	-	High
	without mitigation	3	4	6	2	**26**	**Low**	-	High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
users of roads and residents of homesteads and settlements) within the region	**degree to which impact can be reversed:**	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 3: Potential visual impact on commuters traveling by rail within the region	**Nature of impact:**	Visual impact due to the wet ash disposal facility and on-site ancillary infrastructure (conveyors, access roads, fencing, lighting structures)							
	with mitigation	3	4	4	1	**11**	**Low**	-	High
	without mitigation	3	4	4	1	**11**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 4: Potential visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed wet ash disposal facility	**Nature of impact:**	Visual impact at night due to direct glare from security lighting							
	with mitigation	4	4	4	2	**24**	**Low**	-	High
	without mitigation	4	4	4	3	**36**	**Medium**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 5: Potential visual impact of lighting at night on sensitive visual receptors within the region	**Nature of impact:**	Visual impact at night due to sky glow							
	with mitigation	3	4	2	1	**9**	**Low**	-	High
	without mitigation	3	4	2	2	**18**	**Low**	-	High
	degree to which impact can be	Recoverable							-

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	reversed:								
	degree of impact on irreplaceable resources:	None							-
Impact 6: Potential visual impact of the proposed wet ash disposal facility on visual character of the landscape and sense of place of the region	**Nature of impact:**	Visual impact due to the wet ash disposal facility and on-site ancillary infrastructure (conveyors, access roads, fencing, lighting structures)							
	with mitigation	3	4	2	2	**18**	**Low**	-	High
	without mitigation	3	4	2	2	**18**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 7: Potential visual impact of the proposed wet ash disposal facility on tourist access routes within the region	**Nature of impact:**	Visual impact due to the wet ash disposal facility and on-site ancillary infrastructure (conveyors, access roads, fencing, lighting structures)							
	with mitigation	3	4	2	2	**18**	**Low**	-	High
	without mitigation	3	4	2	2	**18**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
SOCIAL									
Impact 1: Continued generation of electricity for the national grid	**Nature of impact:**	A positive impact through the continued provision of electricity to the region and the national grid							
	with mitigation	4	5	6	5	**75**	**High**	+	Medium
	without mitigation	4	5	6	5	**75**	**High**	+	Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	Not Applicable							Medium
	degree of impact on irreplaceable resources:	High – through the continued supply of electricity more use will be made of non-renewable resources such as coal.							Medium
Impact 2: Health Risk from elevated PM 10 Concentrations	**Nature of impact:**	The new Wet ash disposal facility will potentially result in increased PM10 concentrations in the local area							
	with mitigation	1	4	4	3	**27**	**Low**	-	Medium
	without mitigation	2	4	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate with the implementation of the relevant mitigation measures							Medium
	degree of impact on irreplaceable resources:	Not applicable							Medium
Impact 3: Nuisance from elevated dustfall rates	**Nature of impact:**	The new Wet ash disposal facility will potentially result in increased dust fall rates in the local area							
	with mitigation	1	4	4	3	**27**	**Low**	-	Medium
	without mitigation	2	4	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate with the implementation of the relevant mitigation measures							Medium
	degree of impact on irreplaceable resources:	Not applicable							Medium
Wet ash disposal facility - No-Go Alternative									
GROUND WATER									
Impact 1: No change to groundwater conditions at the	**Nature of impact:**	If the wet ash disposal facility is not built, then it is likely that there will be no change to the groundwater conditions underlying the proposed site, both in terms of quality and groundwater quality.							
	with mitigation	2	4	4	4	**40**	**Medium**	+	medium
	without	2	4	4	4	**40**	**Medium**	+	medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
site	**mitigation**							
	degree to which impact can be reversed:	This positive impact (i.e. not building the wet ash disposal facility) could be reversed if some future activity affected the groundwater underlying the proposed site.						medium
	degree of impact on irreplaceable resources:	The groundwater resource at the proposed site is not considered to be irreplaceable, in the sense that alternative sources of water can be found if needed.						medium
SURFACE WATER								
If the Wet ash disposal facility is not constructed or operated, there will be no change to existing surface water conditions, and hence no potential impacts.								
BIODIVERSITY								
If the wet ash disposal facility is not constructed or operated, there is likely to be no change to existing conditions, and therefore no additional impacts on biodiversity are anticipated								
AVIFAUNA								
If the wet ash disposal facility is not constructed or operated, there is likely to be no change to existing conditions, and therefore no potential impact on the avifauna is anticipated								
VISUAL								
If the wet ash disposal facility is not constructed or operated, there is likely to be no change to existing conditions, and therefore no potential visual impacts are anticipated								
SOCIAL								
If the wet ash disposal facility is not constructed or operated, there is likely to be no change to existing conditions, and therefore no potential visual impacts are anticipated								

Table 9.5: Detailed assessment of identified impacts for the Operational Phase – PowerLines

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Power Line Corridor 3									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
GROUND WATER									
No impacts on the local Ground water are anticipated									
SURFACE WATER									
There are no perceived impacts on surface water during the operation of the relocated power lines									
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact resulting from the loss or degradation of natural habitat							
	with mitigation	1	2	2	2	**10**	**Low**	-	Moderate
	without mitigation	2	3	4	3	**27**	**Low**	-	Moderate
	degree to which impact can be reversed:	High							Moderate
	degree of impact on irreplaceable resources:	Low							Moderate
Impact 2: Loss/ Degradation of	**Nature of impact:**	Adverse Impact resulting from the degradation of surrounding habitat (maintenance operations)							

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
surrounding habitat, species	**with mitigation**	1	2	2	2	**10**	**Low**	-	Moderate
	without mitigation	2	3	4	3	**27**	**Low**	-	Moderate
	degree to which impact can be reversed:	High							Moderate
	degree of impact on irreplaceable resources:	Low							Moderate
AVIFAUNA									
Impact 1: Electrocution	**Nature of impact:**	Bird perches on pylon and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components, resulting in death or severe injury.							
	with mitigation	1	4	2	1	**7**	**Low**	-	High
	without mitigation	2	4	4	2	**20**	**Low**	-	High
	degree to which impact can be reversed:	Low							
	degree of impact on irreplaceable resources:	medium							
Impact 2: Collisions	**Nature of impact:**	Collision of birds with the overhead line (usually the earth wire).							
	with mitigation	2	4	2	3	**24**	**Low**	-	High
	without mitigation	2	4	4	5	**50**	**Medium**	-	High
	degree to which impact can be reversed:	Low							
	degree of impact on irreplaceable resources:	medium							
Impact 3: Disturbance	**Nature of impact:**	Routine maintenance of pylons and power lines could result in disturbance of certain bird species							
	with mitigation	1	2	4	2	**14**	**Low**		medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	without mitigation	2	2	4	3	**24**	**Low**		medium
	degree to which impact can be reversed:	High							
	degree of impact on irreplaceable resources:	Low							
VISUAL									
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**Nature of impact:**	Visual impact due to the power line, access road and servitude							
	with mitigation	4	5	6	2	**30**	**Low**	-	High
	without mitigation	4	5	6	2	**30**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to the power line, access road and servitude							
	with mitigation	3	5	4	1	**12**	**Low**	-	High
	without mitigation	3	5	4	1	**12**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
SOCIAL									
Impact 1: Health risk to	**Nature of impact:**	The health risk to residents from EMF will remain the same, as there are already existing powerlines.							

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
residents from EMF	**with mitigation**	1	5	2	2	**16**	**Low**	-	Medium
	without mitigation	1	5	4	3	**30**	**Low**	-	Medium
	degree to which impact can be reversed:	High – ensure that residences are the required distance away from the servitude							Medium
	degree of impact on irreplaceable resources:	Not applicable							Medium
PowerLine - Corridor 4									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during handling, use and storage can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	-	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
GROUND WATER									
No impacts on the local ground water are anticipated									
SURFACE WATER									
There are no perceived impacts on surface water during the operation of the relocated power lines									
BIODIVERSITY									
Impact 1: Loss or degradation of natural/ pristine habitat	**Nature of impact:**	Adverse Impact resulting from the loss of natural habitat (maintenance operations)							
	with mitigation	1	2	4	3	**21**	**Low**	-	Moderate
	without mitigation	2	3	6	3	**33**	**Medium**	-	Moderate

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	High							Moderate
	degree of impact on irreplaceable resources:	Low							Moderate
Impact 2: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impacts resulting from degradation of surrounding habitat during maintenance operations							
	with mitigation	1	3	4	3	**24**	**Low**	-	Moderate
	without mitigation	2	4	6	3	**36**	**Medium**	-	Moderate
	degree to which impact can be reversed:	High							Moderate
	degree of impact on irreplaceable resources:	Low							Moderate
AVIFAUNA									
Impact 1: Electrocution	**Nature of impact:**	Bird perches on pylon and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components, resulting in death or severe injury.							
	with mitigation	1	4	2	1	**7**	**Low**	-	High
	without mitigation	2	4	4	2	**20**	**Low**	-	High
	degree to which impact can be reversed:	Low							
	degree of impact on irreplaceable resources:	medium							
Impact 2: Collisions	**Nature of impact:**	Collision of birds with the overhead line (usually the earth wire).							
	with mitigation	1	4	2	4	**28**	**Low**	-	High
	without mitigation	2	4	4	5	**50**	**Medium**	-	High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree to which impact can be reversed:	Low							
	degree of impact on irreplaceable resources:	medium							
Impact 3: Disturbance	**Nature of impact:**	Routine maintenance of pylons and power lines could result in disturbance of certain bird species							
	with mitigation	1	2	4	2	**14**	**Low**		medium
	without mitigation	2	2	4	3	**24**	**Low**		medium
	degree to which impact can be reversed:	High							
	degree of impact on irreplaceable resources:	Low							
VISUAL									
Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**Nature of impact:**	Visual impact due to the powerline, access road and servitude							
	with	4	5	6	2	**30**	**Low**	-	High
	without	4	5	6	2	**30**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							
	degree of impact on irreplaceable resources:	None							
Potential visual impact on sensitive visual receptors (i.e.	**Nature of impact:**	Visual impact due to the powerline, access road and servitude							
	with	3	5	4	1	**12**	**Low**	-	High
	without	3	5	4	1	**12**	**Low**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
users of roads and residents of homesteads and settlements) within the region	**degree to which impact can be reversed:**	Recoverable							
	degree of impact on irreplaceable resources:	None							
SOCIAL									
Impact 1: Disruption of land use and loss of economic potential	**Nature of impact:**	Continued disruption of the existing land uses							
	with mitigation	1	5	4	3	**30**	**Low**	-	Medium
	without mitigation	1	5	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							Medium
Impact 2: Health risk to residents from EMF	**Nature of impact:**	Health risk to residents from EMF will remain the same, as there are already powerline							
	with mitigation	1	5	2	2	**16**	**Low**	-	Medium
	without mitigation	1	5	4	3	**30**	**Low**	-	Medium
	degree to which impact can be reversed:	High – ensure that residences are the required distance away from the servitude							Medium
	degree of impact on irreplaceable resources:	Not applicable							Medium
PowerLine - No-Go Alternative									
GROUND WATER									
No adverse impacts on the local groundwater conditions are anticipated									

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
SURFACE WATER								
There are no perceived impacts on surface water during the operation of the relocated power lines								
BIODIVERSITY								
If the power line is not moved, there is likely to be no change to existing conditions, and therefore no additional impacts on biodiversity are anticipated								
AVIFAUNA								
If the power line route is not changed, there is likely to be no change to existing conditions, and no potential impact on the avifauna is anticipated								
VISUAL								
In the event that the power line is not moved, the status quo shall remain.								
SOCIAL								
In the event that the power line is not moved, the status quo shall remain.								

Table 9.6: Detailed assessment of identified impacts for the Operational Phase – Pipeline

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Pipeline Route (preferred)									
GEOLOGY									
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Nature of impact:**	Spillages and leaks from fuels, oil and other potentially hazardous substances during maintenance operations can be kept to a minimum by applying a good housekeeping approach and observing and implementing the relevant mitigation measures.							
	with mitigation	1	1	2	2	**8**	**Low**	Neutral	High
	without mitigation	3	4	6	3	**39**	**Medium**	Negative	High
	degree to which impact can be reversed:	Low							Medium
	degree of impact on irreplaceable resources:	Low							High
GROUND WATER									
Due to the fact that the pipeline is a water pipeline, no impacts on the local Ground water are anticipated									
SURFACE WATER									
There are no perceived impacts on surface water during the operation of the relocated pipeline									
BIODIVERSITY									
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Nature of impact:**	Adverse Impacts resulting from faunal interactions with structures, personnel, activities							
	with mitigation	2	2	2	2	**12**	**Low**	-	High
	without mitigation	3	4	4	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	High							High
	degree of impact on irreplaceable resources:	Moderate							High
Impact 2: Loss or disruption of	**Nature of impact:**	Adverse Impact due to the loss/ disruption of ecological connectivity							

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
ecological connectivity	**with mitigation**	2	1	2	2	**10**	**Low**	-	High
	without mitigation	3	4	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	High							High
	degree of impact on irreplaceable resources:	Moderate							High
Impact 3: Loss/ Degradation of surrounding habitat,species	**Nature of impact:**	Adverse Impacts resulting from degradation of surrounding natural habitat							
	with mitigation	2	1	2	2	**10**	**Low**	-	High
	without mitigation	3	3	4	4	**40**	**Medium**	-	High
	degree to which impact can be reversed:	High							High
	degree of impact on irreplaceable resources:	Moderate							High
SOCIAL									
Impact 1: Disruption of land use and loss of economic potential	**Nature of impact:**	Continued disruption of the existing land uses							
	with mitigation	1	5	4	3	**30**	**Low**		Medium
	without mitigation	1	5	6	4	**48**	**Medium**		Medium
	degree to which impact can be reversed:	Moderate							Medium
	degree of impact on irreplaceable resources:	Not Applicable							Medium
Pipeline - No-Go Alternative									
GROUND WATER									

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
If the pipeline route is not changed, there is likely to be no change to existing groundwater conditions, and no potential impact.								
SURFACE WATER								
If the pipeline route is not changed, there is likely to be no change to existing surface water conditions, and no potential impact.								
BIODIVERSITY								
If the pipeline route is not changed, there is likely to be no additional impacts on the biodiversity component								

Table 9.7: Detailed assessment of identified impacts for the De-Commissioning Phase – Wet ash disposal facility

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Wet ash disposal facility – Site E									
GROUND WATER									
Impact 1: deterioration of groundwater quality due to leachate	**Nature of impact:**	Leachate from the wet ash disposal facility is likely to continue to percolate downwards even when slurry disposal has ceased, albeit at a much lower rate. The liner will mitigate this impact considerably.							
	with mitigation	2	3	2	3	**21**	**Low**	-	high
	without mitigation	2	4	4	3	**30**	**Low**	-	high
	degree to which impact can be reversed:	This impact can be significantly mitigated against, but cannot be entirely reversed. If the drainage system is kept functional, groundwater monitoring continues and the wet ash disposal facility is vegetated then downward drainage of leachate into the groundwater will be minimised.							high
	degree of impact on irreplaceable resources:	The impact on local groundwater is thought to be low, and the local groundwater resource could be replaced by other water resources if necessary.							medium
Impact 2: Minor changes to local water table and local groundwater flow direction	**Nature of impact:**	Once decommissioned, the water table under the wet ash disposal facility should begin to decline again, since the volume of water migrating downwards will be lower. However, there is likely to be a small residual effect on water table, since the infiltration and recharge characteristics of the overlying rehabilitated wet ash disposal facility will not be the same as those of the original landcover. This may lead to a slight rise in water table and potential local changes in groundwater flow direction. These effects are likely to be minor, and limited to the local area.							
	with mitigation	2	4	0	3	**18**	**Low**	-	medium
	without mitigation	2	4	2	3	**24**	**Low**	-	medium
	degree to which impact can be reversed:	The impact can be lessened by vegetating the wet ash disposal facility and preventing erosion etc, which will reduce movement of water /leachate downwards once ash deposition has ceased. The full impact would be difficult to reverse however, since this would most likely involve removing the rehabilitated wet ash disposal facility.							high
	degree of impact on irreplaceable resources:	Very minor impact anticipated							medium
SURFACE WATER									
Impact 1: Deterioration of	**Nature of impact:**	If the leachate from the wet ash disposal facility is not adequately managed (via the drainage system) it could have a severe impact on the water quality of the receiving aquatic environment.							

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
water quality	**with mitigation**	2	2	4	2	**16**	**Low**	-	High
	without mitigation	3	3	8	4	**56**	**Medium**	-	High
	degree to which impact can be reversed:	The degree of the impact can not entirely be reversed, however through regular maintenance of the mitigation measures still in place, especially the liner and the drainage network system, negative impacts on the surrounding environment can be avoided.							Medium
	degree of impact on irreplaceable resources:	Keeping and maintaining mitigation measures and regular maintenance of the drainage network etc. will keep the significance of potential impact low.							High
Impact 2: Storm water run-off	**Nature of impact:**	If storm water run-off is not adequate manage it could results in the transport of harmful/toxic substances into the surrounding environment.							
	with mitigation	1	4	4	2	**18**	**Low**	-	Medium
	without mitigation	4	4	4	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	The degree of the impacts can be reversed if adequate storm water management system is kept in place throughout the operational phase of the wet ash disposal facility.							Medium
	degree of impact on irreplaceable resources:	The significance of impacts can be kept relatively low if adequate storm water management system are kept in place beyond the operational phase and if vegetation is well established. Vegetation will provide stability and reduce the velocity of storm water run-off.							Medium
BIODIVERSITY									
Impact 1: Direct impacts on common fauna, interactions with structures and personnel	**Nature of impact:**	Adverse Impacts resulting from faunal interactions with activities, personnel, structures							
	with mitigation	1	2	2	2	**10**	**Low**	-	high
	without mitigation	1	3	4	3	**24**	**Low**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
Impact 2: Loss/ Degradation of surrounding	**Nature of impact:**	Adverse Impacts resulting from degradation of surrounding habitat							
	with mitigation	2	2	2	2	**12**	**Low**	-	high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
habitat, species	**without mitigation**	2	2	2	2	**12**	**Low**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
VISUAL									
Impact 1: Potential visual impact of site works on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, dust & rehabilitation failure.							
	with mitigation	4	1	6	2	**22**	**Low**	-	High
	without mitigation	4	1	6	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact of site works on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to vegetation clearing, earthworks, dust & rehabilitation failure.							
	with mitigation	3	1	4	1	**8**	**Low**	-	High
	without mitigation	3	1	4	2	**16**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 3:	**Nature of**	Visual impact due to the rehabilitated wet ash disposal facility and removal of superfluous ancillary infrastructure.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Potential visual impact of the rehabilitated wet ash disposal facility on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**impact:**								
	with mitigation	4	5	4	3	**39**	**Medium**	+	High
	without mitigation	4	5	4	3	**39**	**Medium**	+	High
	degree to which impact can be reversed:	N/A							-
	degree of impact on irreplaceable resources:	None							-
Impact 4: Potential visual impact of the rehabilitated wet ash disposal facility on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Visual impact due to the rehabilitated wet ash disposal facility and removal of superfluous ancillary infrastructure.							
	with mitigation	3	5	2	3	**30**	**Low**	+	High
	without mitigation	3	5	2	3	**30**	**Low**	+	High
	degree to which impact can be reversed:	N/A							-
	degree of impact on irreplaceable resources:	None							-

Table 9.8: Detailed assessment of identified impacts for the De-Commissioning Phase – Power Lines

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
PowerLine – Corridor 3									
BIODIVERSITY									
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Nature of impact:**	Adverse Impact resulting from faunal interactions with personnel, activities e.g. the presence of large vehicles and personnel on site. This impact is however temporary and of low significance							
	with mitigation	1	2	2	2	**10**	**Low**	-	high
	without mitigation	2	3	2	3	**21**	**Low**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impact resulting from degradation of surrounding habitat (contamination, fires, etc)							
	with mitigation	1	2	2	2	**10**	**Low**	-	high
	without mitigation	2	3	2	3	**21**	**Low**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Power Line – Corridor 4									
BIODIVERSITY									
Impact 1: Direct impacts on common fauna & interactions with structures	**Nature of impact:**	Adverse Impact resulting from faunal interactions with personnel, activities e.g. the presence of large vehicles and personnel on site. This impact is however temporary and of low significance							
	with mitigation	1	2	4	2	**14**	**Low**	-	high
	without	2	3	4	3	**27**	**Low**	-	high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
& personnel	**mitigation**								
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Loss/ Degradation of surrounding habitat,species	**Nature of impact:**	Adverse Impact resulting from degradation of surrounding habitat (contamination, fires, etc)							
	with mitigation	1	2	4	2	**14**	**Low**	-	high
	without mitigation	2	3	6	3	**33**	**Medium**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high

Table 9.9: Detailed assessment of identified impacts for the De-Commissioning Phase – Pipeline

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Pipeline Route									
BIODIVERSITY									
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Nature of impact:**	Adverse Impact resulting from faunal interactions with personnel, activities e.g. the presence of large vehicles and personnel on site. This impact is however temporary and of low significance							
	with mitigation	1	3	2	2	**12**	**Low**	-	high
	without mitigation	2	4	2	3	**24**	**Low**	-	high
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Loss or disruption of ecological connectivity	**Nature of impact:**	Adverse Impact resulting from temporary disruption of ecological connectivity							
	with mitigation	1	2	2	2	**10**	**Low**	-	high
	without mitigation	2	3	4	3	**27**	**Low**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
Impact 3: Loss/ Degradation of surrounding habitat, species	**Nature of impact:**	Adverse Impact resulting from degradation of surrounding habitat (contamination, fires, etc)							
	with mitigation	1	3	2	2	**12**	**Low**	-	high
	without mitigation	2	4	2	4	**32**	**Medium**	-	high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
	degree to which impact can be reversed:	Moderate						high
	degree of impact on irreplaceable resources:	Low						high

Table 9.10: Detailed assessment of identified cumulative impacts – Wet ash disposal facility

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Wet ash disposal facility – Site E									
GROUND WATER									
Impact 1: Deterioration of groundwater quality due to ash leachate	**Nature of impact:**	The wet ash disposal facility is likely to lead to deterioration of local groundwater quality, which will be most severe during wet ash disposal facility operation but which will likely persist in some form long after the wet ash disposal facility has been decommissioned. This is because leachate will continue to be generated from the ash by natural rainfall percolation, even after ash slurry deposition has ended. This impact will be mitigated by the installation of the HDPE liner.							
	with mitigation	2	4	2	4	**28**	**Low**	-	medium
	without mitigation	2	4	4	4	**40**	**Medium**	-	medium
	degree to which impact can be reversed:	The impact can be lessened but not reversed completely by maintaining good practices during wet ash disposal facility construction and operation, and by re-vegetating and maintaining the wet ash disposal facility after closure.							medium
	degree of impact on irreplaceable resources:	The degree of impact on irreplaceable resources is thought to be low, since local groundwater resources are limited and are theoretically replaceable with alternatives.							medium
Impact 2: Rise in local water table and minor changes to local groundwater flow directions	**Nature of impact:**	There is a possabilityof a residual rise in the water table underlying the wet ash disposal facility, even long after wet ash disposal facility decommissioning. This rise will in turn lead to slightly altered groundwater flow directions in the immediate vicinity of the site. These impacts are considered to be relatively minor. The system will slowly move back towards its natural state after decommissioning, but the full extent of rehabilitation will need to be determined, and will depend on long-term seepage rates, geochemistry of the ash residue, etc. The liner system will mitigate this impact further.							
	with mitigation	1	4	2	4	**28**	**Low**	-	medium
	without mitigation	2	4	2	4	**32**	**Medium**	-	medium
	degree to which impact can be reversed:	Unlikely that this impact can be reversed completely, but mitigation can be carried out (e.g. by vegetating and maintaining the wet ash disposal facility)							medium
	degree of impact on irreplaceable resources:	Minor							medium
SURFACE WATER									
Impact 1: Loss of wetland function	**Nature of impact:**	The loss of associated wetland functions which include: Nutrient removal (particularly Nitrates); trapping of pollutants including sediment; and to a small extent flood attenuation and stream flow augmentation as the dam located to the north of alternative E with still provide these functions.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with mitigation	3	3	6	4	**48**	**Medium**	-	Medium
	without mitigation	4	4	8	5	**80**	**High**	-	High
	degree to which impact can be reversed:	The degree of the impact will not be easily reversed due to the severely impacted nature of the surrounding catchments. Several large dam have been constructed and severe canalisation has occurred in associated wetlands due to the altered state of the catchment.							High
	degree of impact on irreplaceable resources:	The degree of impact on irreplaceable resources is thought to be medium.							Medium
Impact 2: Deterioration of water quality	**Nature of impact:**	Impacts associated with surrounding industrial and agricultural activates (input of nutrients and heavy metal) as well as the Hendrina Power Station and existing wet ash disposal facility							
	with mitigation	4	3	6	4	**52**	**Medium**	-	Medium
	without mitigation	5	4	8	5	**85**	**High**	-	High
	degree to which impact can be reversed:	It is not likely that the cumulative impacts can be easily reverse due to the altered nature of the water quality associated with the catchment. Water quality in the catchment is impacted by nutrient enrichment (agricultural activities and WWTW) and the input of salts from industrial activities.							Medium
	degree of impact on irreplaceable resources:	The degree of impact on irreplaceable resources is thought to be medium due to the already altered state of the aquatic ecosystems located within the catchment.							Medium
Impact 3: Erosion and sedimentation	**Nature of impact:**	The altered water quality (increased turbidity) and substrate composition of the receiving aquatic environment associated with the catchment has resulted in altered marginal habitats due to excessive reed growth and alien vegetation encroachment as a result of the sediment deposition.							
	with mitigation	2	2	4	3	**24**	**Low**	-	Medium
	without mitigation	3	4	8	4	**60**	**Medium**	-	Medium
	degree to which impact can be reversed:	Once sedimentation has occurred, reversion of the impact would be difficult, however if appropriate precautions are put into place it is likely that the risk can be almost completely avoided.							Medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	The contribution of the wet ash disposal facility to the cumulative impacts associated with the catchment can be minimal in adequate erosion control measures are put into place before construction activities commence, and throughout the lifespan of the wet ash disposal facility.							High
BIODIVERSITY									
Impact 1: Impacts on SA's conservation obligations & targets	**Nature of impact:**	Adverse Impacts resulting from loss of important ecological types							
	with mitigation	1	5	2	5	**40**	**Medium**	-	high
	without mitigation	2	5	6	5	**65**	**High**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
Impact 2: Increase in local and regional fragmentation/ isolation of habitat	**Nature of impact:**	Adverse Impact due to continued loss of ecological connectivity							
	with mitigation	1	5	2	5	**40**	**Medium**	-	high
	without mitigation	2	5	6	5	**65**	**High**	-	high
	degree to which impact can be reversed:	High							high
	degree of impact on irreplaceable resources:	Moderate							high
VISUAL									
Impact 1: Potential visual impact on sensitive visual receptors (i.e.	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of mining and industrial type infrastructure							
	with mitigation	4	5	6	3	**45**	**Medium**	-	High
	without mitigation	4	5	6	3	**45**	**Medium**	-	High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**degree to which impact can be reversed:**	Irrecoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of mining and industrial type infrastructure							
	with mitigation	3	5	4	2	**24**	**Low**	-	High
	without mitigation	3	5	4	2	**24**	**Low**	-	High
	degree to which impact can be reversed:	Irrecoverable							-
	degree of impact on irreplaceable resources:	None							-

Table 9.11: Detailed assessment of identified cumulative impacts – Power Lines

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Power Line – Corridor 3									
GROUND WATER									
Impact 1: Possible deterioration in local groundwater quality	**Nature of impact:**	It is possible that construction of the power lines could lead to local deterioration in groundwater quality if pollutants of any sort are spilled or introduced into the holes needed for the pylons during construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium
	without mitigation	2	4	4	1	**10**	**Low**	-	medium
	degree to which impact can be reversed:	Once pollutants are introduced into the ground, reversing the impact would be fairly difficult - necessitating re-excavation, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							medium
	degree of impact on irreplaceable resources:	The groundwater resource along the power line route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							medium
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	The construction of Power line - alternatives which cross through Wetland 1 and 2 and runs alongside Wetlands 4 creating the possibility water contamination by hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase							
	with mitigation	2	2	2	1	**6**	**Low**	-	Medium
	without mitigation	4	3	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise							High
	degree of impact on irreplaceable resources:	The significance of the impacts can be kept low if mitigation measures are strictly enforced. The probability of further water quality deterioration at Wetlands 1 and 2 are lower due to the already altered state of these wetlands. Alternative 1 will however not run over Wetland 6 which therefore makes Alternative 1 the preferred choice due to the relatively un-altered state of Wetland 6.							Medium
Impact 2: Vegetation	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces thereby increasing the erosion potential and the potential velocity of surface run-off.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
removal									
	with mitigation	2	2	2	1	**6**	**Low**	-	Medium
	without mitigation	4	3	4	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is carried out directly following construction activities the severity of the impacts can be considerably reduced to a low significance							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	4	3	4	4	**44**	**Medium**	-	Medium
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity (refer to section 6). Due to the power line crossing several wetland systems, the mismanagement of surface run-off can lead to increased sedimentation within these systems.							High
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if appropriate mitigation measures are enforced and if the extent of the impact is limited to the site and its immediate surroundings.							Medium
BIODIVERSITY									
Impact 1: Impacts on SA's conservation obligations & targets	**Nature of impact:**	Adverse Impacts resulting from loss of sensitive ecological vegetation types							
	with mitigation	1	4	2	3	**21**	**Low**	-	high
	without mitigation	2	5	2	4	**36**	**Medium**	-	high
	degree to which impact can be reversed:	None							high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	Low							high
VISUAL									
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of electrical type infrastructure. These are existing power lines that will be rerouted through the new preferred corridor.							
	with mitigation	4	5	4	2	**26**	**Low**	-	High
	without mitigation	4	5	4	2	**26**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of electrical type infrastructure. These are existing power lines that will be rerouted through the new preferred corridor.							
	with mitigation	3	5	2	1	**10**	**Low**	-	High
	without mitigation	3	5	2	1	**10**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Power Line – Corridor 4									
GROUND WATER									
Impact 1: Possible deterioration in local	**Nature of impact:**	It is possible that construction of the power lines could lead to local deterioration in groundwater quality if pollutants of any sort are spilled or introduced into the holes needed for the pylons during construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
groundwater quality	**without mitigation**	2	4	4	1	**10**	**Low**	-	medium
	degree to which impact can be reversed:	Once pollutants are introduced into the ground, reversing the impact would be fairly difficult - necessitating re-excavation, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							medium
	degree of impact on irreplaceable resources:	The groundwater resource along the power line route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							medium
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	The construction of power line - alternatives which cross through Wetland 1 and 2 and runs alongside Wetlands 4 and 6 creating the possibility water contamination by hydrocarbons (oil and diesel ect.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase. The biggest concern is the potential contamination of Wetland 6 which has a PES of "A".							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	4	3	6	4	**52**	**Medium**	-	High
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise.							High
	degree of impact on irreplaceable resources:	The significance of the impacts can be kept low if mitigation measures are strictly enforced. The probability of further water quality deterioration at Wetlands 1 and 2 are lower due to the already altered state of these wetlands. A point of concern however is the close proximity of the power line to Wetland 6.							Medium
Impact 2: Vegetation removal	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces increasing the potential velocity of surface run-off thereby increasing the erosion potential.							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	4	3	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is carried out directly following construction activities the severity of the impacts can be considerably reduced to a low significance							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation.							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	4	3	6	4	**52**	**Medium**	-	Medium
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity. Due to the power line crossing several wetland systems, the mismanagement surface run-off can lead to increased sedimentation within these systems.							High
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if appropriate mitigation measures are enforced and if the extent of the impacts is limited to the site and its immediate surroundings.							Medium
BIODIVERSITY									
Impact 1: Impacts on SA's conservation obligations & targets	**Nature of impact:**	Adverse Impacts resulting from loss of sensitive ecological vegetation types							
	with mitigation	1	4	4	3	**27**	**Low**	-	high
	without mitigation	2	5	6	4	**52**	**Medium**	-	high
	degree to which impact can be reversed:	None							high
	degree of impact on irreplaceable resources:	Low							high
VISUAL									
Impact 1: Potential visual impact on sensitive visual	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of electrical type infrastructure. These are existing power lines that will be rerouted through the new preferred corridor.							
	with mitigation	4	5	4	2	**26**	**Low**	-	High

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**without mitigation**	4	5	4	2	**26**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Nature of impact:**	Cumulative visual impact resulting from the accumulation of electrical type infrastructure. These are existing power lines that will be rerouted through the new preferred corridor.							
	with mitigation	3	5	2	1	**10**	**Low**	-	High
	without mitigation	3	5	2	1	**10**	**Low**	-	High
	degree to which impact can be reversed:	Recoverable							-
	degree of impact on irreplaceable resources:	None							-

Table 9.12: Detailed assessment of identified cumulative impacts – Pipeline

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Pipeline Corridor									
GROUND WATER									
Impact 1: Possible deterioration in local groundwater quality	**Nature of impact:**	It is possible that construction of the pipeline could lead to local deterioration in groundwater quality if pollutants of any sort are introduced into the trench needed for the pipeline (i.e. the trench is used to bury waste of some kind), or if fuels or solvents are spilled - especially during pipeline construction.							
	with mitigation	2	2	2	1	**6**	**Low**	-	medium
	without mitigation	2	4	4	1	**10**	**Low**	-	medium
	degree to which impact can be reversed:	Once pollutants are put into the trench - e.g. during construction - reversing the impact would be fairly difficult - necessitating re-excavation of the trench, etc. If appropriate precautions are taken however, it is likely that the risk can be almost completely avoided.							medium
	degree of impact on irreplaceable resources:	The groundwater resource along the pipeline route is not considered to be irreplaceable, in the sense that alternative sources of water could be found if needed.							medium
SURFACE WATER									
Impact 1: Deterioration of water quality	**Nature of impact:**	Hydrocarbons (oil and diesel etc.), solvents and other pollutants spilling/leaking from construction machinery and equipment during the construction phase may have an impact on the receiving aquatic environments. Especially with regards to Wetland 6, which has an "A" PES category and to a less extent Wetland 4 (PES = C).							
	with mitigation	1	1	2	1	**4**	**Low**	-	High
	without mitigation	2	2	4	3	**24**	**Low**	-	Medium
	degree to which impact can be reversed:	Reversing the impacts will be relatively difficult however if appropriate measures are carried out (Bioremediation etc.) immediately following a spill the degree and extent of the impacts can be significantly reduced. These measures are however a very costly exercise							High
	degree of impact on irreplaceable resources:	The degree of the impact will be directly related to the extent of the spill etc. With appropriate mitigation measures in place (refer to section 6) the probability of this impact can be reduced drastically.							Medium
Impact 2: Vegetation removal	**Nature of impact:**	The removal of vegetation will result in an increase in smooth surfaces increasing the potential velocity of surface run-off thereby increasing the erosion potential							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with mitigation	1	2	2	1	**5**	**Low**	-	Medium
	without mitigation	3	3	6	3	**36**	**Medium**	-	High
	degree to which impact can be reversed:	The impact can only be fully reversed once the vegetation is entirely re-established.							High
	degree of impact on irreplaceable resources:	If vegetation clearing is kept to a minimum and replanting of vegetation is carried out directly following construction activities the severity of the impacts can be considerably reduced to a Low significance							High
Impact 3: Increased surface run-off	**Nature of impact:**	Increased run-off may contribute to the spread of pollutants, exacerbate erosion potential and lead to sedimentation							
	with mitigation	2	2	2	2	**12**	**Low**	-	Medium
	without mitigation	3	3	6	4	**48**	**Medium**	-	Medium
	degree to which impact can be reversed:	The probability of impacts resulting from surface run-off can be avoided by implementing appropriate and adequate mitigation measures in order to manage run-off and to reduce its velocity							Medium
	degree of impact on irreplaceable resources:	The degree of the impacts will be relatively low if they are mitigated quickly and if the extents of the impacts are limited to the pipeline servitude.							Medium
BIODIVERSITY									
Impact 1: Impacts on SA's conservation obligations & targets	**Nature of impact:**	Adverse Impacts resulting from loss of sensitive ecological vegetation types							
	with mitigation	1	5	2	3	**24**	**Low**	-	high
	without mitigation	2	5	2	4	**36**	**Medium**	-	high
	degree to which impact can be reversed:	Moderate							high

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	degree of impact on irreplaceable resources:	Low							high
Impact 2: Increase in local and regional fragmentation/ isolation of habitat	**Nature of impact:**	Adverse Impacts resulting from continued fragmentation of remaining natural habitat							
	with mitigation	1	5	2	3	**24**	**Low**	-	high
	without mitigation	2	5	2	4	**36**	**Medium**	-	high
	degree to which impact can be reversed:	Moderate							high
	degree of impact on irreplaceable resources:	Low							high

The above impact analysis is summarised in **Table 9.13 – 9.24**.

Table 9.13: Summary of identified impacts for the Construction Phase – Wet ash disposal facility

Potential Impact	Significance			
	Wet ash disposal facility – Site E		Wet ash disposal facility – No-GO	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
GEOLOGY				
Impact 1: Construction-related earthworks	**Medium**	**Low**	**N/A**	
Impact 2: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**		
AGRICULTURAL POTENTIAL				
Impact 1: Loss of agricultural land	**High**	**High**	**N/A**	
Impact 2: Loss or redistribution of top soil	**Medium**	**Low**		
GROUNDWATER				
Impact 1: Deterioration of groundwater quality due to leachate from initial ash slurry	**Medium**	**Low**	**N/A**	
Impact 2: Deterioration of groundwater quality due to spillages during construction	**Low**	**Low**		
Impact 3: Rise in water table during initial slurry deposition	**Low**	**Low**		
NO-GO - Impact 1: No change to groundwater conditions at the site	**N/A**		**Low+**	**Low+**
SURFACE WATER				
Impact 1: Loss of wetland function	**High**	**Low**	**N/A**	
Impact 2: Deterioration of water quality	**Medium**	**Low**		
Impact 3: Increased surface run-off within the wet ash disposal facility	**Medium**	**Low**		
Impact 4: Erosion and Sedimentation	**Medium**	**Low**		
Impact 5: Altered hydrology	**High**	**Low**		
Impact 6: Loss of water resources downstream	**High**	**Medium**		
NO-GO - Impact 1: No change to groundwater conditions at the site	**N/A**		**Medium**	**Medium**
BIODIVERSITY				
Impact 1: Loss or degradation of natural/ pristine habitat	**Medium**	**Medium**	**N/A**	
Impact 2: Direct impacts on common fauna & interactions with structures & personnel	**Medium**	**low**		
Impact 3: Loss or disruption of ecological connectivity	**Medium**	**Medium**		
Impact 4: Loss/ Degradation of surrounding habitat, species	**Medium**	**low**		
AVIFAUNA				
Impact 1: Disturbance	**Low**	**Low**	**N/A**	
Impact 2: Habitat destruction	**Medium**	**Medium**		
HERITAGE				
Impact 1: Destruction of heritage sites and features	**High**	**Medium**	**N/A**	
VISUAL				
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Medium**	**Low**	**N/A**	
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Low**	**Low**		
SOCIAL				

Impact 1: Economic Development through employment	**Low**	**Low**	**Medium**	**Low**
Impact 2: Inflow of temporary workers	**Low**	**Low**	**N/A**	
Impact 3: Health Risk from elevated PM 10 Concentrations	**Medium**	**Low**		
Impact 4: Nuisance from elevated dustfall rates	**Medium**	**Low**		
NO-GO - Impact 2: Continued supply of electricity from Hendrina power station	**N/A**		**High**	**N/A**

Table 9.14: Summary of identified impacts for the Construction Phase – Power Lines

Potential Impact	Significance			
	Power Corridor 3		Power Corridor 4	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
GEOLOGY				
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**	**Medium**	**Low**
AGRICULTURAL POTENTIAL				
Impact 1: Loss or redistribution of top soil	**Medium**	**Low**	**Medium**	**Low**
GROUNDWATER				
Impact 1: Possible deterioration in local groundwater quality	**low**	**low**	**Low**	**Low**
SURFACE WATER				
Impact 1: Deterioration of water quality	**Medium**	**Low**	**Medium**	**Low**
Impact 2: Vegetation removal	**Low**	**Low**	**Medium**	**Low**
Impact 3: Increased surface run-off	**Medium**	**Low**	**Medium**	**Low**
BIODIVERSITY				
Impact 1: Loss or degradation of natural/ pristine habitat	**Medium**	**Low**	**Medium**	**Medium**
Impact 2: Direct impacts on common fauna & interactions with structures & personnel	**Low**	**low**	**Medium**	**Low**
AVIFAUNA				
Impact 1: Disturbance	**Medium**	**Low**	**Medium**	**Low**
Impact 2: Habitat destruction	**Medium**	**Low**	**Medium**	**Low**
VISUAL				
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the power line	**low**	**low**	**low**	**Low**
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**low**	**low**	**low**	**low**
SOCIAL				
Impact 1: Disruption of land use and loss of economic potential	**Medium**	**Low**	**Medium**	**Low**

Table 9.15: Summary of identified impact for the Construction Phase – Pipelines

Potential Impact	Significance	
	Corridor (preferred)	
	Without Mitigation	With Mitigation
GEOLOGY		
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**
AGRICULTURAL POTENTIAL		
Impact 1: Loss or redistribution of top soil	**Medium**	**Low**
GROUNDWATER		
Impact 1: Possible deterioration in local groundwater quality	**low**	**low**
SURFACE WATER		
Impact 1: Deterioration of water quality	**Low**	**Low**

Impact 2: Vegetation removal	**Medium**	**low**
Impact 3: Increased surface run-off	**Medium**	**Low**
BIODIVERSITY		
Impact 1: Loss or degradation of natural/ pristine habitat	**Medium**	**Low**
Impact 2: Direct impacts on common fauna & interactions with structures & personnel	**Medium**	**low**
Impact 3: Loss, or disruption of ecological connectivity	**Medium**	**Low**
Impact 4: Loss/ Degradation of surrounding habitat, species	**Medium**	**Low**
AVIFAUNA		
Impact 1: Disturbance	**low**	**Low**
Impact 2: Habitat destruction	**low**	**low**
VISUAL		
Impact 1: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the power line	**low**	**low**
Impact 2: Potential visual impact of construction on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**low**	**low**
SOCIAL		
Impact 1: Disruption of land use and loss of economic potential	**Medium**	**Low**

Table 9.16: Summary of identified impacts for the Operational Phase – Wet ash disposal facility

Potential Impact	Significance			
	Wet ash disposal facility – Site E		Wet ash disposal facility – No-GO	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
GEOLOGY				
Impact 2: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**	**N/A**	
AGRICULTURAL POTENTIAL				
Impact 1: Soil Pollution	**Medium**	**Low**	**N/A**	
GROUNDWATER				
Impact 1: Deterioration of groundwater quality due to ash leachate	**Medium**	**Low**	**N/A**	
Impact 2: Rise in local water table due to additional recharge caused by slurry deposition	**Medium**	**Low**		
Impact 3: Change in local groundwater flow directions due to rise in local water table	**Low**	**Low**		
NO-GO - Impact 1: No change to groundwater conditions at the site	**N/A**		**Medium^{+}**	**Medium^{+}**
SURFACE WATER				
Impact 1: Loss of water resources downstream	**High**	**Medium**	**N/A**	
Impact 2: Deterioration of water quality	**Medium**	**Low**		
Impact 3: Storm water run-off within the wet ash disposal facility facility.	**Medium**	**Low**		
Impact 4: Changes in natural surface water flow patterns	**High**	**Low**		
BIODIVERSITY				
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Medium**	**low**	**N/A**	
Impact 2: Loss/ Degradation of surrounding habitat, species	**Medium**	**low**		
AVIFAUNA				
Impact 1: Contamination of surrounding water	**Medium**	**Low**	**N/A**	
VISUAL				
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close	**Medium**	**Medium**	**N/A**	

proximity to the proposed wet ash disposal facility			
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Low**	**Low**	
Impact 3: Potential visual impact on commuters traveling by rail in close proximity to the proposed wet ash disposal facility	**Low**	**Low**	
Impact 4: Potential visual impact of lighting at night on sensitive visual receptors in close proximity to the proposed wet ash disposal facility	**Medium**	**Low**	
Impact 5: Potential visual impact of lighting at night on sensitive visual receptors within the region	**Low**	**Low**	
Impact 6: Potential visual impact of the proposed wet ash disposal facility on visual character of the landscape and sense of place of the region	**Low**	**Low**	
Impact 7: Potential visual impact of the proposed wet ash disposal facility on tourist access routes within the region	**Low**	**Low**	
SOCIAL			
Impact 1: Continued generation of electricity for the national grid	**High (+)**	**High (+)**	**N/A**
Impact 2: Health Risk from elevated PM 10 Concentrations	**Medium**	**Low**	
Impact 3: Nuisance from elevated dustfall rates	**Medium**	**Low**	

Table 9.17: Summary of identified impacts for the Operational Phase – Power Lines

Potential Impact	Significance			
	Power Corridor 3		Power Corridor 4	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
GEOLOGY				
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**	**Medium**	**Low**
AGRICULTURAL POTENTIAL				
Impact 1: Loss or redistribution of top soil	**Medium**	**Low**	**Medium**	**Low**
BIODIVERSITY				
Impact 1: Loss or degradation of natural/ pristine habitat	**Low**	**Low**	**Medium**	**Low**
Impact 2: Loss/ Degradation of surrounding habitat, species	**Low**	**Low**	**Medium**	**Low**
AVIFAUNA				
Impact 1: Electrocutions	**low**	**Low**	**Low**	**Low**
Impact 2: Collisions	**Medium**	**Low**	**Medium**	**Low**
Impact 2: Disturbance	**low**	**low**	**Low**	**Low**
VISUAL				
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**low**	**low**	**Low**	**Low**
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**low**	**low**	**Low**	**low**
SOCIAL				
Impact 1: Disruption of land use and loss of economic potential	**Medium**	**Low**	**Medium**	**Low**
Impact 2: Increase in health risk to residents from EMF	**Low**	**Low**	**Low**	**Low**

Table 9.18: Summary of identified impacts for the Operational Phase – Pipeline

Potential Impact	Significance
	Corridor 1

	Without Mitigation	With Mitigation
GEOLOGY		
Impact 1: Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	**Medium**	**Low**
BIODIVERSITY		
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Medium**	**low**
Impact 2: Loss, or disruption of ecological connectivity	**Medium**	**Low**
Impact 3: Loss/ Degradation of surrounding habitat, species	**Medium**	**Low**
AVIFAUNA		
Impact 1: Disturbance	**low**	**Low**
Impact 2: Habitat destruction	**low**	**low**
SOCIAL		
Impact 1: Disruption of land use and loss of economic potential	**Medium**	**Low**

Table 9.19: Summary of identified impacts for the De-Commissioning Phase – Wet ash disposal facility

Potential Impact	Significance	
	Wet ash disposal facility – Site E	
	Without Mitigation	With Mitigation
GROUNDWATER		
Impact 1: deterioration of groundwater quality due to leachate	**Low**	**Low**
Impact 2: Minor changes to local water table and local groundwater flow direction	**Low**	**Low**
SURFACE WATER		
Impact 1: Deterioration of water quality	**Medium**	**Low**
Impact 2: Storm water run-off	**Medium**	**Low**
BIODIVERSITY		
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**low**	**low**
Impact 2: Loss/ Degradation of surrounding habitat, species	**low**	**low**
VISUAL		
Impact 1: Potential visual impact of site works on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Medium**	**Low**
Impact 2: Potential visual impact of site works on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Low**	**Low**
Impact 3: Potential visual impact of the rehabilitated wet ash disposal facility on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Medium**	**Medium**
Impact 4: Potential visual impact of the rehabilitated wet ash disposal facility on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Low**	**Low**

Table 9.20: Summary of identified impacts for the De-Commissioning Phase – Power Lines

Potential Impact	Significance			
	Power Corridor 3		Power Corridor 4	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
BIODIVERSITY				
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Low**	**Low**	**Low**	**Low**
Impact 2: Loss/ Degradation of surrounding habitat, species	**Low**	**Low**	**Medium**	**Low**

Table 9.21: Summary of identified impacts for the De-Commissioning Phase – Pipeline

Potential Impact	Significance	
	Power Corridor 1	
	Without Mitigation	With Mitigation
BIODIVERSITY		
Impact 1: Direct impacts on common fauna & interactions with structures & personnel	**Low**	**low**
Impact 2: Loss, or disruption of ecological connectivity	**Low**	**Low**
Impact 3: Loss/ Degradation of surrounding habitat, species	**Medium**	**Low**

Table 9.22: Summary of identified cumulative impacts – Wet ash disposal facility

Potential Impact	Significance	
	Wet ash disposal facility – Site E	
	Without Mitigation	With Mitigation
GROUNDWATER		
Impact 1: Deterioration of groundwater quality due to ash leachate	**Medium**	**Low**
Impact 2: Rise in local water table and minor changes to local groundwater flow directions	**Medium**	**Low**
SURFACE WATER		
Impact 1: Loss of wetland function	**High**	**Medium**
Impact 2: Deterioration of water quality	**High**	**Medium**
Impact 3: Erosion and sedimentation	**Medium**	**Low**
BIODIVERSITY		
Impact 1: Impacts on SA's conservation obligations & targets	**High**	**Medium**
Impact 2: Increase in local and regional fragmentation/ isolation of habitat	**High**	**Medium**
VISUAL		
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed wet ash disposal facility	**Medium**	**Medium**
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**Low**	**Low**

Table 9.23: Summary of identified cumulative impacts – Power Lines

Potential Impact	Significance			
	Power Corridor 3		Power Corridor 4	
	Without Mitigation	With Mitigation	Without Mitigation	With Mitigation
GROUNDWATER				
Impact 1: Possible deterioration in local groundwater quality	**low**	**low**	**Low**	**Low**
SURFACE WATER				
Impact 1: Deterioration of water quality	**Medium**	**Low**	**Medium**	**Low**
Impact 2: Vegetation removal	**Medium**	**Low**	**Medium**	**Low**
Impact 3: Increased surface run-off	**Medium**	**Low**	**Medium**	**Low**
BIODIVERSITY				
Impact 1: Impacts on SA's conservation obligations & targets	**Medium**	**Low**	**Medium**	**Low**
VISUAL				
Impact 1: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) in close proximity to the proposed power line	**low**	**low**	**low**	**Low**
Impact 2: Potential visual impact on sensitive visual receptors (i.e. users of roads and residents of homesteads and settlements) within the region	**low**	**low**	**low**	**low**

Table 9.24: Summary of identified cumulative impacts – Pipeline

Potential Impact	Significance	
	Corridor 1	
	Without Mitigation	With Mitigation
GEOLOGY		
Impact 1: Possible deterioration in local groundwater quality	**Low**	**Low**
SURFACE WATER		
Impact 1: Deterioration of water quality	**Low**	**Low**
Impact 2: Vegetation removal	**Medium**	**Low**
Impact 3: Increased surface run-off	**Medium**	**Low**
BIODIVERSITY		
Impact 1: Impacts on SA's conservation obligations & targets	**Medium**	**low**
Impact 2: Increase in local and regional fragmentation/ isolation of habitat	**Medium**	**Low**

9.3 Impact Assessment Conclusions

9.3.1 Construction phase impacts

During the construction phase, the majority of impacts identified were considered to be of low significance in the event that the appropriate mitigation measures are implemented.

The following impacts were assessed to be of High significance without mitigation except for the loss of agricultural land that has been assessed with high significance with and without mitigation:

- Wet ash disposal facility
  - Agricultural land
    - Loss of agricultural land
  - Surface water
    - Loss of wetland function
    - Altered Hydrology
    - Loss of water resources down stream
  - Heritage
    - Destruction of Heritage sites and features

A total of five (5) impacts related to the construction of the wet ash disposal facility were assessed as having a high significance before the implementation of mitigation measures. After the implementation of mitigation measures the intensity levels of all impacts reduced significantly.

With regards to the construction of the powerlines and pipeline there where no impacts that were considered to be of a high significance, the majority where considered either medium or low before the implementation of mitigation measures. It is evident from the summary tables above that corridor 3 is the preferred corridor route for the power lines. This deduction has been made based on the results of all specialist studies. The preference seems to be unanimous.

9.3.2 Operational phase impacts

The majority of the impacts identified, associated with the operational phase were considered to be of low significance in the event that the appropriate mitigation measures are implemented.

The following impacts were assessed to be of high significance in the event that mitigation measures are not implemented as required:

- Wet ash disposal facility
    - Surface Water
        - Loss of water resources down stream
        - Changes in natural surface water flow patterns
    - Heritage
        - Destruction of heritage sites and features
    - Social
        - Should the expansion of the wet ash disposal facilities proposed project be granted authorisation. The Hendrina Power Station will remain operational and continue to generate electricity which also feeds into the national grid.

With regards to the Wet ash disposal facility a total of four (4) impacts were assessed as having a high significance before the implementation of mitigation measures. After the implementation of mitigation measures the intensity levels of all impacts dropped, except for the social impact in terms of continued electricity generation, which is considered to be a positive impact.

With regards to the operational phase for the powerlines and pipeline there where no impacts that were considered to be of a high significance, the majority where considered either medium or low before the implementation of mitigation measures.

It is evident from the summary tables above that corridor 3 is the preferred corridor route for the power lines. This deduction has been made based on the results of all specialist studies. The preference seems to be unanimous.

9.3.3 Decommissioning phase impacts

As with the construction and operational phases, the majority of impacts identified associated with the de-commissioning phase were considered to be of low significance in the event that the appropriate mitigation measures are implemented.

No impacts were assessed as having a high significance before the implementation of mitigation measures.

Socio-Economic impacts were not assessed for the de-commissioning phase. It is also anticipated that all environmental impacts will be revisited at power station closure in order to update the impact analysis to take all new information and plans into account.

9.3.4 Cumulative Impacts

The majority of cumulative impacts identified associated with the project were considered to be of low significance in the event that the appropriate mitigation measures are implemented.

The following impacts were assessed to be of High significance in the event that mitigation measures are not implemented as required:

- Wet ash disposal facility
    - Surface water
        - Loss of wetland function
        - Deterioration of water quality
    - Biodiversity
        - Impacts on SA's conservation obligations and targets
        - Increase in local and regional fragmentation / isolation of habitat

With regards to the wet ash disposal facility a total of four (4) cumulative impacts were assessed as having a high significance before the implementation of mitigation measures. After the implementation of mitigation measures the intensity levels of all impacts dropped.

As far as the power lines are concerned, it is evident from the summary tables above that corridor 3 is the preferred corridor route for the power lines. This deduction has been made based on the results of all specialist studies. The preference seems to be unanimous and through all phases of the project.

9.4 Final Specialist Conclusions

9.4.1 Air Quality

In conclusion, if unmitigated, the windblown dust from the wet ash disposal facility may result in significant PM10 ground level concentrations. As the background ambient PM10 ground level concentrations may also be elevated in the area (based on measured PM10 concentrations at Hendrina) it is recommended that the wet ash disposal facility be mitigated in order to minimise the impacts from this source on the surrounding environment.

Fugitive dust can easily be mitigated. It is recommended that the dust management measures as stipulated in the EMPr be applied to ensure the proposed activities have an insignificant impact on the surrounding environment and human health. It is also recommended that single dust fallout buckets be installed downwind of the tailings dam in order to monitor the impacts from this source.

9.4.2 Ground Water

The main impact on groundwater of the proposed ash disposal facility is likely to be a reduction in water quality beneath the site, and in the vicinity (most likely within a few hundred metres) of the site, if there are leakages from the facility. The numerical model results suggest that the movement of leachate away from the ash disposal facility should take place relatively slowly, with the surface water receiver being the drainage to the north west of the proposed ash disposal facility site. Less serious is the anticipated water table mounding beneath the site and the potential alteration of local groundwater flow directions. The construction of a low permeability liner system should greatly reduce the downward movement of leachate into the subsurface, if managed together with the under drain system. Another way to mitigate all of these impacts is to maintain the ash disposal facility in good condition (especially the drainage system) and to ensure that only ash slurry is disposed of i.e. no co-disposal in the facility. Once the ash disposal facility is decommissioned, it should be re-vegetated and the drainage system maintained to reduce downward movement of leachate. The impact of the construction of the water pipeline diversion or the electricity powerlines on groundwater is expected to be minimal, unless spills occur during construction or waste is disposed into the trenches or pits during the construction phase.

It is recommended that the ash disposal facility and leachate control system continue to be maintained after ash disposal has ceased. Monitoring and management of groundwater levels and quality in the vicinity of the ash dam, or as agreed with authorities, should be continued after ash dam closure, and if required the numerical model updated with the new data.

9.4.3 Surface Water

Ash management inherently carries environmental risk, particularly to surface and ground water systems. The extent of the proposed development in relation to the extent of other uses in the water management area adds to cumulative impacts on the Olifants system. The Olifants system is compromised and any additional strain on surface water ecology should be considered in this light. Thus, the remaining ecological integrity associated with the Woest-Alleenspruit is of particular importance on a catchment scale. However, the surface water study carried out in July 2011 indicated that wetlands associated with the study area are in a modified to largely modified state. In light of the PES, retained functionality, EIS and environmental least cost associated with Alternative E, it is the opinion of the specialist that the project can be executed without further impeding ecological integrity of wetlands located outside of the primary study area.

9.4.4 Biodiversity

It is evident that direct impacts associated with the various phases of the project are mostly restricted to the physical activities associated with construction, and to some extent, activities associates with the decommissioning phase (rehabilitation). Indirect as well as direct impacts are mostly restricted to the site and immediate surrounds.

The implementation of generic mitigation measures are expected to ameliorate impacts to an acceptable significance. In selected areas, mostly associated with wetland related habitat, will the success of mitigation measures be of a moderate nature.

9.4.5 Avifauna

From an avifaunal perspective, the overhead power-line poses the greatest threat to the majority of the red-listed focal species identified. Furthermore the following conclusions and recommendations are made:

- Habitat destruction and disturbance are impacts that are associated with all activities of the proposed project, however they are not expected to be highly significant, and should they be mitigated for as per this report and the use of the Construction EMPr.
- Collisions are expected to be the largest impact of this project and thorough line marking is required to mitigate for this, regardless of which line option (3 or 4) is chosen.
- Over-head power-line alternative 3, appears to pass through less sensitive areas, and is more preferred.
- An "avifaunal walk through" is recommended in order to identify the exact spans of line for marking to mitigate for bird collisions.
- Provided that the high risk sections of line are mitigated in the form of marking, the impact should be contained. The EWT, through its partnership with Eskom and ongoing international networking, is well aware of the room for improvement on the effectiveness of line marking devices. However, it is our view that currently available devices, although not 100 % effective, would provide an acceptable level of mitigation for this project.
- Provided that a bird-friendly monopole structure is used for all new pylon structures in the project, as discussed elsewhere in the report, the impact of electrocution should be contained.

9.4.6 Visual

The construction and operation of the proposed wet ash disposal facility and its associated infrastructure will have an impact on the visual environment especially within, 1km of the proposed site, but also within the greater region.

The wet ash disposal facility would be visible within an area that incorporates certain sensitive visual receptors. Such visual receptors include people travelling along roads, residents of homesteads and settlements and tourists visiting the region.

It is noteworthy that a high level of industrial, mining and electrical infrastructure is already present in close proximity to the proposed site. The Hendrina Power Station and the existing wet ash disposal facilities south east of the proposed site are of particular relevance in this regard, as they render the immediate visual environment already impacted upon. As a result, the visual prominence of the proposed wet ash disposal facility is expected to be absorbed somewhat.

9.4.7 Heritage

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area in which it is proposed to develop the wet ash disposal facility and the rerouting of existing infrastructure.

The cultural landscape qualities of the region essentially consist of one component. The first is a rural area in which the human occupation is made up of a pre-colonial element (Iron Age) as well as a much later colonial (farmer and industrial) component.

Two cemeteries were identified, one of which would be impacted on by the proposed ash disposal facility.

- Based on current information regarding sites in the surrounding area, all sites known to occur in the study region are judged to have Grade III significance and therefore would not prevent the proposed development for continuing after the implementation of the proposed mitigation measures and its acceptance by SAHRA.

Therefore, from a heritage point of view it is recommended that the proposed development can continue. However, a request that if archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made.

9.4.8 Powerline Alternatives

Alternative corridors were assessed for the relocation of the three power lines (and one possible future addition) that currently traverse the site. **Figure 9.1** provides a map of the alternatives that were identified and assessed. Through the assessment it is clear that on the whole the impacts associated with corridor 3 have a lower significance and is thus considered more preferred. It is recommended that Eskom consider this alternative as the preferred, however it is essential to take the health and safety risks related to working in close proximity to the power lines into account.

As of 7 February 2013, the project team was made aware of the existence of a new powerline alignment that is to traverse Alternative E (preferred EIA site). The project team is aware that an Environmental Authorisation has been granted and a servitude negotiated with the landowner, however, the project team still await the specific project details in terms of exact location of this powerline. The powerline (new) can be relocated together with the power lines (corridors) assessed above within the same new proposed alignments.

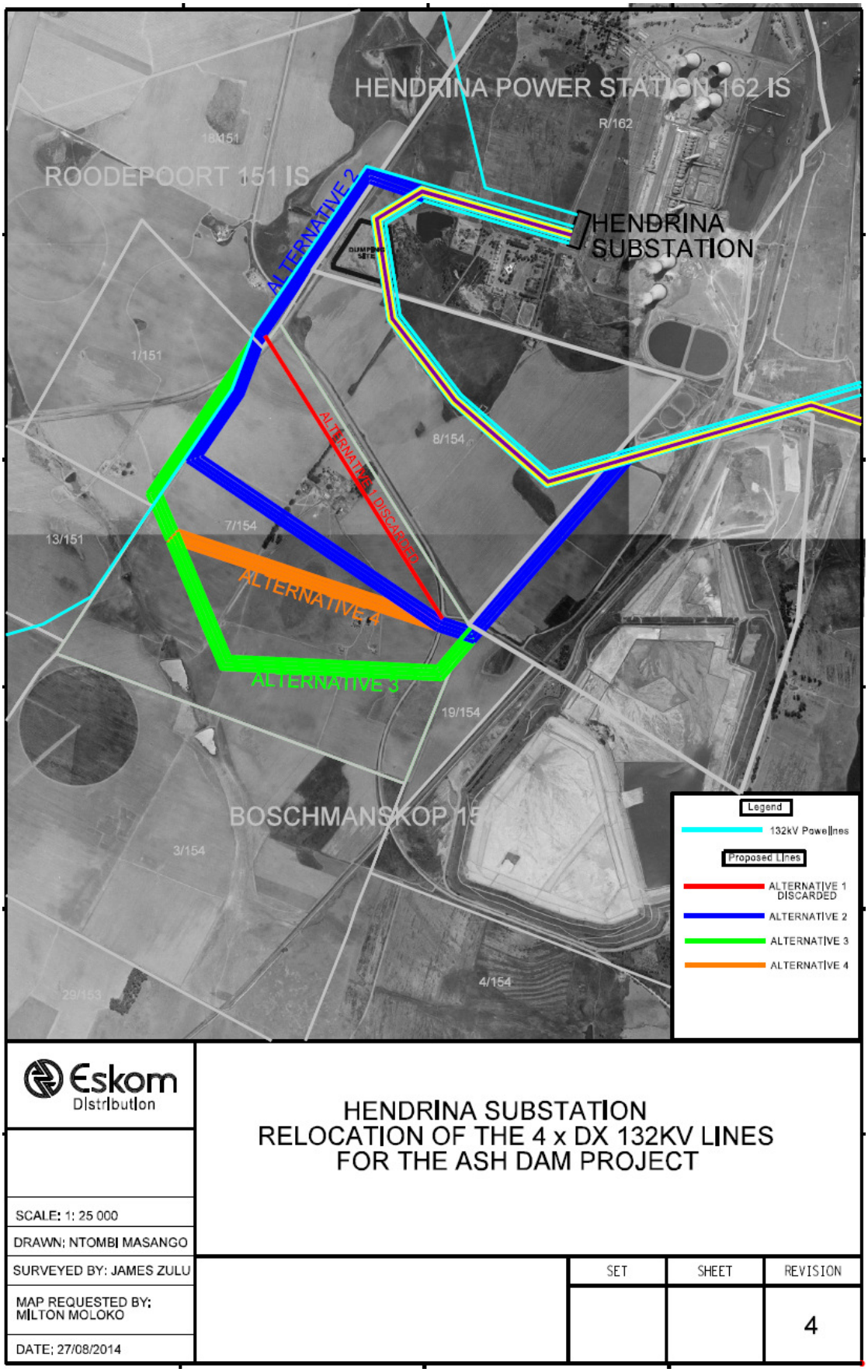

Figure 9.1: Map showing the corridor alternatives for the relocation of the power lines