9 IMPACT ASSESSMENT

9.1 Introduction

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 dry ash disposal facility at the Tutuka 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 9.8** 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**), operational phase (**Table 9.2**), decommissioning phase (**Tables 9.3**) and the cumulative impacts (**Table 9.4**). (**Tables 9.5 – 9.8**) is a summary of the results.

Table 9.1: Detailed assessment of identified impacts for the Construction Phase – Dry 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
GEOLOGY									
Ash disposal facility – All Sites									
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 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									
Ash Disposal Facility - Alternative A									
Potential	**Mitigation**	**Extent**	**Duration**	**Magnitude**	**Probability**	**Significance**		**Status**	**Confidence**

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impact		**(E)**	**(D)**	**(M)**	**(P)**	**(S=(E+D+M)*P)**		**(+ve or -ve)**	
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF							
	degree of impact on irreplaceable resources:	Absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							
GROUND WATER									
Ash Disposal Facility - All alternatives									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Deterioration of groundwater quality due to spillages during construction	**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.							
	Without Mitigations	2	2	6	2	**20**	**Low**	-	High
	With Mitigation	1	1	4	1	**6**	**Low**	-	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:	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.						High
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only, which is not irreplaceable.						Medium

SURFACE WATER

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on hydrology	**Nature of impact:**	Clearing of vegetation result in decrease surface roughness and change in runoff characteristics							
	without	2	2	2	5	**30**	**Low**	-	3
	with	2	2	2	3	**18**	**Low**	-	3
	degree to which impact can be reversed:	Impact is not readily reversed							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low							3
Impacts on surface water quality	**Nature of impact:**	During the construction phase of the project, water quality deterioration will result as a consequence of increased sediment loads within the downslope wetlands, as well as through pollutants derived from spillage, leakage and incorrect disposal of hazardous substances on site. Incorrect waste management and disposal is also likely to contribute further to water quality deterioration.							
	without	3	2	2	4	**28**	**Low**	-	3
	with	2	2	2	3	**18**	**Low**	-	3
	degree to which impact can be reversed:	This impact is difficult to reverse at it has far reaching implications. Even once water constituents return back to background levels, subsequent biological responses might take much longer to recover.							3
	degree of impact on irreplaceable resources:	Low							3
Impacts related to erosion and sedimentation	**Nature of impact:**	Disturbance of vegetation and soil during the construction process will significantly increase the risk of erosion. The compaction of soil surfaces will increase the volumes and velocities of surface run-off, further increasing erosion risk. Use of heavy machinery on site is also likely to result in the formation of well-worn tracks and ruts that act as preferential flow paths to surface run-off. Concentrated surface run-off will lead to erosion, with gully formation likely. Removal of vegetation and the disturbance of the soil profile will expose the soils to erosion by wind (dust) and water (from surface run-off). Eroded soil is likely to enter downstream wetland areas, increasing sedimentation within these wetlands and leading to changes in vegetation composition and aquatic fauna. Erosion is likely to be highest during the summer months when high intensity storm events are likely to result in significant surface runoff. While the vertic clay soils are fairly resistant to erosion in the undisturbed state, once disturbed they will pose a significant erosion risk.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	without	2	2	2	4	**24**	**Low**	-	3
	with	1	1	2	3	**12**	**Low**	-	3
	degree to which impact can be reversed:	Loss in direct wetland integrity and functioning due to erosion cannot be reversed easily. Loss due to downslope sedimentation might be easier to reinstate or might recover spontaneously provided sediment sources are stopped.							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on wetland vegetation and disturbance of wetland habitat	**Nature of impact:**	Destruction of the wetlands will result in the loss or displacement of biodiversity associated with the affected reach of the wetlands, while indirect negative impacts will also accrue to the downstream reaches of the affected wetlands through altered flow volumes and quality. In addition to the loss of wetland habitat, wetland habitat located immediately adjacent to the development footprints are likely to be substantially disturbed during the construction process through increased and uncontrolled movement of heavy machinery and people on site.							
	without	4	3	2	5	**45**	**Medium**	-	
	with	4	3	2	5	**45**	**Medium**	-	
	degree to which impact can be reversed:	Wetland loss will be permanent.							
	degree of impact on irreplaceable resources:	Low.							
Impact related to increase alien/pioneer	**Nature of impact:**	Disturbances to the wetlands on site will provide opportunity for invasion by alien and weedy species. Species such as Bidens formosa (Cosmos) are already prevalent on site and likely to increase, to the detriment of indigenous species.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
vegetation in disturbed areas	**without**	2	2	2	4	**24**	**Low**	-	3
	with	1	2	2	3	**15**	**Low**	-	3
	degree to which impact can be reversed:	Can be reversed							
	degree of impact on irreplaceable resources:	Low							
Impacts on residual wetland ecosystem services	**Nature of impact:**	Loss in wetland habitat, and flow maintenance will result in a decrease in ecosystem services associated with wetlands							
	without	3	2	6	4	**44**	**Medium**	-	3
	with	3	2	6	4	**44**	**Medium**	-	3
	degree to which impact can be reversed:	Without reinstating impaired/impacted wetlands- ecosystem services can not be regained							3
	degree of impact on irreplaceable resources:	Moderate							3

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on hydrology	**Nature of impact:**	Clearing of vegetation result in decrease surface roughness and change in runoff characteristics							
	without	2	2	8	5	**60**	**Medium**	-	3
	with	2	2	8	4	**48**	**Medium**	-	3

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:	Impact is not readily reversed							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on surface water quality	**Nature of impact:**	During the construction phase of the project, water quality deterioration will result as a consequence of increased sediment loads within the downslope wetlands, as well as through pollutants derived from spillage, leakage and incorrect disposal of hazardous substances on site. Incorrect waste management and disposal is also likely to contribute further to water quality deterioration.							
	without	4	2	8	5	**70**	**High**	-	3
	with	4	2	8	4	**56**	**Medium**	-	3
	degree to which impact can be reversed:	This impact is difficult to reverse at it has far reaching implications. Even once water constituents return back to background levels, subsequent biological responses might take much longer to recover.							3
	degree of impact on irreplaceable resources:	Low							3
Impacts related to erosion and sedimentation	**Nature of impact:**	Disturbance of vegetation and soil during the construction process will significantly increase the risk of erosion. The compaction of soil surfaces will increase the volumes and velocities of surface run-off, further increasing erosion risk. Use of heavy machinery on site is also likely to result in the formation of well-worn tracks and ruts that act as preferential flow paths to surface run-off. Concentrated surface run-off will lead to erosion, with gully formation likely. Removal of vegetation and the disturbance of the soil profile will expose the soils to erosion by wind (dust) and water (from surface run-off). Eroded soil is likely to enter downstream wetland areas, increasing sedimentation within these wetlands and leading to changes in vegetation composition and aquatic fauna. Erosion is likely to be highest during the summer months when high intensity storm events are likely to result in significant surface runoff.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
		While the vertic clay soils are fairly resistant to erosion in the undisturbed state, once disturbed they will pose a significant erosion risk.							
	without	3	2	8	5	**65**	**High**	-	3
	with	2	2	8	4	**48**	**Medium**	-	3
	degree to which impact can be reversed:	Loss in direct wetland integrity and functioning due to erosion cannot be reversed easily. Loss due to downslope sedimentation might be easier to reinstate or might recover spontaneously provided sediment sources are stopped.							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on wetland vegetation and disturbance of wetland habitat	**Nature of impact:**	Destruction of the wetlands will result in the loss or displacement of biodiversity associated with the affected reach of the wetlands, while indirect negative impacts will also accrue to the downstream reaches of the affected wetlands through altered flow volumes and quality. In addition to the loss of wetland habitat, wetland habitat located immediately adjacent to the development footprints are likely to be substantially disturbed during the construction process through increased and uncontrolled movement of heavy machinery and people on site.							
	without	4	2	8	5	**70**	**High**	-	3
	with	4	2	8	4	**56**	**Medium**	-	3

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:	Wetland loss will be permanent.							3
	degree of impact on irreplaceable resources:	Low.							3
Impact related to increase alien/pioneer vegetation in disturbed areas	**Nature of impact:**	Disturbances to the wetlands on site will provide opportunity for invasion by alien and weedy species. Species such as *Bidens formosa* (Cosmos) are already prevalent on site and likely to increase, to the detriment of indigenous species.							
	without	3	2	6	4	**44**	**Medium**	-	3
	with	2	2	6	3	**30**	**Low**	-	3
	degree to which impact can be reversed:	Can be reversed							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on residual wetland ecosystem services	**Nature of impact:**	Loss in wetland habitat, and flow maintenance will result in a decrease in ecosystem services associated with wetlands							
	without	4	2	8	5	**70**	**High**	-	3
	with	4	2	8	4	**56**	**Medium**	-	3
	degree to which impact can be reversed:	Without reinstating impaired/impacted wetlands- ecosystem services cannot be regained							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Moderate							3
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Impacts on hydrology	**Nature of impact:**	Clearing of vegetation result in decrease surface roughness and change in runoff characteristics							
	without	3	2	6	5	**55**	**Medium**	-	3
	with	2	2	6	4	**40**	**Medium**	-	3
	degree to which impact can be reversed:	Impact is not readily reversed							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on surface water quality	**Nature of impact:**	During the construction phase of the project, water quality deterioration will result as a consequence of increased sediment loads within the downslope wetlands, as well as through pollutants derived from spillage, leakage and incorrect disposal of hazardous substances on site. Incorrect waste management and disposal is also likely to contribute further to water quality deterioration.							
	without	4	2	6	5	**60**	**Medium**	-	3
	with	3	2	6	4	**44**	**Medium**	-	3

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:	This impact is dificult to reverse at it has far reaching implications. Even once water constituents return back to background levels, subsequent biological responses might take much longer to recover.							3
	degree of impact on irreplaceable resources:	Clearing of vegetation result in decrease surface roughness and change in runoff characteristics							3
Impacts related to erosion and sedimentation	**Nature of impact:**	Disturbance of vegetation and soil during the construction process will significantly increase the risk of erosion. The compaction of soil surfaces will increase the volumes and velocities of surface run-off, further increasing erosion risk. Use of heavy machinery on site is also likely to result in the formation of well-worn tracks and ruts that act as preferential flow paths to surface run-off. Concentrated surface run-off will lead to erosion, with gully formation likely. Removal of vegetation and the disturbance of the soil profile will expose the soils to erosion by wind (dust) and water (from surface run-off). Eroded soil is likely to enter downstream wetland areas, increasing sedimentation within these wetlands and leading to changes in vegetation composition and aquatic fauna. Erosion is likely to be highest during the summer months when high intensity storm events are likely to result in significant surface runoff. While the vertic clay soils are fairly resistant to erosion in the undisturbed state, once disturbed they will pose a significant erosion risk.								
	without	3	2	6	5	**55**	**Medium**	-	3
	with	3	2	6	4	**44**	**Medium**	-	3
	degree to which impact can be reversed:	Loss in direct wetland integrity and functioning due to erosion can not be reversed easily. Loss due to downslope sedimentation might be easier to reinstate or might recover spontaneously provided sediment sources are stopped.							3
	degree of impact on irreplaceable resources:	Low							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on wetland vegetation and disturbance of wetland habitat	**Nature of impact:**	Destruction of the wetlands will result in the loss or displacement of biodiversity associated with the affected reach of the wetlands, while indirect negative impacts will also accrue to the downstream reaches of the affected wetlands through altered flow volumes and quality. In addition to the loss of wetland habitat, wetland habitat located immediately adjacent to the development footprints are likely to be substantially disturbed during the construction process through increased and uncontrolled movement of heavy machinery and people on site.							
	without	3	2	4	4	**36**	**Medium**	-	3
	with	2	2	4	2	**16**	**Low**	-	3
	degree to which impact can be reversed:	Wetland loss will be permanent.							3
	degree of impact on irreplaceable resources:	Low.							3
Impact related to increase alien/pioneer vegetation in disturbed areas	**Nature of impact:**	Disturbances to the wetlands on site will provide opportunity for invasion by alien and weedy species. Species such as *Bidens formosa* (Cosmos) are already prevalent on site and likely to increase, to the detriment of indigenous species.							
	without	3	2	6	4	**44**	**Medium**	-	3
	with	2	2	6	3	**30**	**Low**	-	3
	degree to which impact can be reversed:	Can be reversed							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low							3
Impacts on residual wetland ecosystem services	**Nature of impact:**	Loss in wetland habitat, and flow maintenance will result in a decrease in ecosystem services associated with wetlands							
	without	4	2	4	3	**30**	**Low**	-	3
	with	3	2	4	3	**27**	**Low**	-	3
	degree to which impact can be reversed:	Without reinstating impaired/impacted wetlands- ecosystem services can not be regained							3
	degree of impact on irreplaceable resources:	Moderate							3

BIODIVERSITY

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on flora species of conservation importance (including habitat suitable	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities, such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	High
	with	4	5	10	3	**57**	**Medium**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
for these species)	**degree to which impact can be reversed:**	Direct impacts of the proposed ashing facility is regarded as irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities, such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	
	with	4	5	10	3	**57**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	5	10	4	**72**	**High**	-	High
	with	3	5	10	3	**54**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	5	**65**	**High**	-	High
	with	2	5	4	5	**55**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	5	**60**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	6	5	**70**	**High**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with	3	4	4	5	**55**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities, such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	8	3	**51**	**Medium**	-	High
	with	4	5	6	3	**45**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
importance (including habitat suitable for these species)		necessarily recorded on the site							
	without	4	5	8	3	**51**	**Medium**	-	
	with	4	5	6	3	**45**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	5	8	3	**48**	**Medium**	-	High
	with	3	5	6	3	**42**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	4	**52**	**Medium**	-	High
	with	2	5	4	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	4	**56**	**Medium**	-	
	with	3	5	4	3	**36**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	6	5	**70**	**High**	-	High
	with	3	4	4	4	**44**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative C

Potential	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impact		**(E)**	**(D)**	**(M)**	**(P)**	**(S=(E+D+M)*P)**		**(+ve or -ve)**	
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	High
	with	4	5	8	3	**51**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	
	with	4	5	8	3	**51**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
sensitive or protected flora & fauna habitat types (including loss and degradation)		also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	5	10	4	**72**	**High**	-	High
	with	3	5	8	3	**48**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	5	**65**	**High**	-	High
	with	2	5	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	4	**48**	**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 severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	6	5	**70**	**High**	-	High
	with	3	4	4	4	**44**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

AVIFAUNA

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Disturbance	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests may be disturbed.							
	without	2	4	6	4	**48**	**Medium**		Medium
	with	2	4	4	3	**30**	**Low**		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:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							
Habitat Destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	without	1	5	6	5	**60**	**Medium**		Medium
	with	1	5	6	5	**60**	**Medium**		Medium
	degree to which impact can be reversed:	Irreversible							
	degree of impact on irreplaceable resources:	Medium							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Disturbance	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests my be disturbed.							
	without	2	4	6	4	**48**	**Medium**		Medium
	with	2	4	4	3	**30**	**Low**		Medium
	degree to which impact can be reversed:	Partially reversible							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low							
Habitat Destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	without	1	5	6	5	**60**	**Medium**		Medium
	with	1	5	6	5	**60**	**Medium**		Medium
	degree to which impact can be reversed:	Irreversible							
	degree of impact on irreplaceable resources:	Medium							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Disturbance	**Nature of impact:**	Noise and movement, from staff and machinery, may disturb avifauna, and nests my be disturbed.							
	without	2	4	4	4	**40**	**Medium**		Medium
	with	2	4	4	3	**30**	**Low**		Medium
	degree to which impact can be reversed:	Partially reversible							
	degree of impact on irreplaceable resources:	Low							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Habitat Destruction	**Nature of impact:**	Permanent removal of habitat that is used, or may be used, by avifauna.							
	without	1	5	4	5	**50**	**Medium**		Medium
	with	1	5	4	5	**50**	**Medium**		Medium
	degree to which impact can be reversed:	Irreversible							
	degree of impact on irreplaceable resources:	Medium							

BATS

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Roost disturbance and/or destruction due to construction activities	**Nature of impact:**	If structures that are used by bats as roost sites are destroyed during the construction phase bats using those structures may be killed							
	without	2	3	4	2	**18**	**Low**	-	High
	with	1	2	2	1	**5**	**Low**	-	High
	degree to which impact can be reversed:	Standard construction best practices must be followed. If man-made structures that represent potential roost sites for bats are not destroyed or if identified bat colonies are relocated safely by a bat specialist before destruction of the structure the impact of disturbance and/or construction on bat roost sites can be avoided altogether.							
	degree of impact on irreplaceable resources:	Low							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Disturbance to and displacement from foraging habitat due to construction activities	**Nature of impact:**	Loss of potential bat foraging habitat							
	without	4	4	2	4	**40**	**Medium**	-	Moderate
	with	2	2	2	3	**18**	**Low**	-	Moderate
	degree to which impact can be reversed:	Standard construction best practices must be followed. Destruction of remaining stands of naturally occurring vegetation should be kept to a minimum during the construction phase in order to minimize the potential disturbance to and displacement of bats due to loss of foraging habitat. It has been shown that bat are attracted to man-made water-sources. Care should be taken to avoid disturbance around existing water bodies.							
	degree of impact on irreplaceable resources:	Low							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Roost disturbance and/or destruction due to construction activities	**Nature of impact:**	If structures that are used by bats as roost sites are destroyed during the construction phase bats using those structures may be killed							
	without	2	3	4	2	**18**	**Low**	-	High
	with	1	1	2	1	**4**	**Low**	-	High
	degree to which impact can be reversed:	Standard construction best practices must be followed. If man-made structures that represent potential roost sites for bats are not destroyed or if identified bat colonies are relocated safely by a bat specialist before destruction of the structure the impact of disturbance and/or construction on bat roost sites can be avoided altogether. Although no colonies were found on this site alternative it is possible that the farm building may support colonisation.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low							
Disturbance to and displacement from foraging habitat due to construction activities	**Nature of impact:**	Loss of potential bat foraging habitat							
	without	2	3	4	2	**18**	**Low**	-	High
	with	1	1	2	3	**12**	**Low**	-	High
	degree to which impact can be reversed:	Standard construction best practices must be followed. Destruction of remaining stands of naturally occurring vegetation should be kept to a minimum during the construction phase in order to minimize the potential disturbance to and displacement of bats due to loss of foraging habitat.							
	degree of impact on irreplaceable resources:	Low							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Roost disturbance and/or destruction due to construction activities	**Nature of impact:**	If structures that are used by bats as roost sites are destroyed during the construction phase bats using those structures may be killed							
	without	3	3	4	2	**20**	**Low**	-	High
	with	1	2	2	1	**5**	**Low**	-	High
	degree to which impact can be reversed:	Standard construction best practices must be followed. If man-made structures that represent potential roost sites for bats are not destroyed or if identified bat colonies are relocated safely by a bat specialist before destruction of the structure the impact of disturbance and/or construction on bat roost sites can be avoided altogether. It is unlikely that bats will colonise any part of this site alternative as no suitable structures were identified.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low							
Disturbance to and displacement from foraging habitat due to construction activities	**Nature of impact:**	Loss of potential bat foraging habitat							
	without	2	2	4	4	**32**	**Medium**	-	High
	with	2	2	2	2	**12**	**Low**	-	High
	degree to which impact can be reversed:	Standard construction best practices must be followed. Destruction of remaining stands of naturally occurring vegetation should be kept to a minimum during the construction phase in order to minimize the potential disturbance to and displacement of bats due to loss of foraging habitat. Only a small number of man-made dams and naturally occurring vegetation exists on this site alternative.							
	degree of impact on irreplaceable resources:	Low							
VISUAL									
Ash Disposal Facility – All alternatives									
Transformation of the visual quality of the landscape	**Nature of impact:**	A new ash disposal facility will be developed on the selected site. This will be introduced as new features into the landscape, with moderate adverse visual impacts. No visual impacts are expected during construction of the facility.							
	with	2	2	2	5	**30**	**Low**	-	High
	without	2	2	2	5	**30**	**Low**	-	High
	degree to which impact can be reversed:	The impact during construction cannot be reversed.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	N/A						

NOISE

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	No impact						

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	2	2	3	**18**	**Low**	-	Definite
	with	2	2	2	3	**18**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Linear Infrastructure Corridor – All Alternatives									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -**	**Confidence**

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
								ve)	
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	1	2	2	4	**20**	**Low**	-	Definite
	with	1	2	2	4	**20**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	1	2	2	4	**20**	**Low**	-	Definite
	with	1	2	2	4	**20**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

HERITAGE

Ash Disposal Facility – All Alternatives

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	Nature of impact:	Destruction of heritage sites							
	without	1	5	4	3	**30**	**Low**		High
	with	1	5	4	3	**30**	**Low**		High
	degree to which impact can be reversed:	Mitigation through excavation/documentation							
	degree of impact on irreplaceable resources:								
SOCIAL									
Ash Disposal Facility – All alternatives									
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 workers	**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
	without 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)	
	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 ash disposal facility will result in increased PM10 concentrations due to groundwork's							
	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 ash disposal facility will result in increased dust fall rates due to groundwork's							
	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						-	
Dry ash disposal facility - No-Go Alternative									
GEOLOGY									
In the event that the ash disposal facility is not constructed, there will be no impact on the underlying geology, therefore the status quo will remain.									
AGRICULTURAL POTENTIAL									
In the event that the ash disposal facility is not constructed, there will be no impact on the existing agricultural potential of the land in question, therefore									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
the status quo will remain.									
GROUND WATER									
Impact 1: No change to groundwater conditions at the site	**Nature of impact:**	If the ash disposal facility is not built, then it is likely that there will be no change to the groundwater conditions underlying the Study Area, 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 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 primary study area 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 ash disposal facility is not constructed, no additional biodiversity impacts are expected and the status quo will remain.									
AVIFAUNA									
In the event that the ash disposal facility is not constructed, no avifauna impact can be expected and the status quo will remain.									
HERITAGE									
In the event that the ash disposal facility is not constructed, no Heritage impact can be expected as the grave will not be disturbed and the status quo will									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
remain.									
VISUAL									
In the event that the ash disposal facility is not constructed, no visual impact can be expected and the status quo will remain.									
NOISE									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	1	4	0	4	**20**	**Low**	-	Definite
	with	1	4	0	4	**20**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	1	4	0	4	**20**	**Low**	-	Definite
	with	1	4	0	4	**20**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
SOCIAL									
Impact 1: Economic Development through employment	**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, however, it is considered likely that a number will be able to find work due to the fact that there are not many unskilled employees at the Tutuka power station							
	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 Tutuka power station	**Nature of impact:**	If the ash disposal facility is not constructed the power station will need to be closed once the existing ash disposal facilities are at their full capacity.							
	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 ash disposal facility is constructed/continued.						High	
	degree of impact on irreplaceable resources:	Not Applicable						-	

Table 9.2: Detailed assessment of identified impacts for the Operational Phase – 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
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									
Ash Disposal Facility - Alternative A									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**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:	Impossible to reverse as soils will be completely and permanently covered by ADF						
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.						
GROUND WATER								
Ash Disposal Facility - All alternatives								
Rise in local water table due to additional recharge caused by ash deposition and possible concentration of recharge	**Nature of impact:**	Possible rise in the water table as ash is deposited and recharge is potentially concentrated / increased. The rate of rise will depend on the rate of leachate migration in the ash disposal facility, and this is not known with certainty.						
	Without Mitigations	1	4	4	4	**36**	**Medium**	-	Medium
	With Mitigation	1	4	2	3	**21**	**Low**	-	Medium
	Degree to which impact can be reversed:	Difficult to entirely reverse this impact. A full liner used under the ash disposal facility would mostly prevent it, but would be very expensive.							Medium
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only, which is not irreplaceable.							Medium
Change in local groundwater flow directions due to possible 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).						
	Without Mitigations	2	4	2	4	**32**	**Medium**	-	Medium
	With Mitigation	1	4	2	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
	Degree to which impact can be reversed:	Difficult to entirely reverse this impact unless a full liner is used under the ash disposal facility. Once the ash disposal facility is closed and re-vegetated groundwater levels in the vicinity will probably slowly return to their original state.							Medium
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only, which is not irreplaceable.							Medium
Deterioration of groundwater quality due to leachate from ash disposal facility	**Nature of impact:**	Rainwater percolating through the ash disposed will dissolve potential contaminants in the ash (e.g. SO4, Hg, F, Na) and carry these contaminants downwards into the local groundwater.							
	Without Mitigations	2	4	4	3	**30**	**Low**	-	Medium
	With Mitigation	1	4	2	4	**28**	**Low**	-	Medium
	Degree to which impact can be reversed:	It will be difficult to reverse this impact during ash dam operation. It is more feasible to reduce the amount of leachate as much as possible by ensuring that the under-drain the liner and related systems work as designed. When deposition ceases, natural attenuation over many years is likely to slowly reverse the impact.							Medium
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only.							Medium
Groundwater contamination in local area due to infiltration from surface water polluted by the ash disposal facility.	**Nature of impact:**	Surface water that is being impounded near the ash disposal facility and which is polluted by runoff from the ash disposal facility may leak from surface water impoundments into surface water system, and infiltrate into groundwater some distance (most likely local area) from the ash disposal facility.							
	Without Mitigations	2	4	4	3	**30**	**Low**	-	High
	With Mitigation	1	2	2	2	**10**	**Low**	-	High
	Degree to which impact can be reversed:	Impact can be reversed successfully if all surface water infrastructure is kept in good condition and appropriately designed (e.g. for flood events)							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater which may be expensive to replace if it is a sole source of supply to a nearby farm, for example.							Medium
Deterioration of groundwater quality due to spillages of hydrocarbons	**Nature of impact:**	Spillages of hydrocarbons (e.g. diesel) or solvents or other pollutants may have an impact on the quality of local groundwater resources.							
	Without Mitigations	2	2	4	2	**16**	**Low**	-	High
	With Mitigation	1	1	2	1	**4**	**Low**	-	High
	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.							High
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only, which is not irreplaceable.							Medium
SURFACE WATER									
Ash Disposal Facility - Alternative A									
Impacts on hydrology	**Nature of impact:**	Decreased flows within the downslope wetlands will result in a decreased wetland extent and decreased vegetation vigour as wetland species are replaced by dry land species, increasing the risk of erosion especially during flood events.							
	without	3	5	2	5	**50**	**Medium**	-	3
	with	2	5	2	5	**45**	**Medium**	-	3

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:	Can be reversed						3
	degree of impact on irreplaceable resources:	Low						3
Impacts on surface water quality	**Nature of impact:**	Seepage or leakage of polluted water out of the ash disposal facility and into adjacent wetlands is likely to result in a significant deterioration of water quality within the receiving water resources. Decreasing water quality within the wetlands is likely to have a deleterious effect on biodiversity supported by the wetlands, as well as making the water less fit for use for downstream water users. Downstream water users at a local scale include farmers using the water for livestock watering and irrigation, while further downstream the polluted water would enter the Leeuspruit, Blesbokspruit and the Vaal River.							
	without	3	5	4	5	**60**	**Medium**		3
	with	2	5	4	4	**44**	**Medium**		3
	degree to which impact can be reversed:	Can not be readily reversed						3
	degree of impact on irreplaceable resources:	Low						3

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impacts on hydrology	**Nature of impact:**	Decreased flows within the downslope wetlands will result in a decreased wetland extent and decreased vegetation vigour as wetland species are replaced by dry land species, increasing the risk of erosion especially during flood events.							
	without	2	5	6	5	**65**	**High**	-	3
	with	2	5	6	5	**65**	**High**	-	3
	degree to which impact can be reversed:	Can be reversed							3
	degree of impact on irreplaceable resources:	Low							3
Impacts on surface water quality	**Nature of impact:**	Seepage or leakage of polluted water out of the ash disposal facility and into adjacent wetlands is likely to result in a significant deterioration of water quality within the receiving water resources. Decreasing water quality within the wetlands is likely to have a deleterious effect on biodiversity supported by the wetlands, as well as making the water less fit for use for downstream water users. Downstream water users at a local scale include farmers using the water for livestock watering and irrigation, while further downstream the polluted water would enter the Leeuspruit, Blesbokspruit and the Vaal River.							
	without	3	5	6	5	**70**	**High**	-	3
	with	2	4	4	4	**40**	**Medium**	-	3
	degree to which impact can be reversed:	Can not be readily reversed							3
	degree of impact on irreplaceable resources:	Low							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
Ash Disposal Facility - Alternative C								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**	**Status (+ve or -ve)**	**Confidence**
Impacts on hydrology	**Nature of impact:**	Decreased flows within the downslope wetlands will result in a decreased wetland extent and decreased vegetation vigour as wetland species are replaced by dry land species, increasing the risk of erosion especially during flood events.						
	without	2	5	4	5	**55**	**Medium**	-	3
	with	2	5	4	5	**55**	**Medium**	-	3
	degree to which impact can be reversed:	Can not be readily reversed						
	degree of impact on irreplaceable resources:	Low						
Impacts on surface water quality	**Nature of impact:**	Seepage or leakage of polluted water out of the ash disposal facility and into adjacent wetlands is likely to result in a significant deterioration of water quality within the receiving water resources. Decreasing water quality within the wetlands is likely to have a deleterious effect on biodiversity supported by the wetlands, as well as making the water less fit for use for downstream water users. Downstream water users at a local scale include farmers using the water for livestock watering and irrigation, while further downstream the polluted water would enter the Leeuspruit, Blesbokspruit and the Vaal River.						
	without	3	5	4	5	**60**	**Medium**		3
	with	2	4	4	4	**40**	**Medium**		3

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:	Can not be readily reversed						
	degree of impact on irreplaceable resources:	Low						

BIODIVERSITY

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities, such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	3	4	10	4	**68**	**High**	-	High
	with	3	4	10	3	**51**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities, such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
importance (including habitat suitable for these species)	**without**	3	4	10	4	**68**	**High**	-	
	with	3	4	10	3	**51**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreverisble. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	4	10	4	**68**	**High**	-	High
	with	3	4	8	3	**45**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	5	**65**	**High**	-	High
	with	2	5	4	5	**55**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	5	**60**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	8	5	**80**	**High**	-	High
	with	3	4	6	5	**65**	**High**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probabilit	Significance		Status	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
		(E)	(D)	(M)	y (P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	8	3	**51**	**Medium**	-	High
	with	4	5	6	3	**45**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	8	3	**51**	**Medium**	-	
	with	4	5	6	3	**45**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreverisble. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
protected flora & fauna habitat types (including loss and degradation)	**without**	3	4	8	3	**45**	**Medium**	-	High
	with	3	4	6	3	**39**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	4	**52**	**Medium**	-	High
	with	2	5	4	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	4	**56**	**Medium**	-	
	with	3	5	4	3	**36**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	6	4	**56**	**Medium**	-	High
	with	3	4	4	3	**33**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	High
	with	4	5	8	3	**51**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							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 loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	4	5	10	4	**76**	**High**	-	
	with	4	5	8	3	**51**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	5	8	3	**48**	**Medium**	-	High
	with	3	5	6	3	**42**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	5	**65**	**High**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
conflicts & interactions	**with**	2	5	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	4	**48**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	3	5	8	4	**64**	**High**	-	High
	with	3	4	6	4	**52**	**Medium**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site						Medium

AVIFAUNA

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Contamination of surrounding water.	**Nature of impact:**	Leachate containing heavy metals, could result in contamination of water sources, used by water birds.							
	without	2	4	6	3	**36**	**Medium**		Low
	with	2	4	4	2	**20**	**Low**		Low
	degree to which impact can be reversed:	Reversible							
	degree of impact on irreplaceable resources:	Low							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Contamination of surrounding	**Nature of impact:**	Leachate containing heavy metals, could result in contamination of water sources, used by water birds.							
	without	2	4	6	3	**36**	**Medium**		Low

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
water.	**with**	2	4	4	2	**20**	**Low**		Low
	degree to which impact can be reversed:	Reversible							
	degree of impact on irreplaceable resources:	Low							
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Contamination of surrounding water.	**Nature of impact:**	Leachate containing heavy metals, could result in contamination of water sources, used by water birds.							
	without	2	4	4	3	**30**	**Low**		Low
	with	2	4	4	2	**20**	**Low**		Low
	degree to which impact can be reversed:	Reversible							
	degree of impact on irreplaceable resources:	Low							
VISUAL									
All Alternatives									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Visual exposure of the newly introduced ash disposal facility	**Nature of impact:**	Visual exposure of the newly introduced ash disposal facility is expected to create additional visual impacts by adding a new feature to the landscape that is large in spatial dimensions.							
	without	2	4	6	5	**60**	**Medium**	-	High
	with	2	4	4	5	**50**	**Medium**	-	High
	degree to which impact can be reversed:	Views of the ash disposal facility are expected to be absorbed visually into the mass and scale of the existing features, particularly as the appearance of the power station at large. By vegetating the side slopes of ash disposal facility, the visual impact can further be reduced.							
	degree of impact on irreplaceable resources:	N/A							
Transforming the visual quality and sense of place of the landscape	**Nature of impact:**	The historical visual quality of the area as an agricultural landscape has been transformed by the development of Tutuka Power Station. It is expected that the proposed new development would add to cumulative impacts, but would not further degrade the visual quality and sense of place of the landscape.							
	without	2	4	6	5	**60**	**Medium**	-	High
	with	2	4	4	3	**30**	**Low**	-	Medium
	degree to which impact can be reversed:	The visual appearance of stockpile, consisting of topsoil, subsoil and overburden, can be changed by planting grass, shrubs and trees on the slopes that are visually exposed to the surrounding area. This will increase the possibility of visual absorption into the landscape in terms of texture and colour.							

NOISE

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).						

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	2	2	3	**18**	**Low**	-	High
	with	2	2	2	3	**18**	**Low**	-	High
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
SOCIAL									
Ash Disposal Facility - All Alternatives									
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
	degree to which impact can be reversed:	Not Applicable							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:	High – through the continued supply of electricity more use will be made of non-renewable resources such as coal.							Medium
Health Risk from elevated PM 10 Concentrations	**Nature of impact:**	The new 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
Nuisance from elevated dustfall rates	**Nature of impact:**	The new 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
Ash disposal facility - No-Go Alternative									
GROUND WATER									
Impact 1: No change to groundwater conditions at the site	**Nature of impact:**	If the 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 mitigation	2	4	4	4	**40**	**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:	This positive impact (i.e. not building the 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

Decreased flows within the downslope wetlands will result in a decreased wetland extent and decreased vegetation vigour as wetland species are replaced by dry land species, increasing the risk of erosion especially during flood events.

BIODIVERSITY

If the 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 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 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

NOISE

Ash Disposal Facility - No-Go

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	1	4	0	4	**20**	**Low**	-	Definite
	with	1	4	0	4	**20**	**Low**	-	Definite

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:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	1	4	0	4	**20**	**Low**	-	Definite
	with	1	4	0	4	**20**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
SOCIAL									
If the ash disposal facility is not constructed or operated, the power station might have to close down with negative impacts on the local community									

Table 9.3: Detailed assessment of identified impacts for the De-Commissioning Phase – 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
GROUND WATER									
Ash Disposal Facility - All alternatives									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Deterioration of groundwater quality due to spillages during Decommissioning	**Nature of impact:**	Spillages of hydrocarbons (e.g. diesel) or solvents or other pollutants during the De commissioning phase may have an impact on the quality of local groundwater resources.							
	Without Mitigations	2	2	6	2	**20**	**Low**	-	High
	With Mitigation	1	1	4	1	**6**	**Low**	-	High
	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.							High
	Degree of impact on irreplaceable resources:	Impact likely to be on local groundwater only, which is not irreplaceable.							Medium
Deterioration of groundwater quality due to leachate from ash disposal	**Nature of impact:**	Leachate from the ash disposal facility is likely to continue to percolate downwards even when ash disposal has ceased.							
	Without Mitigations	2	3	2	4	**28**	**Low**	-	Medium
	With Mitigation	2	2	2	4	**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)	
facility	**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 ash disposal facility is vegetated then downward drainage of leachate into the groundwater will be minimised.							Medium
	Degree of impact on irreplaceable resources:	The impact on local groundwater is thought to be low and localised.							Medium
Minor changes to local water table and local groundwater flow direction	**Nature of impact:**	Once decommissioned, the water table under the 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 ash dam 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.							
	Without Mitigations	2	4	2	3	**24**	**Low**	-	Medium
	With Mitigation	2	3	2	3	**21**	**Low**	-	Medium
	Degree to which impact can be reversed:	The impact can be lessened by vegetating the 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 ash disposal facility.							Medium
	Degree of impact on irreplaceable resources:	Minor impact only.							Medium
Groundwater contamination in local area due to infiltration from surface water polluted	**Nature of impact:**	Surface water that is being impounded near the ash disposal facility and which is polluted by runoff from the ash disposal facility may leak from surface water impoundments into surface water system, and infiltrate into groundwater some distance (most likely local area) from the ash disposal facility.							
	Without Mitigations	2	4	4	3	**30**	**Low**	-	High
	With Mitigation	1	2	2	2	**10**	**Low**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
by the ash disposal facility.	**Degree to which impact can be reversed:**	Impact can be reversed successfully if all surface water infrastructure kept in good condition and appropriately designed (e.g. for flood events)						Medium
	Degree of impact on irreplaceable resources:	Impact likely to be on regional groundwater which may be expensive to replace if it is a sole source of supply to a nearby farm, for example.						Medium

SOILS AND AGRICULTURAL POTENTIAL

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF. However, complete covering by topsoil will stabilize ADF and prevent removal by water or wind erosion in the future							
	degree of impact on irreplaceable resources:	Absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
Loss of	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF						

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
agricultural soil	**without**	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF. However, complete covering by topsoil will stabilize ADF and prevent removal by water or wind erosion in the future							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF. However, complete covering by topsoil will stabilize ADF and prevent removal by water or wind erosion in the future							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

SURFACE WATER

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Water Quality	**Nature of impact:**	The long term impacts of the decommissioned disposal facility on surface water quality will rely on leachate and/or runoff quality, as well as the probability of surface water pollution.							
	without	3	5	4	5	**60**	**Medium**	-	3
	with	2	5	2	3	**27**	**Low**	-	3
	degree to which impact can be reversed:	Not readily reversed							3
	degree of impact on irreplaceable resources:	Low							3

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Water Quality	**Nature of impact:**	The long term impacts of the decommissioned disposal facility on surface water quality will rely on leachate and/or runoff quality, as well as the probability of surface water pollution.							
	without	2	5	6	5	**65**	**High**	-	3
	with	2	5	6	3	**39**	**Medium**	-	3
	degree to which impact can be reversed:	Not readily reversed							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Low						3

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Water Quality	**Nature of impact:**	The long term impacts of the decommissioned disposal facility on surface water quality will rely on leachate and/or runoff quality, as well as the probability of surface water pollution.							
	without	2	5	4	5	**55**	**Medium**	-	3
	with	2	5	4	3	**33**	**Medium**	-	3
	degree to which impact can be reversed:	Not readily reversed							3
	degree of impact on irreplaceable resources:	Low							3

BIODIVERSITY

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
Impacts on flora species of conservation	**Nature of impact:**	Includes direct impacts of rehabilitation of the ashing facility on plants of conservation importance during rehabilitation work and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site						

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
importance (including habitat suitable for these species)	**without**	2	5	10	3	**51**	**Medium**	-	High
	with	2	5	10	2	**34**	**Medium**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during rehabilitation and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	2	5	10	3	**51**	**Medium**	-	
	with	2	5	10	2	**34**	**Medium**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	2	4	10	3	**48**	**Medium**	-	High
	with	2	4	8	2	**28**	**Low**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of personnel, vehicles and activities will likely result in conflict situations during rehabilitation.							
	without	2	5	6	5	**65**	**High**	-	High
	with	2	5	4	5	**55**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	5	**60**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	2	4	6	3	**36**	**Medium**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with	2	3	4	2	18	Low	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Impacts on flora species of conservation importance (including habitat suitable for these species)	Nature of impact:	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	3	5	8	2	32	Medium	-	High
	with	3	5	6	2	28	Low	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance	Nature of impact:	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	3	5	8	2	32	Medium	-	

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
(including habitat suitable for these species)	**with**	3	5	6	2	**28**	**Low**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	3	4	8	2	**30**	**Low**	-	High
	with	3	4	6	2	**26**	**Low**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	4	**52**	**Medium**	-	High
	with	2	5	4	3	**33**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							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:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	4	**56**	**Medium**	-	
	with	3	5	4	3	**36**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	2	4	6	4	**48**	**Medium**	-	High
	with	2	4	4	3	**30**	**Low**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium

Ash Disposal Facility - Alternative C

Potential	Mitigation	Extent	Duration	Magnitude	Probabilit	Significance	Status	Confidence

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impact		(E)	(D)	(M)	y (P)	(S=(E+D+M)*P)		(+ve or -ve)	
Impacts on flora species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on plants of conservation importance during construction and site preparation activities', such as soil disturbances and topsoil stripping. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	3	4	10	3	**51**	**Medium**	-	High
	with	3	4	8	2	**30**	**Low**	-	High
	degree to which impact can be reversed:	Direct impacts of the proposed ashing facility is regarded irreversible. Impacts on conservation important species and habitat suitable for these species will entirely destroy any habitat, rendering it inadequate in terms of habitat requirements							High
	degree of impact on irreplaceable resources:	The loss of conservation important species and suitable habitat for these species is regarded significant as these species are already limited in numbers as well as occurring in localised and fragmented habitat							High
Impacts on fauna species of conservation importance (including habitat suitable for these species)	**Nature of impact:**	Includes direct impacts of development of the ashing facility on animals of conservation importance during construction and site preparation activities', such as accidental killing and, particularly, habitat destruction. Also include impacts in habitat that are associated with the presence of conservation important species, although not necessarily recorded on the site							
	without	3	4	10	3	**51**	**Medium**	-	
	with	3	4	8	2	**30**	**Low**	-	
	degree to which impact can be reversed:	Destruction of habitat and animals during the construction process is regarded irreversible. Habitat created subsequent to construction activities is regarded inadequate to satisfy habitat requirements of these species, also affecting migration patterns and movement corridors							High
	degree of impact on irreplaceable resources:	Significant, high transformation and fragmentation levels in the landscape places a priority on remaining areas of suitable habitat, rehabilitation to a pristine status is not regarded possible and losses are irreversible							High
Impacts on sensitive or protected flora	**Nature of impact:**	Destruction or degradation of important/ protected ecological types that are typically restricted in distribution and also typically high in biodiversity. Wetlands are important in regards to the study area							
	without	2	4	10	3	**48**	**Medium**	-	High

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
& fauna habitat types (including loss and degradation)	**with**	2	4	8	2	**28**	**Low**	-	
	degree to which impact can be reversed:	Destruction of sensitive habitat types during this type of development is irreversible. Stripping of topsoil will irreversibly affect the status of habitat, as well as functionality and species composition							High
	degree of impact on irreplaceable resources:	Significant, the restricted distribution on a local and regional level implies a loss of these important habitat types affects the habitat directly, but also the ecological functionality on a larger scale							High
Displacement of fauna species, human-animal conflicts & interactions	**Nature of impact:**	Naturally occurring fauna species will be displaced into adjacent areas of natural habitat, the presence of construction personnel, vehicles and activities will likely result in conflict situations							
	without	2	5	6	5	**65**	**High**	-	High
	with	2	5	4	4	**44**	**Medium**	-	High
	degree to which impact can be reversed:	Reversal of impact generally not possible due to the severity of the development, mitigation can potentially result in reduction of severity. Animals will grow accustomed to structures after a period							Medium
	degree of impact on irreplaceable resources:	Moderate, affected species might include animals of conservation importance							Medium
Impacts on ecological connectivity and ecosystem functioning	**Nature of impact:**	The transformed nature of the landscape places a high premium on remaining natural habitat to serve as migration corridors. Effective ecological functioning of the habitat is also dependent on a minimum availability of natural habitat. Transformation of natural habitat increases disruption of movement corridors and functionality							
	without	3	5	6	5	**70**	**High**	-	
	with	3	5	4	4	**48**	**Medium**	-	
	degree to which impact can be reversed:	The severity of the development implies that the impact cannot be reversed							Medium

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Loss of remaining habitat contributes to the loss of functionality on a landscape scale, therefore also implying impacts on surrounding areas							Medium
Indirect impacts on surrounding habitat	**Nature of impact:**	Impacts on surrounding habitat can potentially include all of the above, as well as additional impacts such as habitat degradation and deterioration due to leaching, effluents, dust, etc							
	without	2	4	6	4	**48**	**Medium**	-	High
	with	2	3	4	3	**27**	**Low**	-	Medium
	degree to which impact can be reversed:	Moderate, implementation of dedicated mitigation measures could result in reduction and containment of impacts to the development site							Medium
	degree of impact on irreplaceable resources:	Moderate, importance of surrounding natural habitat increases with the loss of habitat from the site							Medium
VISUAL									
Permanent transformation of the landscape	**Nature of impact:**	Stockpile highly visible in the horizon are visible as man-made structures. Should these remain as permanent features, the visual impact will remain permanently							
	with	2	4	4	3	**30**	**Low**		Medium
	without	3	5	6	5	**70**	**High**		Medium
	degree to which impact can be reversed:	The impact can be reversed by removal of the ash and restoring the vegetation to its original state (Not a feasible option).							
	degree of impact on irreplaceable resources:								

Table 9.4: Detailed assessment of identified cumulative impacts – 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
GROUND WATER								
Ash Disposal Facility - All alternatives								
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**	**Status (+ve or -ve)**	**Confidence**
Deterioration of groundwater quality due to leachate from ash disposal facility	**Nature of impact:**	The ash disposal facility is likely to lead to deterioration of local groundwater quality even with the appropriate liner, which will be most severe during facility operation but which will likely persist in some form long after the 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 stacking / deposition has ended.						
	Without Mitigations	2	4	6	4	**48**	**Medium**	-	Medium
	With 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 ash disposal facility construction and operation, and by re-vegetating and maintaining the 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. However, local groundwater users who have no other convenient alternatives may need to have alternative supplies provided, which may be expensive.							Medium
Rise in local water table and minor changes to local groundwater flow directions	**Nature of impact:**	Once decommissioned, the water table under the 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 ash disposal facility will not be the same as those of the original land cover. 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.						

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance		Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
	Without Mitigations	2	4	4	4	**40**	**Medium**	-	Medium
	With Mitigation	1	3	2	3	**18**	**Low**	-	Medium
	Degree to which impact can be reversed:	The impact can be lessened by vegetating the 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 ash disposal facility.							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
Groundwater contamination in local area due to infiltration from surface water polluted by the ash disposal facility.	**Nature of impact:**	Surface water that is being impounded near the ash disposal facility and which is polluted by runoff from the ash disposal facility may leak from surface water impoundments into surface water system, and infiltrate into groundwater some distance (most likely local area) from the ash disposal facility.							
	Without Mitigations	2	4	4	3	**30**	**Low**	-	High
	With Mitigation	1	2	2	2	**10**	**Low**	-	High
	Degree to which impact can be reversed:	Impact can be reversed successfully if all surface water infrastructure kept in good condition and appropriately designed (e.g. for flood events)							Medium
	Degree of impact on irreplaceable resources:	Impact likely to be on regional groundwater which may be expensive to replace if it is a sole source of supply to a nearby farm, for example.							Medium

SOILS AND AGRICULTURAL POTENTIAL

Ash Disposal Facility - Alternative A

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)		(+ve or -ve)	
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF, in addition to existing ADF.							
	degree of impact on irreplaceable resources:	Absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF, in addition to existing ADF.							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Loss of agricultural soil	**Nature of impact:**	Unavailability of soil resource for agriculture due to positioning of ADF							
	without	1	5	10	5	**80**	**High**	-	Confident
	with	1	5	10	5	**80**	**High**		
	degree to which impact can be reversed:	Impossible to reverse as soils will be completely and permanently covered by ADF, in addition to existing ADF.							
	degree of impact on irreplaceable resources:	Very probable absence of high potential soils means that there will not be a large-scale loss of irreplaceable resources within the local soil pattern.							
SURFACE WATER									
Ash Disposal Facility - Alternative A									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Decrease PES of wetland type and downstream watercourse	**Nature of impact:**	A combination of altered driver components (hydrology, sediment and vegetation cover) will result in a change in wetland integrity. The magnitude and probability of this change relates to the PES and EIS of the wetlands in question and of wetlands sharing the same catchment.							
	without	2	4	2	4	**32**	**Medium**	-	3
	with	2	2	2	4	**24**	**Low**	-	3

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:	Can not be readily reversed							3
	degree of impact on irreplaceable resources:	Low							3
Ash Disposal Facility - Alternative B									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Decrease PES of wetland type and downstream watercourse	**Nature of impact:**	A combination of altered driver components (hydrology, sediment and vegetation cover) will result in a change in wetland integrity. The magnitude and probability of this change relates to the PES and EIS of the wetlands in question and of wetlands sharing the same catchment.							
	without	2	4	6	5	**60**	**Medium**	-	3
	with	2	3	6	4	**44**	**Medium**	-	3
	degree to which impact can be reversed:	Can not be readily reversed							3
	degree of impact on irreplaceable resources:	Low							3

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Ash Disposal Facility - Alternative C									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Decrease PES of wetland type and downstream watercourse	**Nature of impact:**	A combination of altered driver components (hydrology, sediment and vegetation cover) will result in a change in wetland integrity. The magnitude and probability of this change relates to the PES and EIS of the wetlands in question and of wetlands sharing the same catchment.							
	without	2	4	4	4	**40**	**Medium**	-	3
	with	2	3	4	3	**27**	**Low**	-	3
	degree to which impact can be reversed:	Can not be readily reversed							3
	degree of impact on irreplaceable resources:	Low							3
BIODIVERSITY									
Ash Disposal Facility - Alternative A									
Potential Impact	**Mitigation**	**Extent (E)**	**Duration (D)**	**Magnitude (M)**	**Probability (P)**	**Significance (S=(E+D+M)*P)**		**Status (+ve or -ve)**	**Confidence**
Cumulative impacts on	**Nature of impact:**	The Soweto Highveld Grassland is listed as Endangered and the continued loss of representative habitats will adversely impact on the conservation status of this unit							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
conservation obligations & targets (including national and regional)	**without**	4	5	8	5	**85**	**High**		
	with	4	5	8	5	**85**	**High**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							
	degree of impact on irreplaceable resources:	Soweto Highveld Grassland areas should be conserved as far as possible, continued loss and degradation of this ecological type is regarded significant							
Cumulative increase in local and regional fragmentation/ isolation of habitat	**Nature of impact:**	Current transformation and fragmentation levels of the landscape is regarded severe and the continued loss of natural habitat will result in augmentation of these levels							
	without	3	5	8	4	**64**	**High**		
	with	3	5	6	4	**56**	**Medium**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							
	degree of impact on irreplaceable resources:	Natural habitat is severely restricted and limited in the landscape and the continued loss of remaining portions of natural habitat will increase pressures on remaining portions							
Cumulative increase in environmental degradation, pollution	**Nature of impact:**	Evidence indicates existing moderately significant impacts on surrounding areas of natural habitat. Existing impacts will be augmented by extension of the present ashing facility, particularly in view of the proximity of sensitive habitat to some alternatives							
	without	3	5	8	4	**64**	**High**		
	with	3	5	6	3	**42**	**Medium**		
	degree to which impact can be reversed:	Most of the expected impacts are unavoidable and difficult to mitigate. However, with dedicated mitigation measures the severity could be ameliorated							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)	Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Degradation of remaining portions of natural/ sensitive habitat will place significant pressure on natural habitat to support biodiversity requirements						

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Cumulative impacts on conservation obligations & targets (including national and regional)	**Nature of impact:**	The Soweto Highveld Grassland is listed as Endangered and the continued loss of representative habitats will adversely impact on the conservation status of this unit							
	without	4	5	6	4	**60**	**Medium**		
	with	4	5	6	4	**60**	**Medium**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							
	degree of impact on irreplaceable resources:	Soweto Highveld Grassland areas should be conserved as far as possible, continued loss and degradation of this ecological type is regarded significant							
Cumulative increase in local and regional fragmentation/ isolation of habitat	**Nature of impact:**	Current transformation and fragmentation levels of the landscape is regarded severe and the continued loss of natural habitat will result in augmentation of these levels							
	without	3	5	6	4	**56**	**Medium**		
	with	3	5	4	3	**36**	**Medium**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Natural habitat is severely restricted and limited in the landscape and the continued loss of remaining portions of natural habitat will increase pressures on remaining portions							
Cumulative increase in environmental degradation, pollution	**Nature of impact:**	Evidence indicates existing moderately significant impacts on surrounding areas of natural habitat. Existing impacts will be augmented by extension of the present ashing facility, particularly in view of the proximity of sensitive habitat to some alternatives							
	without	3	5	6	4	**56**	**Medium**		
	with	3	5	4	3	**36**	**Medium**		
	degree to which impact can be reversed:	Most of the expected impacts are unavoidable and difficult to mitigate. However, with dedicated mitigation measures the severity could be ameliorated							
	degree of impact on irreplaceable resources:	Degradation of remaining portions of natural/ sensitive habitat will place significant pressure on natural habitat to support biodiversity requirements							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Cumulative impacts on conservation obligations & targets (including national and regional)	**Nature of impact:**	The Soweto Highveld Grassland is listed as Endangered and the continued loss of representative habitats will adversely impact on the conservation status of this unit							
	without	4	5	8	4	**68**	**High**		
	with	4	5	8	4	**68**	**High**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	degree of impact on irreplaceable resources:	Soweto Highveld Grassland areas should be conserved as far as possible, continued loss and degradation of this ecological type is regarded significant							
Cumulative increase in local and regional fragmentation/ isolation of habitat	**Nature of impact:**	Current transformation and fragmentation levels of the landscape is regarded severe and the continued loss of natural habitat will result in augmentation of these levels							
	without	3	5	6	4	**56**	**Medium**		
	with	3	5	4	4	**48**	**Medium**		
	degree to which impact can be reversed:	The severity of the impacts dictates that transformation is permanent and the loss of habitat cannot be reversed							
	degree of impact on irreplaceable resources:	Natural habitat is severely restricted and limited in the landscape and the continued loss of remaining portions of natural habitat will increase pressures on remaining portions							
Cumulative increase in environmental degradation, pollution	**Nature of impact:**	Evidence indicates existing moderately significant impacts on surrounding areas of natural habitat. Existing impacts will be augmented by extension of the present ashing facility, particularly in view of the proximity of sensitive habitat to some alternatives							
	without	3	5	6	4	**56**	**Medium**		
	with	3	5	4	3	**36**	**Medium**		
	degree to which impact can be reversed:	Most of the expected impacts are unavoidable and difficult to mitigate. However, with dedicated mitigation measures the severity could be ameliorated							
	degree of impact on irreplaceable resources:	Degradation of remaining portions of natural/ sensitive habitat will place significant pressure on natural habitat to support biodiversity requirements							
NOISE									
Ash Disposal Facility - Alternative A									

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Ash Disposal Facility - Alternative B

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	4	2	3	**24**	**Low**	-	Definite

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							

Ash Disposal Facility - Alternative C

Potential Impact	Mitigation	Extent (E)	Duration (D)	Magnitude (M)	Probability (P)	Significance (S=(E+D+M)*P)		Status (+ve or -ve)	Confidence
Noise	**Nature of impact:**	Adherence to ambient noise levels listed by SANS 10103 for a rural district, i.e. 45 dBA (day) and 35 dBA (night).							
	without	2	4	2	3	**24**	**Low**	-	Definite
	with	2	4	2	3	**24**	**Low**	-	Definite

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:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
Noise	**Nature of impact:**	Increase in present ambient noise levels							
	without	2	2	2	3	**18**	**Low**	-	High
	with	2	2	2	3	**18**	**Low**	-	High
	degree to which impact can be reversed:	Fully reversible							
	degree of impact on irreplaceable resources:	No impact							
VISUAL									
Incremental cumulative impact with the addition of an ash disposal facility in the visual landscape where and existing facility is already visible and not regarded as part	**Nature of impact:**	Cumulative impacts are likely to occur, but are not regarded as sufficient enough to fundamentally change the landscape character.							
	with								
	without	2	4	4	3	**30**	**Low**	-	High
	degree to which impact can be reversed:	The impact cannot be reversed							

Potential Impact	Mitigation	Extent	Duration	Magnitude	Probability	Significance	Status	Confidence
		(E)	(D)	(M)	(P)	(S=(E+D+M)*P)	(+ve or -ve)	
of the natural environment.								

The above impact analysis is summarised in **Table 9.5 – 9.8**.

Table 9.5: Summary of identified impacts for the Construction Phase – Ash disposal facility

Potential Impact	Mitigation	Significance			
		Ash disposal facility – Site			No-Go
		A	B	C	
GEOLOGY					
Construction-related earthworks	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Low**	**Low**	
Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
AGRICULTURAL POTENTIAL					
Loss of agricultural soil	Without	**High**	**High**	**High**	**Low**
	With	**High**	**High**	**High**	**Low**
GROUNDWATER					
Deterioration of groundwater quality due to spillages during construction	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
SURFACE WATER					
Impacts on hydrology	Without	**Low**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Medium**	**Medium**	
Impacts on surface water quality	Without	**Low**	**High**	**Medium**	
	With	**Low**	**Medium**	**Medium**	
Impacts related to erosion and sedimentation	Without	**Low**	**High**	**Medium**	
	With	**Low**	**Medium**	**Medium**	
Impacts on wetland vegetation and disturbance of wetland habitat	Without	**Medium**	**High**	**Medium**	
	With	**Medium**	**Medium**	**Low**	
Impact related to increase alien/pioneer vegetation in disturbed areas	Without	**Low**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
Impacts on residual wetland ecosystem services	Without	**Medium**	**High**	**Low**	**Medium**
	With	**Medium**	**Medium**	**Low**	**Medium**
BIODIVERSITY					
Impacts on flora species of conservation importance (including habitat suitable for these species	Without	**High**	**Medium**	**High**	**N/A**
	With	**Medium**	**Medium**	**Medium**	
Impacts on fauna species of conservation importance (including habitat suitable for these species)	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Displacement of fauna species, human-animal conflicts & interactions	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	

Impacts on ecological connectivity and ecosystem functioning;	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Indirect impacts on surrounding habitat	Without	**High**	**High**	**High**	
	With	**Medium**	**Medium**	**Medium**	
AVIFAUNA					
Disturbance	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Low**	**Low**	
Habitat Destruction	Without	**Medium**	**Medium**	**Medium**	
	With	**Medium**	**Medium**	**Medium**	
BATS					
Roost disturbance and/or destruction due to construction activities	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
Disturbance to and displacement from foraging habitat due to construction activities	Without	**Medium**	**Medium**	**Low**	
	With	**Low**	**Low**	**Low**	
HERITAGE					
Destruction of heritage sites and features	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
VISUAL					
Transformation of the visual quality of the landscape	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
SOCIAL					
Impact 1: Economic Development through employment	Without	**Low**	**Low**	**Low**	**Medium**
	With	**Low**	**Low**	**Low**	**Low**
Impact 2: Inflow of temporary workers	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
Impact 3: Health Risk from elevated PM 10 Concentrations	Without	**Low**	**Low**	**Low**	
	With	**Medium**	**Medium**	**Medium**	
Impact 4: Nuisance from elevated dustfall rates	Without	**Low**	**Low**	**Low**	
	With	**Medium**	**Medium**	**Medium**	

Table 9.6: Summary of identified impacts for the Operational Phase – Ash disposal facility

Potential Impact	Mitigation	Significance			
		Ash disposal facility – Site			No-GO
		A	B	C	
GEOLOGY					
Pollution of geological features in case of spillage or leakage of hydrocarbon and other hazardous material	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
AGRICULTURAL POTENTIAL					
Loss of agricultural soil	Without	**High**	**High**	**High**	**Low**
	With	**High**	**High**	**High**	**Low**
GROUNDWATER					
Rise in local water table due to additional recharge caused by ash deposition and possible concentration of recharge	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Low**	**Low**	
Change in local groundwater flow directions due to possible rise in local water table	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
Deterioration of groundwater quality due to leachate from ash disposal facility	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
Groundwater contamination in local area due to infiltration from surface water polluted by the ash disposal facility.	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
Deterioration of groundwater quality due to spillages of hydrocarbons	Without	**Low**	**Low**	**Low**	**Medium**
	With	**Low**	**Low**	**Low**	**Medium**
SURFACE WATER					
Impacts on hydrology	Without	**Medium**	**High**	**Medium**	**N/A**
	With	**Medium**	**High**	**Medium**	
Impacts on surface water quality	Without	**Medium**	**High**	**Medium**	
	With	**Medium**	**Medium**	**Medium**	
BIODIVERSITY					
Impacts on flora species of conservation importance (including habitat suitable for these species)	Without	**High**	**Medium**	**High**	**N/A**
	With	**Medium**	**Medium**	**Medium**	
Impacts on fauna species of conservation importance (including habitat suitable for these species)	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	Without	**High**	**Medium**	**Medium**	
	With	**Medium**	**Medium**	**Medium**	
Impacts on ecological connectivity and ecosystem functioning	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	

Displacement of fauna species, human-animal conflicts & interactions	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Indirect impacts on surrounding habitat	Without	**High**	**Medium**	**High**	
	With	**High**	**Medium**	**Medium**	
AVIFAUNA					
Contamination of surrounding water.	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Low**	**Low**	
VISUAL					
Visual exposure of the newly introduced ash disposal facility	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Medium**	**Medium**	**Medium**	
Transforming the visual quality and sense of place of the landscape	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
SOCIAL					
Continued generation of electricity for the national grid	Without	**High**	**High**	**High**	**N/A**
	With	**High**	**High**	**High**	
Health Risk from elevated PM 10 Concentrations	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
Nuisance from elevated dustfall rates	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	

Table 9.7: Summary of identified impacts for the De-Commissioning Phase – Ash disposal facility

Potential Impact	**Mitigation**	**Significance**			
		Ash disposal facility – Site			**No-GO**
		A	**B**	**C**	
GROUND WATER					
Deterioration of groundwater quality due to spillages during Decommissioning	Without	**Low**	**Low**	**Low**	**N/A**
	With	**Low**	**Low**	**Low**	
Deterioration of groundwater quality due to leachate from ash disposal	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
Minor changes to local water table and local groundwater flow direction	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
Groundwater contamination in local area due to infiltration from surface water polluted by the ash disposal facility.	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
AGRICULTURAL POTENTIAL					
Loss of agricultural soil	Without	**High**	**High**	**High**	**Low**
	With	**High**	**High**	**High**	**Low**
SURFACE WATER					
Water Quality	Without	**Medium**	**High**	**Medium**	**N/A**
	With	**Low**	**Medium**	**Medium**	
BIODIVERSITY					

Impacts on flora species of conservation importance (including habitat suitable for these species)	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Medium**	**Low**	**Low**	
Impacts on fauna species of conservation importance (including habitat suitable for these species)	Without	**Medium**	**Medium**	**Medium**	
	With	**Medium**	**Low**	**Low**	
Impacts on sensitive or protected flora & fauna habitat types (including loss and degradation)	Without	**Medium**	**Low**	**Medium**	
	With	**Low**	**Low**	**Low**	
Displacement of fauna species, human-animal conflicts & interactions	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Impacts on ecological connectivity and ecosystem functioning	Without	**High**	**Medium**	**High**	
	With	**Medium**	**Medium**	**Medium**	
Indirect impacts on surrounding habitat	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
VISUAL					
Permanent transformation of the landscape	Without	**High**	**High**	**High**	**N/A**
	With	**Low**	**Low**	**Low**	

Table 9.8: Summary of identified cumulative impacts – Ash disposal facility

Potential Impact	**Mitigation**	**Significance**			
		Ash disposal facility – Site			**No-GO**
		A	**B**	**C**	
GROUNDWATER					
Deterioration of groundwater quality due to leachate from ash disposal facility	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Medium**	**Medium**	**Medium**	
Rise in local water table and minor changes to local groundwater flow directions	Without	**Medium**	**Medium**	**Medium**	
	With	**Low**	**Low**	**Low**	
Groundwater contamination in local area due to infiltration from surface water polluted by the ash disposal facility.	Without	**Low**	**Low**	**Low**	
	With	**Low**	**Low**	**Low**	
AGRICULTURAL POTENTIAL					
Loss of agricultural soil	Without	**High**	**High**	**High**	**Medium**
	With	**High**	**High**	**High**	**Low**
SURFACE WATER					
Decrease PES of wetland type and downstream watercourse	Without	**Medium**	**Medium**	**Medium**	**N/A**
	With	**Low**	**Medium**	**Low**	
BIODIVERSITY					
Cumulative impacts on conservation obligations & targets (including national and regional)	Without	**High**	**Medium**	**High**	**N/A**
	With	**High**	**Medium**	**High**	
Cumulative increase in local and regional	Without	**High**	**Medium**	**Medium**	

fragmentation/ isolation of habitat	With	**Medium**	**Medium**	**Medium**	
Cumulative increase in environmental degradation, pollution	Without	**High**	**Medium**	**Medium**	
	With	**Medium**	**Medium**	**Medium**	
VISUAL					
Incremental cumulative impact with the addition of an ash disposal facility in the visual landscape where and existing facility is already visible and not regarded as part of the natural environment.	Without	**Low**	**Low**	**Low**	**N/A**
	With	**N/A**	**N/A**	**N/A**	

9.3 Final Specialist Conclusions

9.3.1 Air Quality

The following can be concluded from the air quality impact assessment:

- Particulate matter, as dust fall-out, PM_{10} and $PM_{2.5}$, were identified as the pollutants of concern.
- Annual average ground-level concentrations of PM_{10} simulated by dispersion modelling did exceed NAAQS over an area ranging between 611 ha (Alternative C) and 949 ha (Alternative A). The number of sensitive receptors where exceedances are predicted ranges between 1 (Alternative C) and 4 (Alternative B).
- Exceedances of daily standards for PM_{10} are expected lowest as a result of Alternative C.
- Irrespective of the alternative, effective and continuous application of the mitigation measures will be essential to maintaining compliance with the NAAQS.

9.3.2 Ground Water

The main impacts on groundwater of the proposed ash disposal facility are likely to be:

- Deterioration in water quality; and
- Rise in groundwater levels in the immediate vicinity of the ash disposal facility due to additional recharge and groundwater mounding, which may alter the local groundwater flow direction.

The numerical model results suggest that the movement of leachate away from the ash disposal facility as a groundwater plume should take place relatively slowly, with plume extents being generally less than 1 km from the ash disposal facility after 100 years.

The main way to mitigate these impacts is to maintain the ash disposal facility in good condition (especially the drainage system). Once the ash disposal facility is decommissioned, it should be re-vegetated to minimise infiltration and to improve runoff quality, and the drainage system maintained to reduce downward movement of leachate from the base of the ash disposal facility. Groundwater monitoring from suitable boreholes should be undertaken during all

phases of ash disposal and after closure. If required the numerical model could be updated with new monitoring data.

In terms of the risk to groundwater, all three proposed alternative sites (A, B and C) present a similar risk, although slight preference would be given to Sites B and C due to the higher proportion of non-perennial water courses within their footprints compared to Alternative Site A.

9.3.3 Surface Water

The wetland assessment ascertained that most wetlands within the primary and secondary study area are in a Modified state. The wetland study contributions to the screening and scoping assessment assisted in the selection of the current alternatives assessed, in which large drainage lines and areas reflected a greater probability of wetness and were avoided as far as possible. This assessment complimented the screening and scoping assessment in that the selection criteria further minimises perceived impacts on wetlands. Similarly, general and more specific mitigation measures are provided for most anticipated impacts. The most significant impacts from a wetland perspective are considered to be the loss of wetland habitat that falls within the footprints of the proposed ash disposal facility and the risk of water quality deterioration due to seepage and leakage of pollutants from the facility.

All reasonable Alternatives have been assessed and it is unlikely that these impacts will be expressed with less significance anywhere else in the direct landscape than at Alternative A. However, some residual impact will persist if Alternative A is selected which may be further mitigated by avoiding as much wetland habitat as is reasonably possible. A possible consideration might be to combine parts of Alternative A and C. It is however, recommended that ashing footprint be kept within the catchment of wetlands 6 and 10.

9.3.4 Biodiversity

Based on the disparity of habitat types within each of the site alternatives, as well as the requirement of approximately 800 ha for the proposed development, it is strongly suggested that suitable portions (moderate to low floristic and faunal sensitivity) be used for development purposes. It is important to note that habitat of medium-high and high floristic and faunal sensitivity be excluded as well as placing the proposed ashing facility as far away from the sensitive wetland habitat type situated south of Alternative A.

9.3.5 Soils & Agriculture

As discussed above, the main impact of the establishment of an extension to the ADF would be the loss of several hundred hectares of potentially arable land. The low to moderate (at best)

potential of the majority of the soils under consideration means that this impact would not be of the highest significance. However, a definite area of concern is the fact that there are wetlands in the central part of the area, where the Wolwespruit flows southward, eventually joining the Vaal River in the Grootdraai Dam some 15 km to the south.

Wetland soils are among the most fragile and most important of soils due to their position in the landscape and their function in stabilizing and regulating the wetland ecosystem. The presence of permanent wetlands in the area is thus somewhat of a cause for concern. Here, great care must be taken to avoid contamination of the watercourse by waste material, which should be planned in conjunction with hydraulic engineers and/or groundwater specialists.

Along the edge of the existing ADF, chemical precipitation can be seen, as well as around the shores of the dams in the large wetland. This situation, and the potential exacerbation thereof, needs to be investigated further. The clayey nature of the soils means that any runoff from an extension to the ADF will percolate very slowly through the soil profile, giving ample time for precipitation from solution and deposition on the surface or in the soil.

The quantification of this situation, as well as possible solutions, needs to be done in conjunction with hydrologists and/or groundwater specialists.

9.3.6 Avifauna

No fatal flaws have been identified in terms of avifauna and the proposed ash disposal facility can be built on any of the three alternatives, provided that the various mitigation measures recommended in this report are implemented. However, from an avifaunal perspective, site alternatives C is preferred for development. The greatest impact of the proposed project is likely to be that of habitat destruction, while leachate from fly ash, into water systems used by avifauna is also of concern. 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 be mitigated for as per this report and the use of the Construction EMP.
- An "avifaunal walk through" by an avifaunal specialist, of the chosen site prior to construction/extension is recommended in order to identify potential breeding sites or nests of focal species.

9.3.7 Bats

Any species that occurs in the area of the proposed continuous disposal of ash at the Tutuka Power Station is vulnerable to disturbance and/or displacement as a result of the construction. At

least one of the bat species identified as potentially occurring in the area of the study site is Vulnerable (*Cleotis percivali)*, four Near Threatened (*Hipposideros gigas, Miniopterus natalensis, Rhinolophus blasii* and *Rhinolophus swinnyi*) and seven Least Concern. Acoustic recording confirmed that at least two of the bats occurring in the area were present on the site (*Neomicia capensis* and *Tadarida aegyptiaca)*. The uniformity of the habitat around the site also means that localized habitat destruction and disturbance would impact on bats but the habitat is not unique or important for bats and as such the surrounding habitats would be equally available to bats to utilize. The overall impact of the development on the bat population in the area is likely to be low, particularly if steps to mitigate impacts are taken.

Of the three site alternatives, alternative C would be preferred over site alternatives A and B because it is the only one that does not offer any appropriate roost sites for bats. Every effort should be made to mitigate the impacts on bats during this project through a construction EMP as well as by following the recommendations in this report.

9.3.8 Noise

Based on the findings of this noise study the drawn conclusions are:

- The extent of the significant noise impact, i.e. where the increase in ambient noise level will be equal or less than 3 dB, is limited to within approximately 560 m from the boundary of each of the alternatives;
- There are only four farmsteads where the increase in ambient noise level could be in excess of 3 dB. Without exception these are located right at the boundary of the respective alternatives;
- For each of the investigated alternatives and phases the significance rating is LOW; and
- In terms of their noise impacts the preferred site is Alternative C, while the rest are acceptable.

9.3.9 Heritage

The aim of the survey was to locate, identify, evaluate and document sites, objects and structures of cultural significance found within the area of the proposed development, to assess the significance thereof and to consider alternatives and plans for the mitigation of any adverse impacts.

9.3.10Visual

The proposed extension of an ash disposal facility for Tutuka Power Station is required to continue power generation at the plant.

The visual quality of the receiving environment has already been modified by views of the power station and associated infrastructure, which includes the ash disposal facility South of the power station. The power station dominates views in the foreground and middle ground, with the ash disposal facility less visible and largely integrated into the topography of the area.

The severity of impact is influenced by the perception of viewers, which is assumed to be neutral. The visual absorption capacity of the environment is assessed to be sufficient to integrate the facility into the existing landscape, provided the preferred site is chosen and proposed mitigation measures are carried out.

It is concluded that the visual impact of the proposed development is high in places, but can be mitigated by selecting the option with the least effect on sensitive receptors and implementing the proposed mitigation measures.

9.3.11 Social

The proposed ash disposal facility may result in water and air pollution, which in turn will have impacts on the health of humans, animals and crops. The ash facility needs to be 1.5km away from any settlements, and 3 to 5km away in the prevailing wind direction. Impacts on animals and crops would lead to negative economic impacts. It will, however, also have a positive impact on meeting electricity demands.

The impacts are already present in this case and the social impact process determined whether anything substantial will change on the social side with the continued extension of the ash disposal facility.

Although there are not many potential social impacts that can occur as a result of the project (as this is a proposed continuation of an already existing waste facility), the impacts, if they do occur, will not be severe. It is, however, still imperative that mitigation measures are implemented to prevent any negative impacts from occurring.

9.4 Site Preference Rankings

Table 9.9: Averages and weighted averages indicating the preferred site.

SPECIALIST	Weight	SITE			
		A	B	C	
Air	**2.26**	3	2	4	
Groundwater	**2.35**	3	3	3	
Bats	**2**	3	3	4	
Birds	**2**	3	3	4	
Heritage	**1.55**	3	3	3	
Social	**1.61**	3	3	3	
Noise	**1.32**	3	3	4	
Agric	**1.74**	4	3	3	
Surface Water	**2.29**	4	2	3	
Biodiversity	**2.19**	2	4	3	
Visual	**1.55**	3	4	2	
		2.428571	2.357143	2.571429	**Average**
		59.59	56.94	63.78	
		5.959	5.694	6.378	**Weighted Average**

Table 9.9 is a summary of the preferences of all the individual specialist studies. The studies have been combined and weighted averages has been calculated based on the method and discipline specific weights as proposed in the original Plan of Study.

Alternative C has been identified as the most suitable alternative with the least significant Environmental impacts across all disciplines (Figure 9.1).

Alternative A as the second most preferred alternative could be used if the required airspace could not be accommodated in **Alternative C**. Using a combination of these two alternatives should incorporate the recommendation from the Wetlands specialist with regard to the avoidance of certain Wetland areas.

Figure 9.1: Location of the three alternatives that formed part of the primary study area for the Tutuka Continuous ADF.

9.5 Impact Assessment Conclusions

9.5.1 Construction phase impacts

Some significant impacts has been identified that will occur during the construction phase. This is especially applicable to the Biodiversity, Surface Water and the loss of Agricultural Potential. Most of these could be reduced to Medium significance following mitigation. The only residual impact with high significance is the loss of Agricultural potential. The impacts are relatively evenly distributed amongst all of the site alternatives.

With this in mind it is important to realise that the alternatives itself has been identified as areas with the minimum impact on the Environment in relation to the study area. This has been done by incorporating the results from all the different specialist studies.

This means that although there will be significant biodiversity impacts by using the Alternative C, the cumulative impacts on all aspects studied will most probably be less than for any other area within the 8 km radius.

9.5.2 Operational phase impacts

As with the Construction phase all but two impacts between Biodiversity and the Wetlands assessment (most significant impacts in these disciplines) can be mitigated to Medium significance. The impact on Hydrology and the impact on the surrounding Environmental remain high following mitigation. The Groundwater report describe the residual impact on Hydrology in detail.

The other residual impact with High significance during the operational phase, is the irreversible loss of Agricultural soil. This impact will be relevant to any area identified for disposal and the impact has been minimised as far as possible by selecting the lowest possible agricultural potential soils.

9.5.3 Decommissioning phase impacts

No new impacts will be introduced during the decommissioning phase with high significance. By aligning operations with all mitigations proposed in the Environmental Management plan impacts will be minimised as far as possible. After De-commissioning these impacts are expected to decrease in Severity.

The only impact remaining after decommissioning with High significance is the loss of Agricultural soil which has been provisioned for by selecting the lowest potential soils for the facility.

9.5.4 Cumulative Impacts

Cumulative impacts on conservation objectives and targets have been identified as the most important biodiversity impact. This together with the loss of Agricultural land can be raised as the most important cumulative impacts of the Tutuka Continues Ash Disposal Facility project.

Taking into account the post mitigation impacts of the proposed **Alternative C** as well as the preference rankings from the various specialists it is clear that this alternative C, see **(Figure 9.1)**, is the preferred alternative for the project. It is important to realise that as with all the other alternatives some wetlands will be affected by using this area.

Alternative A has been identified as the second most preferred alternative based on Environmental considerations. A combination of these two alternatives would increase the footprint area of the facility but could provide more leeway for the avoidance of sensitive areas on both alternatives such as Wetlands and Dams.

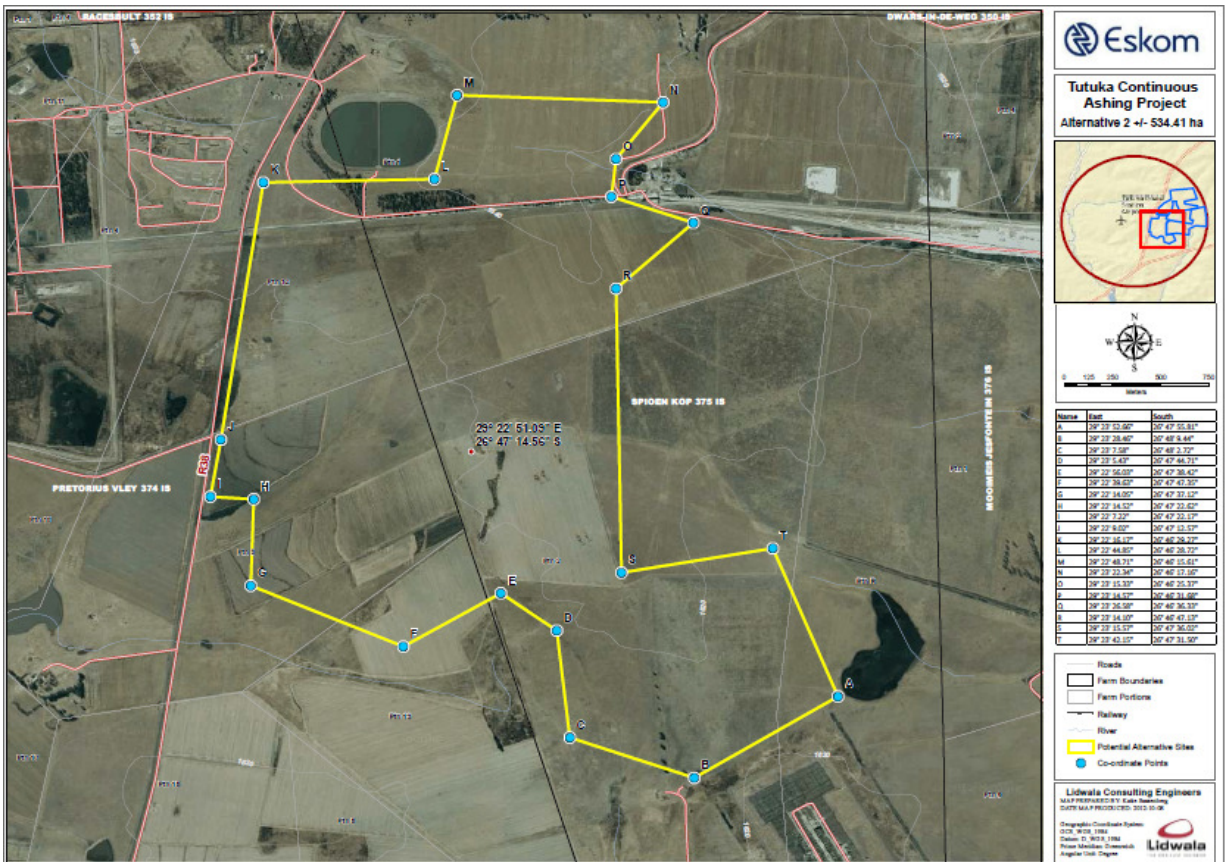

Figure 9.2. Proposed footprint (area) for the Tutuka Continuous Ash Disposal facility based on the findings of the EIA studies (Alternative C).

Taking all the various factors and studies into account the EAP propose a layout as indicated in the conceptual design **Appendix C**. This design incorporates all the Environmental sensitivities to achieve a "least environmental cost" solution that is still practical and financially feasible. It is therefore recommended by the Environmental Assessment Practitioner that the proposed option are approved subjected to the implementation and monitoring of all the mitigation measures as listed in the specialist studies and carried over to the Environmental Management Programme.