

ENVIRONMENTAL IMPACT



MANAGEMENT SERVICES

**ADDENDUM TO GENERAL ENVIRONMENTAL
MANAGEMENT PROGRAMME**

**SITE SPECIFIC ENVIRONMENTAL
MANAGEMENT PROGRAMME**

**KENDAL ZEUS AND KUSILE ZEUS POWER
LINES**

**EIMS Ref #: 0933
DEA Ref # 12/12/20/1095**



Environmental Impact Management Services (Pty) Ltd
Block 5 Fernridge Office Park, 5 Hunter Avenue,
Ferndale, Randburg.
P.O. Box 2083, Pinegowrie 2123
Tel: +27(0)11 789-7170
Fax: +27(0)11 787-3059



DOCUMENT CONTROL

400kV Power Lines from Kendal Power Station to Zeus Substation and from Kusile Power Station to Zeus Substation

Site Specific Environmental Management Programme

	NAME	SIGNATURE	DATE
Compiled:	Nobuhle Hughes Nangamso Zizo Siwendu		
Checked:	Liam Whitlow		
Authorized:	Liam Whitlow		

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REVISION AND AMENDMENTS

DATE	No.	DESCRIPTION OF REVISION OR AMENDMENT
12/02/2013	0	Final EMPR – Submission to DEA

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1 GENERAL OVERVIEW

1.1 INTRODUCTION

Eskom Holdings SOC Limited (Eskom - the Applicant) wishes to construct two 400kV power lines, one between the existing Kendal Power Station and Zeus Substation and the other between Kusile Power Station and Zeus Substation. In order to proceed with this activity Eskom was required to obtain an Environmental Authorisation (EA) in accordance with the provisions of the National Environmental Management Act (Act 107 of 1998). In order to obtain the EA it was necessary to conduct an Environmental Impact Assessment (EIA) process (Ref: 12/12/20/1095) which culminated with the submission of an EIA Report and a Draft Environmental Management Programme (EMPR). The EA was issued on the 08/10/2009 (authorisation registration number 12/12/20/1096) by the competent authority (CA), the Department of Environmental Affairs (DEA). Once the EA is issued, the Draft EMPR needs to be revised to include any conditions contained in the EA received from the DEA as well as outcomes of a post EA walk-down of the approved power line alignments.

Eskom has appointed Environmental Impact Management Services (Pty) Ltd (EIMS) to conduct the post EA walk-down and to amend the Draft EMPR to include the EA conditions and the walk-down findings and recommendations from relevant specialists (ecology, avifauna, heritage and wetlands). This Final EMPR presents a guideline for the mitigation and management measures to be implemented to avoid, reduce and minimise potential environmental impacts arising out of the development and operation of the proposed power lines and ancillary structures. The purpose of an EMPR is to give effect to precautionary measures, which are to be put in place for controlling the activities that take place on site, and to ensure compliance with national legislative and regulatory requirements. The EMPR should allow for risk minimization, rather than just ensuring legal compliance. The EMPR as a basic requirement complies with Regulation 543, Section 33 (promulgated under the National Environmental Management Act-Act 107 of 1998-NEMA).

It should be borne in mind, however, that the EMPR is a working document that should be updated on a regular basis to ensure continued applicability and improvement- any amendments must comply with the DEA requirements. The relevant approved EMPR and EA must be kept on the property where the activity will be undertaken. The EA and EMPR must be produced to any authorised official of the DEA who requests such and must be made available for inspection by any employee or agent of the applicant who works or undertakes work at the property. By virtue of the fact that the EMPR forms part of the documentation submitted to the CA for decision-making purposes, and forms part of the EA, the provisions contained herein become legally binding.

Table 1 below presents an overview of the project as approved by the DEA (authorisation registration number: 12/12/20/1096).

Table 1: Overview of approved project.

Description:	Construction of 2 x 400kV power lines from Kendal Power Station to Zeus Substation and Kusile Power Station to Zeus Substation. These two power lines will be approximately 110 km in length and will run parallel to each other.
Location	General Kendal and Kusile Power Stations near Ogies and Zeus substation in Secunda; within the Emalahleni, Delmas, and Govan Mbeki Local Municipalities, and the Nkangala and Gert Sibande District Municipalities, in Mpumalanga Province.

Specific	Position	Latitude	Longitude
Start Point		Kendal to Zeus: 26° 5.183'S	28° 58.384'E
		Kusilel to Zeus: 26° 5.071'S	28° 58.320'E
Middle Point		Kendal to Zeus: 26° 22.239'S	29° 1.069'E
		Kusile to Zeus: 26° 22.238'S	29° 1.102'E
End Point		Kendal to Zeus: 26° 40.077'S	29° 5.535'E
		Kusile to Zeus: 26° 40.057'S	29° 5.562'E

Please refer to Appendix C for the final site layout plan.

The Final EMPR comprises of the general EMPR (with the general environmental specifications) provided by Eskom and compiled by Zitholele Consulting (see Appendix B for the general EMPR) and the site specific environmental management and mitigation measures based on the issued EA and walk-down, as addendum to the general EMPR. Since the Final EMPR is an extension of the conditions of the EA, non-compliance with the Final EMPR constitutes non-compliance with the EA. The holder of the EA must notify the DEA (including the Director: Environmental Impact Evaluation and the Director: Compliance Monitoring) in writing and within 48 hours if any condition of the EA cannot or is not adhered to. Any notification in terms of this condition must be accompanied by reasons for the non-compliance.

The Environmental Assessment Practitioner (EAP) who compiled this report is tabled below:

Table 2: EAP details.

Environmental Assessment Practitioner (EAP):	Environmental Impact Management Services (Pty) Ltd.		
Contact person:	Nobuhle Hughes		
Postal address:	P.O.Box 2083, Pinetown,		
Postal code:	2023	Cell:	073 220 6388
Telephone:	011 789 7170	Fax:	011 787 3059
E-mail:	nobuhle@eims.co.za		

1.2 OBJECTIVES

The primary objectives of the Final EMPR (comprising of the general and site specific environmental specification) are as follows:

- To promote sustainability and describe an action programme to mitigate as far as possible negative impacts;
- This Final EMPR will be a practical document that precisely sets out both the goals and actions required in mitigation. Though the term “Mitigation” can be broad in definition, it means in this context to “allay, moderate, palliate, temper or intensify.” Mitigation of a negative impact means that its effect is reduced. Mitigation of a positive impact means that its effect is increased or optimised; and
- To indicate responsibilities for the implementation of these action items within the programme.

This Final EMPR shall be deemed to have contractual standing on the basis that its contents are a detailed expansion of the requirement/s of the EA, and is provided to the Contractor and the Project Manager. The objectives and targets in this Final EMPR are further guided by the National Environmental Management Act, (1998 as amended) itself and by its Regulations 543, 544, 545. Thus the underlying principles of Sustainable development are the ultimate objectives and target of this report.

The following guiding principles have been included, and serve as the driver behind mitigation and monitoring of impacts created by the development activity. The Final EMPR has included measures to ensure the development activity complies with the following principals (NEMA, Act 107 of 1998 as amended), amongst others:

- ✓ That the disturbance of watercourses, flora and fauna are minimised and remedied;
- ✓ That pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied or avoided;
- ✓ That waste is avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;
- ✓ That heritage resources are protected;
- ✓ That a risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions; and
- ✓ That negative impacts on the environment and on people's environmental rights be anticipated and prevented and remedied.

2 LEGISLATION AND ADDITIONAL REQUIREMENTS OF THE EA

The applicant together with the ECO and the EO shall identify and comply with all relevant national, provincial and local legislation, including associated regulations and shall establish and maintain procedures to keep track of, document and ensure compliance with environmental legislative changes. These legislative requirements include, but are not limited to, the provisions of the legislation represented in Table 3.

Table 3: General Environmental Legislation.

Title of legislation, policy or guideline:	Administering authority:
National Water Act (Act No. 36 of 1998)	Department of Water Affairs
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Department of Mineral Resources
National Environmental Management Act (Act No. 107 of 1998) - and associated Regulations	Department of Environmental Affairs
National Environmental Management: Biodiversity Act, (Act No. 10 of 2004)	Department of Environmental Affairs
National Environmental Management: Protected Areas Act, (Act No. 57 of 2003)	Department of Environmental Affairs
National Environmental Management: Waste Act (Act No. 59 of 2008) - and associated Regulations	Department of Environmental Affairs
Occupational Health and Safety Act, (Act 85 of 1993)	Department of Labour
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Department of Environmental Affairs
South African National Heritage Resources Act (Act No. 25 of 1999)	South African National Heritage Resources Authority.
National Forest Act, (Act No. 122 of 1984)	Department of Agriculture, Forestry and Fisheries

The following additional requirements were included but are not limited to, the approved EA. Please refer Appendix 2 for a full list of the EA conditions.

- ✓ No construction activities (including the vegetation clearing, excavations, construction camps, access roads, soil stockpiling and material storage) must be kept within river banks, wetlands and drainage channels;
- ✓ Should any heritage resources be exposed during the excavation for the purpose of construction, construction in the vicinity of the finding must be stopped. A registered heritage specialist must be called to the site for inspection. Under no circumstances shall any heritage material be destroyed or removed from the site. The relevant heritage resource agency must be informed about the finding;
- ✓ Sections of the power line that transverse known paths of large birds, or cross or are aligned to dams, pans, rivers and drainage lines, must be marked with appropriate bird flappers and diverters;
- ✓ All areas to be disturbed during the construction phase of the project must be rehabilitated using only indigenous plants;
- ✓ Indigenous vegetation which does not interfere with the safe operation of the power line must be left undisturbed;
- ✓ Wetland, avifaunal and heritage specialists should be present during the planning and pegging of the final route alignment to ensure that the positions of pylons result in minimum impacts on birds, heritage resources and sensitive landscapes features (wetlands and rivers);
- ✓ Waste containers must be provided on the construction site as well as along the access routes to prevent littering;
- ✓ No surface or ground water may be polluted due to activity on the site; and
- ✓ Construction must include appropriate design measures that allow surface and subsurface movement of water along drainage lines so as not to impede natural surface and subsurface flows. Drainage measures must promote the dissipation of storm water- off.

3 FINAL ROUTE ALIGNMENT

A site walkthrough of the final route alignment was undertaken by four specialists (Ecology, Avifauna, Heritage and Wetland), Please refer to Appendix D for the specialist reports. The specialist site walkthrough consisted of a walk down of the power line alignment and the evaluation of each proposed tower position as provided by Eskom. Each power line is approximately 110km in length. In total 365 tower positions were assessed. The Kendal to Zeus (KE-ZE) power line started from the Kendal Power Station to Zeus Substation and the Kusile to Zeus (KU-ZE) power line started from the Zeus Substation to the Kendal Power Station.

Many of the towers were found within previously altered landscapes (mostly cultivation). A significant number of towers are within grassland areas. No plants species of concern were found anywhere within the footprint of proposed towers. However, some species were found along the alignment or within the servitude. This included the plant species of low conservation concern, *Hypoxis hemerocallidea*, *Boophone disticha* and *Crinum bulbispermum* (all listed as Declining). No protected trees were recorded anywhere along the alignment, nor any habitats in which they would be expected to be found.

Sixteen (16) heritage sites were identified along the route alignment by the heritage specialist. Out of the 16 heritage sites, only Tower KE-ZE 134 is found to impact directly on an identified heritage site (KE-ZEU-009). Only one area of paleontological significance (specifically, geological outcrop) was visible on site during the site survey.

81 towers with delineated wetland courses were identified on site. All of the wetlands recorded on site have been impacted upon and degraded by various anthropogenic activities (mining, power stations,

water abstraction, urbanization and agriculture. Most of the wetlands are seasonally wet, with surface flow limited to relatively extreme events. Towers KE-ZE 125 and KU-ZE 182 are located within a permanently wet wetland area.

4 FINDINGS OF SPECIALISTS WALK-DOWN

This section presents the broad findings of the pre-construction specialist walk-down per discipline. The information in this section has been extracted from the relevant specialist studies. The complete specialist reports are presented in Appendix D.

4.1 HERITAGE AND PALAEOLOGY SPECIALISTS

The Heritage walk-down was undertaken by Professional Grave Solutions (PGS) Heritage and Grave relocation consultants. Metsi-Metseng Geological Environmental Services CC was appointed by PSG Heritage and Grave relocation consultants to undertake a desktop survey, assessing the potential palaeontology impact for the proposed construction of the Kendal to Zeus and Kusile to Zeus 400kV power lines. The walk-down took place between the 29th of October 2012 and the 3rd of November 2012. The survey was tracklogged.

During the site survey of the final route alignment and proposed tower positions, 16 heritage sites were identified along the route alignment by the heritage specialist. Out of the 16 heritage sites, only Tower KE-ZE 134 is found to impact directly on an identified heritage site (KE-ZEU-009).

There is only one area of paleontological significance (specifically, geological outcrop) that was visible on site during the site survey. The Palaeontology desktop survey undertaken by Metsi-Metseng Geological Environmental Services CC entailed a basic assessment of the topography and geology of the area by using appropriate geological (1:250 000, 2628 East Rand) maps in conjunction with Google Earth. A review of the literature on the geological formations underlying the development site revealed that the study area is mainly underlain by Permian sedimentary rocks of the Vryheid Formation of the Ecca Subgroup which forms part of the Karoo Supergroup with Jurassic aged igneous rocks occurring in the form of large dolerite sills and dykes. There is a possibility that fossils could be encountered during excavation of bedrock of the Vryheid Formation within the development footprint of individual towers and these fossils would be of international significance. Although the Vryheid Formation has a high sensitivity there are very little to no outcrops of the Formation, making it difficult to confirm the presence of any fossil material.

Heritage resources are unique and non-renewable and as such any impact on such resources must be seen as significant. As mentioned above, 16 sites of heritage significance were identified during the site survey. Specific recommendations for these sites are as follows:

- ✓ Demarcate the sites as a no go areas; and
- ✓ The sites must be monitored during construction.

Only one tower position, KE-ZE 134, impacts directly on an identified heritage site (KE-ZEU-009). The recommendations for this site are:

- ✓ Demarcate the site as a no go area;
- ✓ If it is found that the site is right in the tower foot print during pegging, the possibility of moving the tower foot print 50 meters towards Tower KE-ZE133 or KE-ZE135 must be considered;
- ✓ If the tower cannot be moved a grave relocation process for the grave and test excavations for the circular structure must initiated before construction can commence;

- ✓ The grave relocation process must include an extensive social consultation process before permit applications to SAHRA, Local and Provincial can be lodged for the relocation (This process can take up to 6 months);
- ✓ The test excavations on the circular structure will require a permit from SAHRA under Section 36 of the NHRA, after which the test excavations can be done. On completion of the test excavation a permit application for the destruction of the site must be lodged with SAHRA. On granting of the permit construction can commence and the site destroyed (This process can take up to 4 months); and
- ✓ The site must be monitored during construction.

Based on the findings of the walk-down the following general mitigation measures are recommended:

- ✓ A monitoring plan or watching brief must be agreed upon by all the stakeholders for the different phases of the project;
- ✓ A Palaeontologist is employed by the contractor to monitor the excavation of foundation and service trenches, landscaping and any other intrusive works, in the paleontological sensitive areas;
- ✓ The contractor undertakes to give the palaeontologist sufficient time to identify and record any palaeontological finds and features;
- ✓ If during construction any possible finds are made, the operations must be stopped and the qualified archaeologist be contacted for an assessment of the find;
- ✓ All stakeholders and key personnel should undergo an archaeological/cultural heritage induction course prior to commencement of construction;
- ✓ In the event that an area previously not included in an archaeological or cultural resources survey is to be disturbed, the South African Heritage Resources Agency (SAHRA) needs to be contacted;
- ✓ An enquiry must be lodged with them into the necessity for a Heritage Impact Assessment;
- ✓ In the event that a heritage survey is required then a qualified heritage practitioner, preferably registered with the Cultural Resources Management Section (CRM) of the Association of Southern African Professional Archaeologists (ASAPA), must be used;
- ✓ Any survey must comply with the standards and requirements of the National Heritage Resources Act (NHRA) as well as the South African Heritage Resources Agency (SAHRA). In the event that a possible find is discovered during construction, all activities must be halted in the area of the discovery, a qualified archaeologist (or relevant cultural heritage specialist) contacted and an evaluation undertaken. Recommendations from this evaluation must be complied with prior to recommencement of work on the specific area. In the event that human remains are uncovered or previously unknown graves are discovered a qualified archaeologist (or relevant cultural heritage specialist) needs to be contacted and an evaluation of the finds made; and
- ✓ If the human remains are to be exhumed and relocated, the relocation procedures as accepted by SAHRA needs to be followed.

Long sections of the proposed Kendal to Zeus & Kusile to Zeus 400kV power lines are underlain by Karoo aged sedimentary rocks of the Vryheid Formation which has a high sensitivity for fossil material being found during excavations for individual pylon footings and foundations. Although the Vryheid Formation has a high sensitivity there are very little to no outcrops of the Formation, making it difficult to confirm the presence of any fossil material. In light of this it is recommended that:

- ✓ A qualified Palaeontologist is on site during the construction phase when excavations expose bedrock of the Vryheid Formation; and
- ✓ An application for a collection permit from SAHRA must be obtained and a Palaeontologist appointed for the collection and rescue of fossil material prior to the start of the construction phase.

4.2 ECOLOGICAL SPECIALIST

The specialist ecological walk down was conducted from the 29th of October to the 16th of November 2012 by David Hoare Consulting CC (See Appendix D for the full report). The survey was done with the use of a hand-held GPS receiver to locate pylon positions. At each tower/pylon position, the general habitat conditions were recorded and an assessment was made of the potential presence of any ecological sensitivities, as follows:

- ✓ Landuse / landcover;
- ✓ Species of conservation concern;
- ✓ Protected trees;
- ✓ Natural habitat of conservation concern; and
- ✓ Wetland habitats.

A minimum of one photograph was taken at each tower position within natural areas. All photographs were taken along the alignment. Ecological sensitivities identified during the walk-down are the presence of grasslands and wetlands. Many towers are within previously altered landscapes (mostly cultivation) and pose no biodiversity issues. A significant number of towers are within grassland areas, but the impact of these is considered to be small and no alterations in position are proposed.

No plants species of concern were found anywhere within the footprint of proposed towers. However, some species were found along the alignment or within the servitude. This included the plant species of low conservation concern, *Hypoxis hemerocallidea*, *Boophone disticha* and *Crinum bulbispermum* (all listed as Declining). No protected trees were recorded anywhere along the alignment, nor any habitats in which they would be expected to be found.

Grasslands are interspersed with shallow drainage valleys in which wetlands usually occur. A small number of towers are within wetland areas. Some of these can be shifted to avoid impacts on wetlands and may affect habitats that are important for some species of narrow ecological amplitude or that are rare in the general landscape. A variety of different wetlands occur within the power line servitude, including small streams with permanent channels, permanent wetlands in valley bottoms, seasonal wetlands, floodplains and hillslope seeps. These are all classified as protected areas in terms of the National Water Act and they should either be avoided or a permit obtained to affect them. In some cases, it is possible to accommodate towers within these areas without undue impacts being anticipated, but in others, it may be preferable to shift towers to avoid more severe impacts on wetlands. Sensitive areas associated with particular towers included the following:

- ✓ KU-ZE79/KE-ZE22: is located in a hillslope seep;
- ✓ KU-ZE81/KE-ZE24: is situated in a hillslope seep, especially at location of Tower KU-ZE81 (see Figures 1 and 2);
- ✓ KU-ZE84/KE-ZE27: is in a wetland;
- ✓ KU-ZE86: is situated in a drainage line drainage line, not in good condition, moderately eroded, but sensitive to further disturbance;
- ✓ KU-ZE121/KE-ZE64: is located in disturbed wetland between cultivated lands, but habitat is intact and a marsh owl was found there. The habitat is not critically important and is disturbed;
- ✓ KU-ZE123/KE-ZE66: is in permanent wetland on floodplain dominated by *Eleocharis dregeana* and *Leersia hexandra* (species only found in permanent wetlands). This is a relatively rare floodplain habitat in the general landscape that is in good condition at this site. It forms part of the floodplain system that includes meandering channel and other dryer floodplain areas (see Figures 3 and 4);

- ✓ KU-ZE168: is located in a drainage line, not in good condition, but in functional state. If possible, move further north (approximately 40 m);
- ✓ KU-ZE178/KE-ZE121: is in a seasonal wetland on floodplain dominated by a combination of obligate and facultative wetland plant species, including *Ranunculus multifidus*, *Crinum bulbispermum* and *Limosella major* (see Figure 5). This floodplain habitat is in good condition at this site. Just downstream, the habitat becomes a permanent wetland (at the location of KU-ZE179/KE-ZE122) (see Figures 5 and 6) and
- ✓ KE-ZE168: is situated in a disturbed wetland in poor condition adjacent to small farm dam.



Figure 1: Google imagery of Towers KE-ZE 24 and KU-ZE 81 with wetland shown in blue.



Figure 2: Hillslope seep vegetation at Tower KU-ZE 81



Figure 3: Google imagery of Towers KE-ZE 66 and KU-ZE 123 in floodplain area.



Figure 4: Permanent wetland vegetation at Towers KE-ZE 66 and KU-ZE 123

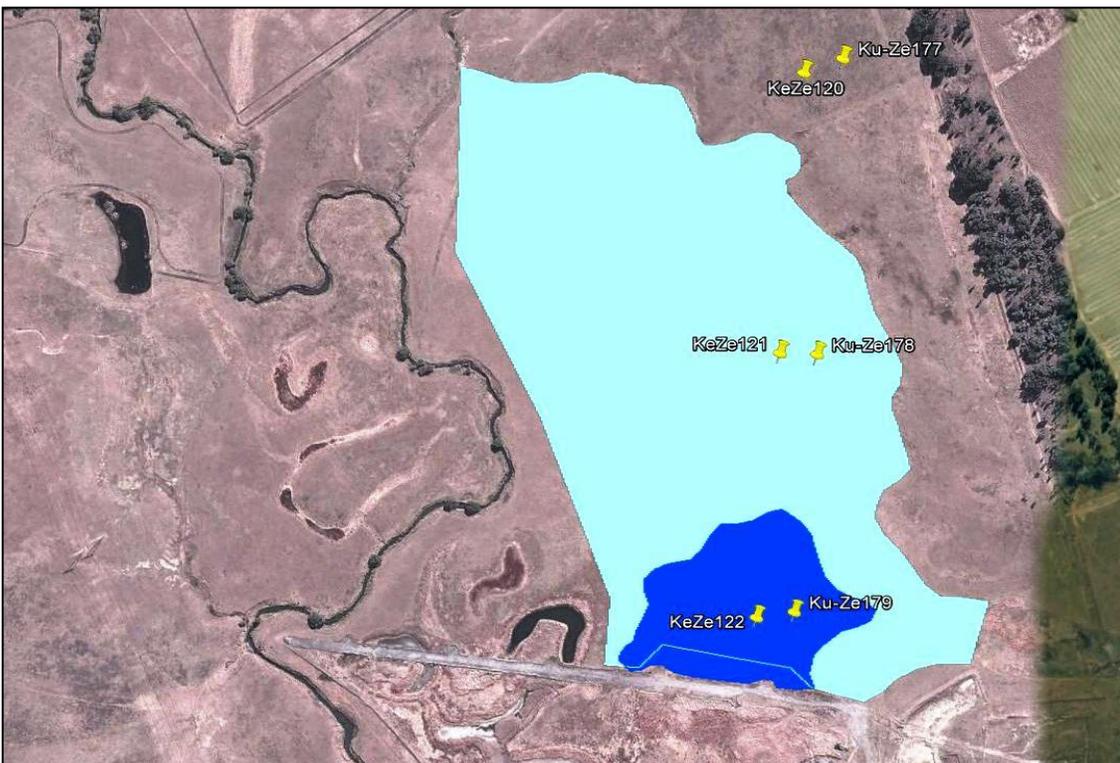


Figure 5: Google imagery of Towers KE-ZE 121 and KU-ZE 178 in floodplain area (light blue) and Towers KE-ZE 122 and KU-ZE 179 in permanent wetland (dark blue).



Figure 6: Permanent wetland vegetation at Towers KE-ZE 121 and KU-ZE 178

A number of proposed towers are within wetland areas. Specific recommendations for these sites are:

- KU-ZE79/KE-ZE22: Hillslope seep. If possible, move slightly further south (20-50m) to the edge of the cultivated land;
- KU-ZE81/KE-ZE24: Hillslope seep, especially at location of Tower KU-ZE81. If possible, move, although this does not appear to be technically possible for Tower KU-ZE81 without changing the whole alignment;
- KU-ZE84/KE-ZE27: Wetland. If possible, move slightly further north (50 m) closer to the edge of the cultivated land;
- KU-ZE86: Drainage line, not in good condition, moderately eroded, but sensitive to further disturbance. If possible, move slightly further north (30m);
- KU-ZE121/KE-ZE64: Disturbed wetland wetland between cultivated lands, but habitat is intact and a marsh owl was found there. The towers are at the point of a bend, so the possibility of position adjustments is unknown. The habitat is not critically important and is disturbed, but, if possible, move towers closer to the edge of the wetland area;
- KU-ZE123/KE-ZE66: Permanent wetland on floodplain dominated by *Eleocharis dregeana* and *Leersia hexandra* (species only found in permanent wetlands). This is a relatively rare floodplain habitat in the general landscape that is in good condition at this site. It forms part of the floodplain system that includes meandering channel and other dryer floodplain areas. Tower KU-ZE123 should be moved 100m towards Towers KU-ZE124 and KE-ZE66 should be moved 100m towards Tower KE-ZE67, both to be positioned outside permanent wetland habitat;
- KU-ZE168: Drainage line, not in good condition, but in functional state. If possible, move further north (approximately 40m);
- KU-ZE178/KE-ZE121: Seasonal wetland on floodplain dominated by a combination of obligate and facultative wetland plant species, including

Ranunculus multifidus, *Crinum bulbispermum* and *Limosella major*. This floodplain habitat is in good condition at this site. Just downstream, the habitat becomes a permanent wetland (at the location of Towers KU-ZE179/KE-ZE122). The only way this area can be avoided is if Towers KU-ZE178/KE-ZE121 and KU-ZE179/KE-ZE122 are shifted 200 – 350m to the east out of the wetlands; and KE-ZE168: Disturbed wetland in poor condition adjacent to small farm dam. If possible, move further south (approximately 40 m) out of wetland area.

- To deal with the positioning of tower structures within wetlands, the following measures are proposed:
 - If possible from a technical point of view, towers within wetlands should be re-positioned in such a way as to fall a minimum of 30m outside the watercourse area. If this is not possible then the following measures will need to be taken;
 - There is a legal obligation to apply for a Water Use Licence (WUL) for any water resource that may be affected, as defined in the National Water Act. This includes this watercourse; and
 - The exact extent and location of water resource, as defined in the National Water Act, must be determined. A specialist wetland study is being undertaken for this project, so it is expected that this wetland study will confirm the location of boundaries of such features.

- To minimise damage to grassland areas, the following measures are proposed:
 - Clear only the position of the tower foundations, not the entire base of the tower;
 - Rehabilitate disturbed areas immediately after construction;
 - Use existing access roads, where possible; and
 - Avoid impacts on surrounding areas.

- To control alien plants in all parts of the alignment, but especially in the northern parts, the following measures are proposed:
 - Avoid creating conditions in which alien plants may become established;
 - Keep disturbance of indigenous vegetation to a minimum;
 - Rehabilitate disturbed areas as quickly as possible;
 - Do not import soil from areas with alien plants;
 - Establish an on-going monitoring programme to detect and quantify any alien species that may become established and identify the problem species (as per conservation of agricultural resources act); and
 - Immediately control any alien plants that become established using registered control methods.

- A possible alien plant monitoring programme could be as follows:
 - Annual audit of project area and immediate surroundings by qualified botanist. If no species are detected, then this can be stated. If any alien invasive species are detected then the distribution of these should be mapped (GPS co-ordinates of plants or concentrations of plants), number of individuals (whole site or per unit area), age and/or size classes of plants and aerial cover of plants.

4.3 AVIFAUNA SPECIALIST

The avifauna specialist walk-down was conducted on the 23rd and 24th of August 2012 by Wild Skies Ecological Services, and during the week of the 29th of October 2012 by a Grass Owl specialist (Matt

Pretorius – currently studying an MSC on the species). The key findings and proposed mitigation measures are as follows:

- ✎ Electrocutation of birds: Electrocutation of birds on the proposed Kendal to Zeus and Kusile to Zeus 400kV power lines is not possible due to the large clearances on this size power line;
- ✎ Collision of birds: To mitigate for collision, it is recommended that the earth wires on the spans (please refer to Table 4: The spans of the lines requiring the above-mentioned mitigation. Table 4) be fitted with the best available (at the time of construction) Eskom approved anti bird collision line marking device. This should preferably be a dynamic device, i.e. one that moves. It is important that these devices are installed as soon as the conductors are strung, not only once the line is commissioned, as the conductors pose a collision risk as soon as they are strung. The devices should be installed alternating a light and a dark colour to provide contrast against dark and light backgrounds respectively. This will make the overhead cables more visible to birds flying in the area. It will be Eskom's responsibility to ensure that these marking devices are maintained in an effective state, and replaced if necessary, for the lifespan of this power line. Since the two proposed power lines are so close together, it is recommended that the outer earth wire on each line be marked. In other words only two of the four earth wires will need to be marked. This will save money, whilst in my opinion still providing adequate mitigation. This only applies if the two lines are built as close together as the information indicates currently. If this changes for any reason the specialist must be consulted again;
- ✎ Habitat destruction: General environmental best practice should be adhered to in areas such as wetlands, streams and natural grassland. There is little habitat suitable to African Grass Owl along the alignment, with the exception of one patch of *Imperata cylindrica* grass at Tower KE-ZE 69. This is prime roosting habitat for Africa Grass Owl. Pellets of the species were also found on this site, confirming that they have utilised the area previously. Since this is a preferred grass species for this bird species, is in short supply elsewhere in its range, and is likely to be destroyed or significantly altered during construction it is recommended that it be relocated to another site where it can be used by owls. This relocation and transplant needs to be done during early summer in order to ensure success. It is therefore recommended that this be arranged between the landowner, Eskom and Matt Pretorius in the near future. If Environmental Control Officer is appointed in time he/she should also be part of this process; Disturbance of birds: There are no particular issues identified at this stage. If the Environmental Control Officer identifies any sensitive breeding species on or close to site during construction, the specialist should be notified and given opportunity to provide case specific management recommendations; and
- ✎ Electrical faulting caused by birds: All towers close to water should be fitted with the standard Eskom Bird Guards as per Eskom Transmission guidelines. This will deter birds from perching directly above live hardware thereby posing a risk of faulting.

Table 4: The spans of the lines requiring the above-mentioned mitigation.

Kusile Zeus Tower number	Kendal Zeus tower number	Comment	Risk	Mitigation
64-69	7-12	Small pan, wetland, slimes dam, flight path	Collision	Install marking device as explained above.
71-74	14-17	Wetland, dam, flight path	Collision	Install marking device as explained above.

77-78	20-21	Wetland crossing, flight path	Collision	Install marking device as explained above.
80-82	23-25	Wetland crossing, flight path	Collision	Install marking device as explained above.
83-85	26-28	Close to dam, wetland, flight path	Collision	Install marking device as explained above.
87-89	30-32	Wetland crossing	Collision	Install marking device as explained above.
97-101	40-44	Dam, flight path	Collision	Install marking device as explained above.
106-108	49-51	String of dams, flight path	Collision	Install marking device as explained above.
110 - 118	53-61	Several dams, wetlands, pans	Collision	Install marking device as explained above.
121-124	64-67	Wetland crossing	Collision	Install marking device as explained above.
132-137	75-79	Wetland	Collision	Install marking device as explained above.
140-142	83-85	Dam	Collision	Install marking device as explained above.
147-151	90-94	Wetland crossing, dams	Collision	Install marking device as explained above.
155-156	98-99	Wetland crossing	Collision	Install marking device as explained above.
162-166	105-109	Wetland crossing	Collision	Install marking device as explained above.
178-185	120-128	Dams, wetlands	Collision	Install marking device as explained above.
187-192	130-134	River, small dam	Collision	Install marking device as explained above.
197-199	139-141	Stream crossing	Collision	Install marking device as explained above.
206-209	148-151	Stream, dam	Collision	Install marking device as explained above.
210-211	152-153	Small dam	Collision	Install marking device as explained above.

214-216	156-158	Flight path	Collision	Install marking device as explained above.
217-223	159-165	Stream, dam	Collision	Install marking device as explained above.
225-231	167-173	Dams, streams, wetlands	Collision	Install marking device as explained above.

4.4 WETLAND SPECIALIST

The wetland specialist walk-down was conducted between the 29th of November 2012 and the 6th of December 2012 by Wetland Consulting Services. The site visit was undertaken to identify and delineate wetlands within a radius of 500m of the proposed transmission lines, taking into account the 55m servitude along the transmission line that will be utilized for the construction of the power line and later for maintenance. The proposed tower positions along the transmission line were then overlaid on the delineated watercourses on site. The key findings are as follows:

- ✓ There are 81 towers with delineated wetland courses;
- ✓ All of the wetlands recorded on site have been impacted upon and degraded by various anthropogenic activities (mining, power stations, water abstraction, urbanization and agriculture;
- ✓ Most of the wetlands are seasonally wet, with surface flow limited to relatively extreme events; and
- ✓ Towers KE-ZE 125 and KU-ZE 182 are within a permanently wet wetland area.

The following impacts are expected as a consequence of the proposed lines:

- ✓ Loss and destruction of vegetation and wetland habitat within the tower footprint during construction;
- ✓ Soil compaction and increased risk of soil erosion due to machinery and vehicles used during construction and during routine maintenance in the operational phase; and
- ✓ Obstruction and hazard of birds utilizing the wetland areas.

Based on the findings of the walk down and wetland delineation, the recommendations are as follows:

- ✓ Relocate or reposition towers that are within wetlands;
- ✓ Remove some of the proposed towers that are within wetlands to minimise anticipated impacts;
- ✓ Add new towers at specific locations;
- ✓ It is acknowledged that from a technical viewpoint some of the towers cannot be moved or repositioned without impacting on the entire alignment. The consequences of this would be to redesign the entire transmission line. From a legal and registered servitude point of view the redesign of the entire transmission line might not be feasible. Based on these concerns, the proposed alignment was evaluated and two options were identified as follows:
 - Option 1: to identify towers that could be possibly repositioned without interfering with the entire line and thus trigger a redesign of the entire transmission line (see Table 7); and
 - Option 2: to identify towers that can be repositioned and provide their new positions relative to the water resources impacts point of view (refer to Table 5).
- ✓ The consequences of the above evaluation would be as follows:
 - For Towers that fall under Option 2, both repositioning and on site mitigation measures would be required; and
 - For Towers that fall under Option 1, only on-site mitigation measures would be required. These only include Towers that are in the bends.

In cases where repositioning or relocation is not possible the following measures must be put in place:

- Fencing or demarcation of construction area: prior to any activities especially within demarcated wetland areas, limits of construction related activities must be clearly demarcated so as to avoid unnecessary direct impacts to the vegetation beyond the limits of construction;
- Re-vegetation/rehabilitation: Re-vegetation should ideally commence as soon as construction activities have ceased. The areas where vegetation is disturbed must be landscaped and re-vegetated with indigenous species similar to the surrounding areas. Seeding with an appropriate seed mix (consult local vegetation experts) should be implemented if there is a qualified opinion, from a botanist, that vegetation cannot recover by itself. The use of creeping stoloniferous grass such as kweek, *Cynodon dactylon* could be considered to help stabilise the disturbed soils. Once the initial rehabilitation has been completed the wetland especially where Towers are installed (around the base) should be checked for erosion at the end of the following summer. If erosion is observed, appropriate action should be taken to limit its extent;
- The eradication of invasive plant species: Alien plants are likely to colonise the areas disturbed during the construction process. Areas disturbed during the construction process should be checked on a 6 monthly basis and any undesirable plants encountered in the areas immediately around the towers' positions should be removed, ideally by hand so as to reduce the risk of herbicides being transferred further into the wetlands;
- Soil compaction and increase risks of erosion: Sediment transport during the construction period is likely to be high especially in areas where towers are inside permanent wet areas. Efforts must be made to limit sediment transport beyond the limits of the construction site. Various methods are available to achieve this. It is important to note that erosion control/protection interventions/structures must be inspected regularly and replaced if any if any are found to be worn out or damaged. If sediments accumulate, the erosion barriers must be cleaned regularly. Erosion protection structures including Rheno mattresses must be considered around the base of the tower to limit any scouring and side cutting erosion around the structure if the structure is within permanent wet area. During construction, no construction vehicles should traverse the wetland and riparian zone and no construction materials should be stored or dumped within the wetland area. The movement of construction vehicles within the wetland (if cannot be absolutely avoided) should be kept to the absolute minimum required given the position of this tower. The vehicles should not in any way travel longitudinal to the wetland area as that will create preferential flow path then erosion. It is also recommended that after completion of construction activities all areas of compacted soils will need to be ploughed so as to break up the compacted soil surface and landscaped to approximate the natural slope or ground level of the area (if necessary). This will aid infiltration and decrease run-off, while also creating conditions for vegetation to re-establish in these areas around towers. The ploughed areas will need to be monitored for signs of erosion until these areas have re-vegetated. Should erosion occur, an appropriate erosion control measures will need to be implemented as indicated above. It is recommended that all material stockpiles, temporary construction access routes must ploughed and re-vegetated upon completion of construction activities and alien vegetation regrowth in these areas must be monitored;
- Maintenance of servitude: Existing informal road networks observed on site should be used as service roads wherever possible. Construction of new roads should be avoided at all times where possible to limit any additional impacts that could be avoided on site. If practically possible (i.e. while considering all safety aspects), no burning of the servitude should take place within the wetland areas. Rather, vegetation in these areas should be cut using manual cutting, brush cutting (labour intensive method) especially at the crossings, and mechanical

methods through the entire servitude such as slashers, mowers etc. Cutting of vegetation should be done in the winter months, outside the breeding season of wetland dependant birds (should winter breeding birds occur in the area, this must be taken into consideration prior to any burning). In the instance that burning of the servitude is required; it should be undertaken in the winter months and should at all times be done under careful supervision to prevent the spread of veld fires; and

- Protection of large wetland birds: Stringing power lines across wetlands could result in an obstruction and hazard to larger water birds that could fly into the power lines. The impact of the proposed power line on birdlife has been assessed in detail as well mitigation measures given by the avifaunal specialist.

Table 5: A table indicating towers that cannot be repositioned without affecting the entire transmission line. (Extracted from original staking information from Eskom).

Structure	X_Easting	Y_Northing	Structure_1
1 Sol Zeus 46	9342.569000	-2950801.558000	518C 0 - 45 degree strain
Ke-Ze 175	8637.543000	-2949138.068000	518C 0 - 45 degree strain
Ku-Ze 233	8691.450000	-2949126.057000	518C 0 - 45 degree strain
Ku-Ze 229	8550.388000	-2947941.745000	518C 0 - 45 degree strain
Ke-Ze 171	8478.427000	-2947904.834000	518C 0 - 45 degree strain
*Ke-Ze 125	1839.764000	-2931802.319000	518C 0 - 45 degree strain
*Ku-Ze 182	1895.712000	-2931793.253000	518C 0 - 45 degree strain
Ke-Ze 49	-1452.851000	-2902824.673000	518C 0 - 45 degree strain
Ku-Ze 106	-1398.493000	-2902810.334000	518C 0 - 45 degree strain

***:** *The shaded towers are within permanent wet wetland area and ideally these will need to be moved but given that there are in the bend no specific recommendations have been made in this report with respect to them. It is however recommended that the design engineer should consider moving these towers on the basis of access during construction and from a wetland impact management point of view.*

Table 6: A table indicating proposed repositioning and relocation of towers and as well as recommendations and their proposed new positions.

Structure	Proposed Changes	X_coord	Y_coord
Ke-Ze 15	90-100m North along line	28.987861556600	-26.117192921200
Ku-Ze 72	90-100m North along line	28.988390472600	-26.117268359300
Ke-Ze 16	220m South along line	28.986385340500	-26.124078816700
Ku-Ze 73	220m South along line	28.986914272600	-26.124279917500
Ke-Ze 21	120m North along line	28.983349531400	-26.138675400200

Ku-Ze 78	170m North along line	28.983896126400	-26.138781185200
Ke-Ze 27	70m North along line	28.981471826900	-26.161567654200
Ku-Ze 84	70m North along line	28.982057605000	-26.161497246700
Ke-Ze 29	15m North along line	28.981917286900	-26.169442104800
Ku-Ze 86	30m North along line	28.982453773200	-26.169280809500
Ke-Ze 31	15m South along line	28.982363093100	-26.177720010400
Ku-Ze 88	15m South along line	28.982899586000	-26.177768483500
Ke-Ze 44	15m South along line	28.984503880900	-26.217108493800
Ke-Ze 60	30 m North along line	29.005884375400	-26.271148680500
Ke-Ze 65	210m North along line	29.007245436700	-26.284702796500
Ku-Ze 122	210m North along line	29.007746631700	-26.284751178100
Ku-Ze 123	60m South along line	29.007460615100	-26.290673070100
Ke-Ze 66	40m South along line	29.006923594500	-26.290640825300
Ke-Ze 68	25m North along line	29.008629808200	-26.295005045500
Ku-Ze 125	25m North along line	29.009061699900	-26.294689854100
Ke-Ze 69	Modify to High Tower	29.012085435300	-26.297878356800
Ku-Ze 126	Modify to High Tower	29.012537896200	-26.297563153300
Ku-Ze 137	85m South along line	29.019434323800	-26.334640485500
Ke-Ze 80	60m South along line	29.018858236700	-26.334622023500
Ke-Ze 81	150m South along line	29.018653224000	-26.339186351300
Ku-Ze 138	170m South along line	29.019188180200	-26.339186280600
Ke-Ze 82	30m South along line	29.018550716100	-26.341496322400
Ku-Ze 139	85m South along line	29.019126828100	-26.341459168700
Ke-Ze 85	15m North along line	29.018058497900	-26.351785514400
Ke-Ze 92	40m North along line	29.018922695700	-26.376723965800
Ku-Ze 149	40m North along line	29.019498982200	-26.376686810700
Ke-Ze 94	175m South along line	29.020508988800	-26.385151523300
Ku-Ze 151	175m South along line	29.021064736600	-26.385132903800
Ku-Ze 153	25m South along line	29.022033196500	-26.390620261800
Ke-Ze 98	160m North along line	29.022507716200	-26.396189258500
Ku-Ze 155	150m North along line	29.023104724100	-26.396356013000

Ku-Ze 159	170m North along line	29.025676898400	-26.410459911700
Ke-Ze 102	160m North along line	29.025079842300	-26.410422940000
Ke-Ze 111	210m North along line	29.023542047500	-26.441420017500
Ku-Ze 168	260m North along line	29.024118623100	-26.441234534100
Ke-Ze 114	145m South along line	29.022144577300	-26.456473670100
Ku-Ze 171	180m South along line	29.022680099800	-26.456603356900
Ku - Ze 178	100m South along line	29.020362585200	-26.481941584300
Ke-Ze 121	115m South along line	29.019805323000	-26.481965543100
Ke-Ze 123	75m North along line	29.019249034600	-26.487840194000
Ke-Ze 130	30m South along line	29.027402429600	-26.514307820000
Ku-Ze 187	30m South along line	29.027853566900	-26.513854007200
Ke-Ze 142	50m South along line	29.049606636800	-26.552386713400
Ku-Ze 200	50m South along line	29.050012094900	-26.552121297200
Ke-Ze 144	100m South along line	29.053053135900	-26.557576302000
Ku-Ze 206	40m South along line	29.060761188200	-26.571662489300
Ke-Ze 152	65m North along line	29.065521257000	-26.582812370800
Ku-Ze 210	70m North along line	29.066079024100	-26.582835993200
Ke-Ze 155	180m North along line	29.066509255700	-26.591967517500
Ku-Ze 213	180m North along line	29.067013846400	-26.591824000800
Ke-Ze 160	55m South along line	29.071672197000	-26.607940725000
Ku-Ze 218	55m South along line	29.072203416700	-26.607797176700
Ke-Ze 174	100m North along line	29.086234246500	-26.648886655500
Ku-Ze 232	100m North along line	29.086818786900	-26.648743020800
2 Sol Zeus 50	30m North along line	29.092178695500	-26.673013373000
1 Sol Zeus 48	30m North along line	29.092678759100	-26.673102885300
1 Sol Zeus 46	20m North	29.093809321700	-26.667406274600

5 GENERAL ENVIRONMENTAL SPECIFICATIONS

The general EMPR is made up of the Draft EMPR that was submitted and approved with the Final EIA report and subsequent EA (authorisation registration number: 12/12/20/1096). The general EMPR is based on the standard Eskom EMPR and the findings of the EIA report, and

provides the general environmental management and mitigation specifications applicable to the project (see Appendix B for the full general EMPR).

6 SITE SPECIFIC ENVIRONMENTAL SPECIFICATIONS

This section provides the site specific environmental management and mitigation specifications applicable to this project. These are based on the findings of a detailed site walk-down undertaken by the specialists (ecology, avifauna, heritage and wetlands) and the independent Environmental Assessment Practitioner (EAP) after the EA was awarded and prior to commencement of construction. The walk-down findings and recommendations of the specialists and EAP were used to revise the Draft EMPR into this Final EMPR which is being submitted to the competent authority for approval prior to commencement.

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
Planning and Design Phase						
5.1	Impact on heritage site.	<ol style="list-style-type: none"> If it is found that a heritage site is right in the tower (tower KE-ZE 134) footprint during pegging, the possibility of moving the pylon foot print 50 meters towards KE-ZE 133 or 135 must be considered. If the pylon cannot be moved a grave relocation process for the grave and test excavations for the circular structure must initiated before construction can commence. The grave relocation process must include an extensive social consultation process before permit applications to SAHRA, Local and Provincial can be lodged for the relocation (This process can take up to 6 months). The test excavations on the circular structure will require a permit from SAHRA under Section 36 of the NHRA, after which the test excavations can be done. On completion of the test excavation a permit application for the destruction of the site must be lodged with SAHRA. On granting of the permit construction can commence and the site destroyed. (This process can take up to 4 months). 	SS (tower KE-ZE 134)	<p>Prior to commencement.</p> <p>Prior to commencement/ Continuous.</p>	<p>Construction outside the tower footprint</p> <p>Permit applications to SAHRA.</p>	Contractor/ Applicant
5.2	Impact on sensitive ecological features.	<ol style="list-style-type: none"> If possible from a technical point of view, Towers within wetlands should be re-positioned in such a way as to fall a minimum of 30m outside the watercourse area. If this is not possible then the following measures will need to be taken: <ul style="list-style-type: none"> There is a legal obligation to apply for a Water Use Licence (WUL) for any water resource that may be affected, as defined in the National Water Act. This includes this watercourse; and The exact extent and location of water resource, as defined in the National Water Act, must be defined by a wetland specialist. A wetland study that was undertaken for this walk-down has confirmed the location boundaries of these features. 	<p>SS (towers KU-ZE79/KE-ZE22)</p> <p>SS (towers KU-ZE81/KE-ZE24)</p> <p>SS (towers KU-ZE84/KE-ZE27)</p> <p>SS (tower KU-ZE86)</p> <p>SS (towers KU-ZE121/KE-ZE64)</p> <p>SS (towers KU-ZE123/KE-ZE66)</p> <p>SS (tower KU-ZE168)</p> <p>SS (towers KU-ZE178/KE-ZE121)</p>	<p>Prior to commencement/ Continuous.</p> <p>Prior to commencement.</p>	<p>Construction outside of drainage area. OR</p> <p>Relevant Water Use Approvals.</p>	Contractor/ Applicant
5.3	Impacts on wetlands.	<ol style="list-style-type: none"> Fencing or demarcation of construction area: prior to any construction activities especially in towers within demarcated wetland determined. Limitations of construction related activities must be clearly demarcated so as to avoid unnecessary direct impacts to the vegetation beyond the limits of construction. 	<p>SS (towers KE-ZE 175/KU-ZE 233)</p> <p>SS (towers KU-ZE 232)</p> <p>SS (towers KU-ZE 229/KE-ZE 171)</p> <p>SS (towers KE-ZE 160/KU - ZE 218)</p> <p>SS (towers KE-ZE 155/KU-ZE 213)</p> <p>SS (towers KU-ZE 211/ KE-ZE 153)</p> <p>SS (towers KU-ZE 210/KE-ZE 152)</p> <p>SS (towers KU-ZE 206/KU- ZE 203)</p>	Prior to commencement.	Fencing of construction area.	Contractor/ Applicant

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
			SS (towers KE-ZE 145/KU-202)			
			SS (towers KU-ZE 201/KE-ZE 143)			
			SS (towers KU-ZE 200/KU-ZE 190)			
			SS (towers KE-ZE 130/KU-ZE 187)			
			SS (towers KE-ZE 125/KU-ZE 182)			
			SS (towers KU-ZE 181/KE-ZE 124)			
			SS (towers KE-ZE 123)			
			SS (towers KE-ZE 122/KU-ZE 179)			
			SS (towers KE-ZE 114/KU-ZE 171)			
			SS (towers KU-ZE 168/KE-ZE 111)			
			SS (towers KU-ZE 159)			
			SS (towers KU-ZE 155)			
			SS (towers KU-ZE 153)			
			SS (towers KU-ZE 152/KE-ZE 95)			
			SS (towers KE-ZE 94/KU-ZE 151)			
			SS (towers KE-ZE 92)			
			SS (towers KE-ZE 85)			
			SS (towers KE-ZE 82)			
			SS (towers KE-ZE 81/KU-ZE 138)			
			SS (towers KU-ZE 137/KE-ZE 69)			
			SS (towers KU-ZE 126/KE-ZE 68)			
			SS (towers KU-ZE 125)			
			SS (towers KU-ZE 123/KE-ZE 65)			
			SS (towers KE-ZE 60)			
			SS (towers KE-ZE 59/KU-ZE 116)			
			SS (towers KE-ZE 49/KU-ZE 106)			
			SS (towers KE-ZE 44/KU-ZE 88)			
			SS (towers KE-ZE 31)			

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
			SS (towers KE-ZE 29/KU-ZE 86) SS (towers KE-ZE 27/KU-ZE 84) SS (towers KU-ZE 81/KE-ZE 24) SS (towers KU-ZE 80/KE-ZE 23) SS (towers KE-ZE 22/KU-ZE 79) SS (towers KU-ZE 78/KE-ZE 21) SS (towers KU- ZE 73/ KE-ZE 16) SS (towers KU-ZE 72/KE-ZE 15)			
2. Construction Phase						
6.1	Impact on sensitive heritage features.	1. Any identified heritage site should be demarcated as a no-go area and care be taken during construction not to disturb the site in anyway. The site must be monitored during construction. 2. Access to the pylons in close proximity to any heritage sites should be gained from the access road of the existing power line.	SS (towers KU-ZE79/KE-ZE22) SS (towers KU-ZE81/KE-ZE24) SS (towers KU-ZE84/KE-ZE27) SS (tower KU-ZE86) SS (towers KU-ZE121/KE-ZE64) SS (towers KU-ZE123/KE-ZE66) SS (tower KU-ZE168) SS(towers KU-ZE178/KE-ZE121) Heritage site (KE-ZEU-006)	Prior to commencement of construction. Continuous.	No-go demarcation No disturbance to these sites.	EO/ECO/ Contractor
6.2	Impact on sensitive avifaunal species.	1. To mitigate for bird collisions, it is recommended that the earth wires on the spans be fitted with the best available (at the time of construction) Eskom approved anti bird collision line marking devices. The devices should be installed alternating a light and a dark colour to provide contrast against dark and light backgrounds respectively. This will make the overhead cables more visible to birds flying in the area. Since the two proposed power lines are so close together, it is recommended that the outer earth wire on each line be marked and therefore, only two of the four earth wires will need to be marked. This only applies if the two lines are built as close together as the information indicates currently. If this changes for any reason the specialist must be consulted again.	SS (towers KU-ZE 64-69/KE-ZE7-12) SS (towers KU-ZE71-74/KE-ZE14-17) SS (towers KU-ZE77-78/KE-ZE20-21) SS (towers KU-ZE80-82/KE-ZE23-25) SS (towers KU-ZE83-85/KE-ZE26-28) SS (towers KU-ZE87-89/KE-ZE30-32) SS (towers KU-ZE97-101/KE-ZE40-44) SS (towers KU-ZE106-108/KE-ZE49-51) SS (towers KU-ZE110-118/KE-ZE53-61)	Continuous. Prior to signoff of construction.	Bird markers fitted in accordance with specialist specifications, on relevant spans.	Contractor/ Applicant

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
			SS (towers KU-ZE121-124/KE-ZE64-67) SS (towers KU-ZE132-137/KE-ZE75-79) SS (towers KU-ZE140-142/KE-ZE83-85) SS (towers KU-ZE147-151/KE-ZE90-94) SS (towers KU-ZE155-156/KE-ZE98-99) SS (towers KU-ZE162-166/KE-ZE105-109) SS (towers KU-ZE178-185/KE-ZE120-128) SS (towers KU-ZE187-192/KE-ZE130-134) SS (towers KU-ZE197-199/KE-ZE139-141) SS (towers KU-ZE206-209/KE-ZE148-151) SS (towers KU-ZE210-211/KE-ZE152-153) SS (towers KU-ZE214-216/KE-ZE156-158) SS (towers KU-ZE217-223/KE-ZE159-165) SS (towers KU-ZE225-231/KE-ZE167-173)			
		2. To mitigate for bird habitat destruction, it is recommended that general environmental best practice should be adhered to in areas such as wetlands, streams and natural grassland. 3. There is little habitat suitable to African Grass Owl along the alignment, with the exception of one patch of <i>Imperata cylindrica</i> grass at KE-ZE 69. This is prime roosting habitat for Africa Grass Owl. Pellets of the species were also found on this site, confirming that they have utilised the area previously. Since this is a preferred grass species for this bird species, is in short supply elsewhere in its range, and is likely to be destroyed or significantly altered during construction it is recommended that it be relocated to another site where it can be used by owls. This relocation and transplant needs to be done during early summer in order to ensure success. 4. To mitigate for electrical faulting caused by birds, all towers close to water should be fitted with the standard Eskom Bird Guards as per Eskom Transmission guidelines. This will deter birds from perching directly above live hardware thereby posing a risk of faulting.	SS (All towers) SS (KE-ZE 69)	Continuous. Prior to signoff of construction, preferably in early summer. Prior to signoff of construction.		Contractor/ Applicant Applicant, Landowners, Owl Specialist, ECO Contractor/ Applicant
6.3	Impact on wetland	1. Areas disturbed during the construction process should be checked on a 6 monthly basis and any undesirable plants encountered in the areas	SS (All towers)	On a 6 monthly basis.	No alien invasive	Contractor/ Applicant

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
			SS (towers KU-ZE 181/KE-ZE 124)			
			SS (towers KE-ZE 123)			
			SS (towers KE-ZE 122/KU-ZE 179)			
			SS (towers KE-ZE 114/KU-ZE 171)			
			SS (towers KU-ZE 168/KE-ZE 111)			
			SS (towers KU-ZE 159)			
			SS (towers KU-ZE 155)			
			SS (towers KU-ZE 153)			
			SS (towers KU-ZE 152; KE-ZE 95)			
			SS (towers KE-ZE 94/ KU-ZE 151)			
			SS (towers KE-ZE 92)			
			SS (towers KE-ZE 85)			
			SS (towers KE-ZE 82)			
			SS (towers KE-ZE 81/KU-ZE 138)			
			SS (towers KU-ZE 137/KE-ZE 69)			
			SS (towers KU-ZE 126/KE-ZE 68)			
			SS (towers KU-ZE 125)			
			SS (towers KU-ZE 123/KE-ZE 65)			
			SS (towers KE-ZE 60)			
			SS (towers KE-ZE 59/KU-ZE 116)			
			SS (towers KE-ZE 49/KU-ZE 106)			
			SS (towers KE-ZE 44/KU-ZE 88)			
			SS (towers KE-ZE 31)			
			SS (towers KE-ZE 29/KU-ZE 86)			
			SS (towers KE-ZE 27/KU-ZE 84)			
			SS (towers KU-ZE 81/KE-ZE 24)			
			SS (towers KU-ZE 80/KE-ZE 23)			
			SS (towers KE-ZE 22/KU-ZE 79)			

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
		<p>4. Existing informal road networks observed on site should be used as service roads wherever possible. Construction of new roads should be avoided at all times where possible to limit any additional impacts that could be avoided on site. If practically possible (i.e. while considering all safety aspects), no burning of the servitude should take place within the wetland areas. Rather, vegetation in these areas should be cut using manual cutting, brush cutting (labour intensive method) especially at the crossings, and mechanical methods through the entire servitude such as slashers, mowers etc. Cutting of vegetation should be done in the winter months, outside the breeding season of wetland dependant birds (should winter breeding birds occur in the area, this must be taken into consideration prior to any burning). In the instance that burning of the servitude is required; it should be undertaken in the winter months and should at all times be done under careful supervision to prevent the spread of veld fires.</p> <p>5. In areas where towers are inside wetland areas and cannot be relocated, it is recommended that turbidity be monitored during construction using a hand held turbidity meter. Turbidity levels should not exceed pre activity turbidity levels by more than 25%. Post construction the site should be surveyed and checked for signs of erosion including bank collapse biennially thereafter until banks are well stabilized. Eroding areas should be mapped, reported and stabilized.</p>	<p>SS (towers KU-ZE 78/KE-ZE 21) SS (towers KU-ZE 73/ KE-ZE16) SS (towers KU-ZE 72/KE-ZE 15) SS (All towers)</p>	<p>Continuous construction.</p>	<p>during</p> <p>No burning of the servitude within the wetland areas.</p>	<p>Contractor/ Applicant</p>
			<p>SS (towers KU-ZE 73/KE-ZE 15) SS (towers KU-ZE 73/KE-ZE 16) SS (towers KU-ZE 78/KE-ZE 21) SS (towers KU-ZE 79/KE-ZE 22) SS (towers KU-ZE 80/KE-ZE23) SS (towers KU-ZE 84/KE-ZE27) SS (towers KU-ZE 86/KE-ZE29) SS (towers KU-ZE 88/KE-ZE31) SS (tower KE-ZE44) SS (towers KU-ZE 116/KE-ZE59) SS (tower KE-ZE60) SS (towers KU-ZE 122/KE-ZE65) SS (towers KU-ZE 123/KE-ZE66) SS (towers KU-ZE 125/KE-ZE68) SS (towers KU-ZE 126/KE-ZE69) SS (towers KU-ZE 137/KE-ZE80) SS (towers KU-ZE 138/KE-ZE81) SS (towers KU-ZE 139/KE-ZE82) SS (tower KE-ZE85) SS (towers KU-ZE 149/KE-ZE92) SS (towers KU-ZE 151/KE-ZE94) SS (towers KU-ZE 152/KE-ZE95) SS (tower KU-ZE153) SS (towers KU-ZE 155/KE-ZE98) SS (towers KU-ZE 159/KE-ZE102)</p>	<p>6 Monthly.</p>	<p>Photographic proof & turbidity meter reading records.</p>	<p>Contractor/ Applicant</p>

I.D.	Aspect	Mitigation Measures	Site Specific (SS)/ General (G)	Monitoring Frequency	Indicator/ Target	Responsibility
			SS (towers KU-ZE 168/KE-ZE111) SS (towers KU-ZE 171/KE-ZE114) SS (towers KU-ZE 178/KE-ZE121) SS (towers KU-ZE 179/KE-ZE122) SS (tower KE-ZE123) SS (towers KU-ZE 187/KE-ZE130) SS (towers KU-ZE 200/KE-ZE142) SS (tower KE-ZE143) SS (tower KU-ZE201) SS (towers KU-ZE 203/KE-ZE145) SS (tower KU-ZE206) SS (towers KU-ZE 210/KE-ZE152) SS (towers KU-ZE 213/KE-ZE155) SS (towers KU-ZE 218/KE-ZE160) SS (towers KU-ZE 232/KE-ZE174)			
3. Operation phase						
7.1	Impact wetland areas.	on 1. Regular checks and maintenance of servitude should be conducted, as well as keeping access road as informal as possible and the use existing roads as far as possible to limit construction of new roads. 2. Annual checks of invasive vegetation should be conducted & any invasive vegetation to be controlled and removed before seeding.	SS (All towers) SS (All towers)	Continuous operation. during Continuous operation. during	Photographic proof. Photographic proof.	Contractor/ Applicant
4. Rehabilitation Phase						
8.1	Impact wetland areas.	on 1. Re-vegetation should ideally commence as soon as construction activities have ceased. The areas where vegetation is disturbed must be landscaped and re-vegetated with indigenous species similar to the surrounding areas. Seeding with an appropriate seed mix (consult local vegetation experts) should be implemented if there is a qualified opinion, from a botanist, that vegetation cannot recover by itself. The use of a creeping stoloniferous grass such as Kweek, <i>Cynodon dactylon</i> could be considered to help stabilise the disturbed soils. Once the initial rehabilitation has been completed the wetland especial where towers are installed (around the base) should be checked for erosion at the end of the following summer. If erosion is observed, appropriate action should be taken to limit its extent.	SS (All towers)	Continuously Rehabilitation. during	Re-vegetation photographic proof.	Contractor/ Applicant

APPENDIX A: ENVIRONMENTAL AUTHORISATION (EA)

APPENDIX B: FINAL SITE LAYOUT PLAN

APPENDIX C: SPECIALIST WALK-DOWN REPORTS