FRAMEWORK EMP (fEMP) FOR A SINGLE CARRIAGE RAILWAY, AND ASSOCIATED INFRASTRUCTURE, IN THE WITBANK AREA

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
1. COMPLIANCE WITH ENVIRONMENTAL LEGISLATION								
All Activities (railway and all associated structures and infrastructure, including the 88kV power lines, substations and access roads)	Compliance with Regulation 385, 386, 387 of National Environmental Management Act	Delay in onset of activity Suspension of construction & operational phases Prosecution	**Objective:** To ensure that requisite EIA authorisation has been received **Mechanism:** 1) Complete the statutory EIA[i] process	EA (and appeal adjudication if relevant) received from the DEA[ii]	EIA Consultant	EIA process and documentation	Prior to site establishment	ESKOM
	Compliance with Sections 34, 35, 36 and 38 of National Heritage Resources Act.	Delay in issuing of NEMA[iii] EA Delay in onset of activity Suspension of construction phase Prosecution	**Objective:** To ensure that the requisite heritage inputs have been integrated into the EIA process **Mechanism:** 1) Solicit comment from Gauteng/ Mpumalanga Heritage Agency or SAHRA[iv] as part of the EIA consultation process 2) Complete permit application process if required	Comment from SAHRA as input into the DEA EA Permit(s) to destroy identified resources (if required) received from Responsible Heritage Authority	EIA Consultant Heritage Specialist	EIA process and documentation NHRA[v] permit application	Prior to submission of EIA (for comment) Prior to site establishment (for any permits)	ESKOM
Railway and access road bridges over water courses	Compliance with Section 38 of National Water Act	Delay in onset of activity Suspension of construction and operational phases Prosecution	**Objective:** To ensure that requisite WULA authorisation has been received **Mechanism:** Complete the statutory WULA process	WUL authorisation received from DWA	Eskom	WULA process and documentation from EIA	Prior to site establishment	ESKOM

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Waste handling and disposal	Compliance with the National Environmental Management Waste Act	Delay in issuing of the EIA EA Delay in onset of activity Suspension of construction & operational phases Prosecution	**Objective:** To ensure that the requisite authorisation has been received **Mechanism:** Solicit comment from DWA[vi] as part of the EIA consultation process	Comment from DWA as input into the DEA EA	EIA Consultant (to provide input)	EIA process and documentation	Prior to submission of EIA (for comment)	ESKOM
2. ENVIRONMENTAL INPUT INTO TENDER DRAFTING AND ADJUDICATION								
All Activities (railway and all associated structures and infrastructure, including the 88kV power lines, substations and access roads)	Compilation of tender documentation and Specifications	Negative impacts on environment during construction	**Objective:** To ensure acceptable management of environmental issues during construction **Mechanism:** 1) Incorporate relevant environmental management specifications into the Tender and Contract documentation[vii] 2) Incorporate relevant payment items into the Schedule of Quantities	Tender documentation and Contract Documentation include environmental management requirements	Engineering Design Consultant/ ESKOM Environmental Consultant/ ESKOM	EIA documentation Specialist studies Framework EMP	Tender Design & Design Review Stage	Review by ESKOM
	Tender Adjudication	Negative impacts on environment during construction	**Objective:** To ensure acceptable management of environmental issues during construction **Mechanism:** 1) Assess ability of Tenderers to adequately manage the environmental issues	Tender evaluation report contain reference to environmental ability of tenderers Successful Contractor shows clear commitment to and capacity for meeting the environmental management obligations	Engineering Design Consultant/ ESKOM Environmental Consultant/ ESKOM	Completed Tender Documentation In-house Environmental Agreement and Tenderer Questionnaire (where applicable)	Tender Adjudication Stage	Review by ESKOM
3. ENVIRONMENTAL INPUT INTO DESIGN								
All Activities (railway and all associated	Detailed design of infrastructure	Design fails to respond optimally to the	**Objective:** To ensure that the design responds to the identified environmental constraints and	Design meets objectives and does not degrade	Engineering Design Consultant/	EIA documentation	Tender Design & Design	ESKOM

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structures and infrastructure, including the 88kV power lines, substations and access roads)		environmental considerations	opportunities **Mechanism:** 1) Consider design level mitigation measures recommended by the specialists, especially with respect to wetlands, noise, air quality, flora, aquatic ecology and heritage 2) Balance technical and financial considerations against environmental constraints and opportunities in finalising the design of key elements 3) Incorporate in-house procedures, where relevant and available 4) Where applicable, ensure that appropriate and suitable technologies, which are environmentally friendly, are implemented in the design of all activities authorised; 5) Submit criteria for construction camp and material storage site selection and measures for management of sites and related activities such as ablution and housing facilities, waste and water management at such areas to the DEA; 6) Submit measures for protection / avoidance of heritage resources identified on site to the DEA. 7) The authorised activity shall not commence within 30 days of the date of signature of the authorisation; 8) 14 days written notice must be given to the DEA that the activity will commence. Commencement for the purposes of this condition includes site preparation.	the environment Design and layouts etc respond to the mitigation measures and recommendations in the EIR	ESKOM Environmental Consultant/ ESKOM	Specialist studies Framework EMP In-house procedures (were relevant and available)	Review Stage	
Landowners	Negotiation with landowners	Landowners unfairly prejudiced by proposed siting of railway line, access road, power line and substations	**Objective:** To ensure adequate regard has been taken of landowner concerns and that these are appropriately addressed **Mechanism:** 1) Initiate negotiations with landowners timeously 2) Address reasonable expectations/ requests where possible 3) In event of impasse follow legal expropriation route, but ensure that extent of expropriation is minimised, restrictions on land use are minimised and reasonable costs are paid	Location of infrastructure does not prejudice any landowners Location and layout responds to issues recorded in the Issues Trail Ideally, landowners should be satisfied with outcome of negotiations process. In event of impasse	ESKOM	EIA process In-house procedures for landowner negotiations and expropriation	Ideally initiated together with submission of final EIA (which indicates preferred corridors) Finalised prior to site establishme nt	ESKOM

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				requiring expropriation, landowners should be afforded reasonable and appropriate rights/ access				
Railway, access roads and power lines	Selection of preferred corridor	Corridor that degrades environment unnecessarily and poses heightened health and safety risk	**Objective:** To ensure selection of BPEO[viii] for the rail and power line corridors **Mechanism:** 1) Select corridor that curtails environmental impacts and enhances environmental benefits, whilst being technically feasible and affordable 2) In adjudicating the preferred routing, careful consideration must be given to, in particular, the risks associated with the conveyer (e.g. dust and noise).	Routing meets objective. Selected route minimises any negative environmental impacts, maximises any benefits and minimise health and safety risks	ESKOM	EIA documentation Specialist studies Framework EMP	Prior to submission of EIA	ESKOM
Railway line and underground water table	Ensuring that areas where cut operations are required do not intersect with the water table	Cut operations may intersect with the water table and result in the decanting of aquifers thereby impacting on borehole users in the area.	**Objective:** To ensure that cut operations do not impact on the water table. **Mechanism:** 1) Prior to cut operations rotary core drilling is required in areas where the water table is expected to be high; 2) Before rotary core drilling commences a risk assessment must be undertaken subject to comments from affected landowners	Areas with high water tables are avoided.	ESKOM	Risk Assessment (subject to comment from affected landowner)	Prior to construction	ESKOM
4. ENVIRONMENTAL MANAGEMENT OF THE CONSTRUCTION PHASE[ix]								
All Activities (railway and all associated structures and infrastructure, including the 88kV power lines, substations and access roads)	Monitoring and enforcement of specified environmental management requirements	Negative impacts on environment during construction of railway and associated structures/ infrastructure	**Objective:** To ensure that the construction of the railway and associated structures/ infrastructure does not result in avoidable impacts on the environment, and that any impacts that do occur are anticipated and managed **Mechanism:** 1) Appoint an Environmental Control Officer is (either independent or in-house, preferably the ECO for the power station) 2) Ensure that this project is included in the	Environmental impacts effectively monitored and managed during the construction phase with no residual impacts on the environment Comprehensive record of	Site Engineer Environmental consultant ESKOM	Contract Document	During Construction Phase (from site establishment to Contract Completion)	ESKOM DEA/ MDALA[x]/ GDARD[xi]

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			existing Kusile Power Station EMC meetings 3) Develop and implement an environmental auditing system for the construction phase 4) Audit the Contractors compliance with the requirements of the environmental specification contained within the relevant Contract Document 5) Produce regular (monthly) environmental audit reports for submission to the DEA 6) Records relating to monitoring must be kept on site and made available for inspection to any relevant and competent authority in respect to this development; 7) The DEA reserves the right to monitor and audit the development through its life cycle to ensure that it complies with the conditions of the EA 8) All compliance and monitoring correspondences must be forwarded for attention of the Director: Compliance Monitoring Directorate within the DEA;	compliance and remedial actions available to ESKOM and the authorities				

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
Communication	Communication with Contractor and his staff	Inability to communicate effectively with the Contractor regarding their environmental obligations, resulting in unnecessary environmental degradation	**Objective:** To ensure that there is effective communication with the Contractor on environmental issues **Mechanism:** 1) Include environmental considerations as an item on the agenda of the monthly site meetings for each Contractor 2) Include environmental considerations in the Contractors programme (where relevant) 3) Appoint a senior manager on the Contractors staff as the designated Environmental Officer, empowered to managed compliance with the environmental requirements on behalf of the Contractor 4) Compile and implement the necessary Method Statements 5) Undertake environmental awareness training of all site staff during the commencement of each Contract, with regular refreshers for the duration of the Contract 6) Raise awareness amongst construction workers about local traditions and practices; 7) Ensure that employment procedures / policy is communicated to local stakeholders, especially local fire control committee / initiative, local farmers / land owners as well as the ward 32 local councillor; 8) Consult with local South African Police Services (SAPS) to establish standard operating procedures for the control and removal of loiterers at the construction site; and 9) Construction workers should be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers must also be provided with identification tags. 10) Launch aggressive culturally appropriate STI and HIV/AIDS awareness campaigns; 11) Distribute condoms by placing them at centrally located points; 12) Control access to the construction site to prevent sex workers; 13) Employ local women to decrease their financial vulnerability.	Environmental management requirements are proactively communicated with the Contractor and reflected in a more responsible approach to construction	Contractor Site Engineer Environmental consultant/ ESKOM	Contract Document Programme Meetings [Note: costs of awareness training covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM in-house technical & environmental staff
	Communication with public	Inability to deal with public queries and	**Objective:** To ensure that the public has a mechanism to contact a responsible individual in order to obtain information or report complaints	Public are able to communicate effectively with the	Contractor	Contract Document	During Construction Phase (from	Site Engineer Environmental

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		complaints	**Mechanism** 1) Provide a contact number of someone responsible for the site on the site signage 2) Maintain a complaints register on site to allow public complaints to be recorded. Complaints should be noted and signed off at site meetings 3) Hold meetings with EMC at agreed frequencies 4) Inform local businesses about the expected influx of construction workers so that they could plan for extra demand; and 5) Ensure that the local community communicates their expectations of construction workers' behaviour with the construction sub-contractor, and formalize a written agreement between the community and the sub-contractor. 6) Have clear rules and regulations for access to the construction site to control loitering; 7) Factual and transparent information should be supplied to the community from the beginning of the project; 8) Employment opportunities should also be offered to the local community	relevant members of the project team either to obtain information or lodge complaints		[Note: costs covered within contract price]	site establishment to Contract Completion)	Consultant ESKOM
Site Establishment	Site / corridor establishment ~ *Access*	Hazards to landowners and public, and security of materials	**Objective:** To secure the Site / Corridor against unauthorised entry and to protect members of the public/ landowners **Mechanism:** 1) Secure Site / Corridor in an appropriate manner 2) Where necessary to control access, fence and secure Contractor's camp (if not utilising power station contractor camp) 3) <u>The applicant shall ensure that fencing of the railway and the access road is adequate and protection measures are taken to minimise the potential risk of theft.</u> 4) Provide alternative access/ detours for public/ landowners	Site / Corridor is secure and there is no unauthorised entry No members of the public/ landowners injured	Contractor	Contract Document [Note: costs covered within contract price]	Erection ~ during site establishment Maintenance ~ for duration of Contract	Site Engineer Environmental Consultant ESKOM in-house technical & environmental staff
	Site establishment ~ *Site structures*	Site infrastructure that degrades the visual aesthetics of the area, unnecessarily exacerbates environmental consequences of construction	**Objective:** To minimise the environmental consequences associated with the establishment of the site infrastructure **Mechanism:** 1) Locate key site infrastructure in environmentally acceptable area and limit its extent 2) Position site infrastructure so as to limit visual intrusion on neighbours or the greater	Site infrastructure has limited impact on the visual aesthetics of the area and does not result in unnecessary environmental degradation	Contractor	Contract Document [Note: costs covered within contract price]	During site establishment	Site Engineer Environmental Consultant ESKOM

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		and leads to public complaint	environment 3) Select materials for site infrastructure that limit reflection and blend in with the environment 4) Accommodate temporary services underground and within the same trench where possible					
	Site establishment ~ *Geology and Topography*	Site infrastructure that damages or destructs the geology strata and topography of the area, unnecessarily exacerbates environmental consequences of construction	**Objective:** To minimise the environmental consequences associated with the establishment of the site infrastructure **Mechanism:** 1) Significant precautionary measures are required to stabilise the cuttings, which may include having to reduce the slope angles and construction of temporary support measures. This must be done in order to minimise instability and soil erosion during construction. 2) Where the underlying geology is of the Dwyka formation precautions must be put in place to prevent the rocks from slaking (mechanically breaking down) upon exposure, and ravelling of exposed cut faces is a geotechnical characteristic of these formations that must be addressed in the design of the cutting. 3) No blasting is undertaken on site without a suitable blast design, compiled in line with relevant SANS codes and approved by an appropriately qualified professional; 4) Limit the cut and fill operations to the preferred alternative alignment servitude; and 5) Ensure that adequate storm water control measures are in place to prevent erosion.	Limit damage to geological strata and topography. No complaints from public	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Site establishment ~ *Protection of topsoil and sensitive areas/ artefacts*	Destruction and loss of topsoil, and sensitive areas/ artefacts (which could include indigenous vegetation, fauna, aquatic ecosystems or heritage resources)	**Objective:** To retain topsoil for later use in closure and to ensure that disturbance to sensitive areas or artefacts is minimised **Mechanism:** 1) Locate key site infrastructure in environmentally acceptable area and limit its extent 2) Remove topsoil approximately 150 mm deep from establishment, working area and stockpile areas, and stockpile for later use 3) Protect topsoil stockpiles against erosion and contamination 4) Provide containment and settlement facilities for effluents from concrete mixing facilities 5) Provide spill containment facilities for hazardous materials like fuel and oil	Sufficient topsoil for closure available No topsoil contaminated with cement materials, fuel, oil or other undesirable compounds No sensitive sites or artefacts damaged or destroyed	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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			6) Minimise the extent of areas cleared 7) Identify sensitive areas or artefacts and demarcate these as no-go areas 8) Develop contingency plans to address heritage resource discoveries during construction 9) Ensure that all machinery on site is in a good working order; 10) Limit all activities to the proposed railway line servitude; 11) Ensure that adequate storm water control measures are in place to prevent erosion; 12) Avoid placement of ballast on the clay soils; 13) Spread absorbent sand on areas where oil spills are likely to occur, such as the refuelling area in the hard park; 14) If soils are excavated for the cut operations, ensure that the soil is utilised elsewhere for rehabilitation/road building/fill purposes; and 15) Ensure that soil is stockpiled in such a way as to prevent erosion from storm water. 16) Graveyards can be demarcated with brick walls or with fences when they are retained in-situ within 30m from the railway line or associated infrastructure. 17) Should any artefacts be exposed during excavations, construction must cease upon the discovery of such findings. Under no circumstances artefacts be destroyed or removed from sites unless approved by the SAHRA					
	Site establishment ~ *Terrestrial Ecology*	Destruction of terrestrial fauna and flora and sensitive areas/ artefacts (which could include indigenous vegetation, fauna, aquatic ecosystems or heritage resources)	**Objective:** To retain ecological integrity and minimise disturbance to sensitive areas **Mechanism:** 1) All construction areas should be demarcated prior to construction to ensure that the footprint of the impacts are limited (including areas where vehicles may traverse); 2) The sensitive vegetation should be avoided and construction limited to 50 m from the edge of the wetlands and streams; 3) All alien invasive species on site should be removed and follow up monitoring and removal programmes should be initiated once construction is complete; 4) All alien invasive plants occurring on site must be addressed in accordance with the Conservation of Agricultural Resources Act No. 43 of 1983. Hunting, trapping, poisoning, snaring of animals or cutting / collection of	Limited extent of vegetation destroyed during construction activities	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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			firewood is strictly prohibited; 5) Adhere to the Eskom vegetation management guideline; 6) Investigate the option of establishing a nature area on Eskom property to act as an impact offset. The area to the north of Kusile power station has been purchased by Eskom and will provide the ideal area for such an offset area; 7) Remove sensitive plants by means of the Search-and-Rescue exercise as undertaken for the Kusile power station; 8) Place rescued plants in the Kusile nursery prior to re-establishment in a natural area, preferably in the off-set area;; and 9) Install power lines according to the Eskom bird collision prevention guideline. 10) Install bird diverters on the earth wire between towers where lines are in close proximity to water bodies.					
	Site establishment ~ *Aquatic Ecology*	Destruction of aquatic ecology and sensitive areas	**Objective:** To retain aquatic ecological integrity and minimise disturbance to sensitive areas **Mechanism:** 1) Avoid any spillage or pollution entering the system during construction phase. 2) Maintain surveillance of construction activities; 3) Limit speed and traffic on dirt roads adjacent to sites; 4) Construction should take place at the right time of the year to reduce runoff into streams; and 5) Sediment traps should be put into place and should be maintained. 6) Infrastructure and design should take into account the natural flow of the current system and base flow; and 7) Access roads and construction should where possible avoid the streams and adjacent riparian zones and take into consideration base flow (i.e. compaction and diversion).	Limited damage to sensitive aquatic ecosystems identified on the site	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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	Site establishment ~ *Surface, wetlands and groundwater*	Pollution of water resources by effluents	**Objective:** To avoid pollution of water resources **Mechanism:** 1) Establish contaminated water management system 2) Provide suitable and sufficient ablution facilities that are serviced regularly 3) Provide containment and settlement facilities for effluents from concrete mixing facilities 4) Provide spill containment facilities for hazardous materials like fuel and oil 5) Demarcated areas where waste can be safely contained and stored on a temporary basis during the construction phase should be provided at the hard park; 6) When adequate volumes (not more than 1 month) have accumulated all waste is to be removed from site and disposed of at a licensed facility; 7) Waste is not to be buried on site; 8) Hydro-carbons should be stored in a bunded storage area; 9) All hazardous materials *inter alia* paints, turpentine and thinners must be stored appropriately to prevent these contaminants from entering the environment; 10) Spill-sorb or similar type product must be used to absorb hydrocarbon spills in the event that such spills should occur; 11) Care must be taken to ensure that in removing vegetation adequate erosion control measures are implemented; 12) No construction vehicles or activities will be allowed to work within 50 m of any of the streams or wetlands on site, unless this cannot be avoided, then it should only occur under supervision of the ECO; 13) Demarcate the no-go areas with tape and ensure that the demarcation remains in place for the duration of the construction works; and 14) Use existing river crossings where possible. 15) If generators are used they should be placed in a bunded area to capture all potential spillages; 16) No pit latrines should be allowed; 17) Rail wagons should be covered to prevent any spillages of lime during operations 18) Groundwater monitoring in the railway study area should be included in the existing monitoring protocol for the construction of the Kusile power station	Effluents managed effectively No pollution of water resources	Contractor	Contract Document [Note: costs covered within contract price]	During site establishment	Site Engineer Environmental Consultant ESKOM

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			19) Install necessary drainage works and anti-erosion measures. Appropriate measures must be taken to maintain these drainage channels. It is Eskom's responsibility to ensure that maintenance is undertaken at regular intervals or on a when necessary basis;					
	Site establishment ~ *Solid waste*	Pollution of environment with solid waste materials	**Objective:** To avoid pollution of environment with solid waste materials **Mechanism:** 1) Demarcate, and enforce use of, a designated eating area 2) Provide adequate waste bins 3) Set up system for regular waste removal to approved facility 4) Minimise waste by sorting wastes into recyclable and non recyclable wastes 5) Prohibit burying or burning of waste on Site 6) Ensure measures for management and minimisation of waste and disposal of all waste at appropriate waste disposal facilities including waste at the construction camp. Under no circumstances shall any waste be disposed in water bodies, all waste shall be appropriately handled and disposed of at the relevant disposal facility.	Appropriate management of solid wastes No complaints from public	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Site establishment ~ *Fire*	Increased fire risk to surrounding areas	**Objective:** To decrease fire risk **Mechanism:** 1) Provide adequate cooking and heating facilities for staff 2) Prohibit open fires 3) Develop emergency protocols for dealing with fires 4) Ensure adequate fire-fighting equipment is available on site, particularly near "hot" works	No occurrence of fires on site or on surrounding areas	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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	Site management ~ *Materials*	Risk of environmental contamination or safety hazard to public/ site staff resulting from inappropriate treatment of materials	**Objective:** To ensure that materials are handled, used and stored in a manner that limits the risk of environmental contamination or a safety hazard **Mechanism:** 1) Inform delivery drivers re requirements of the specifications (Appendix D) 2) Secure materials during transport 3) Identify appropriate storage areas for stockpiling of materials, storage of hydrocarbons and storage of hazardous substances and ensure that these areas are appropriately prepared for their purpose 4) Dispose of hazardous substances in terms of the relevant legal requirements 5) Limit spillage of hazardous substances or substances with the potential to cause contamination of the environment 6) Develop emergency protocols for dealing with spillages particularly where these pose a pollution risk or involve hazardous substances 7) Compile and implement the necessary Method Statements 8) Undertake environmental awareness training of all site staff	Correct handling, use and storage of materials, including hazardous materials No incidents of environmental contamination No accidents or incidents related to the handling of materials No public complaints	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Site management ~ *Equipment maintenance and storage*	Presence of plant on site which exacerbates environmental impact including pollution and nuisance	**Objective:** Ensure that all plants on site are well maintained and serviced in the appropriate manner **Mechanism:** 1) Ensure that all plants or equipment are in good working order 2) Undertake maintenance within specified area (workshop) 3) Use drip trays for all stationary or parked plant and when servicing equipment away from designated areas	All plants in good working order Maintenance of plants do not result in environmental degradation No public complaints	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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	Site management ~ *Surface water and/or existing stormwater systems*	Contamination of stormwater runoff with suspended solids	**Objective:** Contain soils and materials within defined areas and prevent contamination of stormwater runoff **Mechanism:** 1) Identify predetermined stockpile areas for topsoil, construction materials and excavated material 2) Dispose of waste excavated material at appropriate waste disposal sites 3) Rehabilitate site to prevent soil erosion, including temporary revegetation of areas that will remain exposed for extended periods 4) Undertake concrete mixing away from sensitive areas and on impermeable surfaces 5) Store fuels in storage area that is appropriately bunded and drains to a sump 6) Ensure that substances that pose a risk of water contamination are appropriately stored and disposed of 7) Develop and implement water monitoring programme where work abuts aquatic systems	Correct stockpiling of excavated material on site No waste material left on site No erosion on site No pollution of water resources	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Site management ~ *Dust*	Dust nuisance from the excavated and stockpiled materials	**Objective:** To avoid dust nuisance from excavated materials or construction materials **Mechanism:** 1) Implement dust suppression measures e.g. regular watering 2) Undertake concrete mixing away from sensitive areas 3) Develop and implement dust monitoring programme	Appropriate management of dust No complaints from public No complaints from site staff	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Site management ~ *Noise*	Noise nuisance from construction equipment	**Objective:** To avoid noise nuisance from construction equipment **Mechanism:** 1) Limit working hours for noisy equipment to daylight hours 2) Fit silencers appropriate to equipment 3) Develop and implement noise monitoring programme	Appropriate management of noisy activities No complaints from public No complaints from site staff	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

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	Site management ~ *Traffic*	Traffic nuisance from construction vehicles	**Objective:** To avoid traffic nuisance from construction vehicles **Mechanism:** 1) All trips for delivery of materials should utilise the N4. These trips to and from the N4 should use the R545 to the Kusile Power Station construction site; 2) The shoulder sight distance along the R104 where the rail crossing will be located is adequate for this class of road and will not be an issue even if construction traffic gains access to and from the site at this point. Therefore it is recommended that this road be used to access the site; 3) W107 and W108 intersection warning signs with IN 11.569 supplementary warning plates must be erected on the R104 approaching the existing intersection with the D2236, and at the potential point of access to the site, indicating the presence of heavy vehicles at the intersections. 4) The R104 between Bronkhorstspruit and Balmoral is tarred road and in good condition. However with heavy construction traffic over a period of two years, if this road pavement is not monitored, surface distress and edge deterioration could develop and accelerate and potentially become road safety hazards. This road should be resurfaced back to its original condition once construction is completed; 5) A detailed construction-related traffic management plan must be developed prior to the commencement of any construction work both in terms of road safety and road pavement maintenance. 6) Construction traffic should not in normal circumstances be permitted to use any portion of the existing gravel access roads, the proposed service road within the future rail reserve would be more appropriate as a site access road. 7) All road design work must be carried out by suitably qualified personnel, compliant with relevant standards and be approved by the appropriate road authority. 8) All other construction vehicles, e.g. tippers, dump trucks, compactors, water bowsers, etc. will as far as possible be confined to site and will not travel on public roads.	Appropriate management of traffic activities No complaints from public	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
	Site management ~ *Public health and safety*	Hazardous conditions to landowners and members of the public	**Objective:** Provide adequate warning to landowners/ public regarding potential hazards and ensure safe access where required **Mechanism:** 1) Ensure adequate signage for landowners/ public about the work, particularly where work abuts major public thoroughfares or use areas 2) Erect and maintain fencing and gated access to restricted areas 3) Implement requisite traffic safety measures at abutting roads 4) Implement requisite safety measures where there are abutting public use areas 5) Ensure adequate accessibility to landowners/ public where required for safe access	Safe conditions for public No members of the public/ landowners injured Signboards put up before construction commences Provision of safe access routes for landowners/ public, which are clearly demarcated and visible	Contractor	Contract Document [Note: costs covered within contract price]	During Construction Phase (from site establishment to Contract Completion)	Site Engineer Environmental Consultant ESKOM
	Closure ~ *Environmental integrity*	Environmental integrity of site undermined resulting in reduced visual aesthetics, erosion, compromised land capability and the requirement for on-going management intervention	**Objective:** To ensure that the site is appropriately rehabilitated following the execution of the works, such that residual environmental impacts are remediated or curtailed **Mechanism:** 1) Remove all temporary facilities and waste materials 2) Replace stockpiled topsoil 3) Install necessary drainage works and anti-erosion measures 4) Landscape and revegetate disturbed areas with appropriate vegetation 5) Ensure that the Contractor is required to maintain revegetated areas until an acceptable cover has been achieved	All portions of site, including construction camp and working areas, cleared of equipment and temporary facilities Topsoil replaced on all areas, and stabilised Disturbed areas rehabilitated Acceptable cover achieved on closed site Closed site free of erosion and alien invasive plants	Contractor	Contract Document [Note: costs covered within contract price]	Following execution of the works	Site Engineer Environmental consultant ESKOM DEA/ MDALA/ GDARD

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
5. ENVIRONMENTAL MANAGEMENT OF THE OPERATIONAL AND DECOMMISSIONING[xii] PHASES								
All Activities (railway and all associated structures and infrastructure, including the 88kV power lines, substations and access roads)	Environmental management documentation and procedures	No framework within which to locate the management of the operational and decom. phases No procedures against which to assess environmental performance during the operational and decom. phases and thus no measure of compliance	**Objective:** To develop environmental management documentation and procedures which are consistent with the existing Environmental Management Procedures and will ensure the effective and proactive management of the operational and decom. phases **Mechanism:** 1) Use the existing Generation Business Unit Environmental Management Procedure as the basis to develop site specific environmental documentation and procedures for the railway, including its associated structures and infrastructure 2) Ensure that Environmental Management Procedures provide site specific environmental policies and management plans that comply with ESKOM's EMS 3) Ensure that the procedures are practical and implementable on the site	Environmental Management Procedure for the railway and associated infrastructure which is consistent with the Business Unit's existing documents, complies with ESKOM's EMS requirements and will ensure effective management of the operational and decommissionning . phases	Environmental Consultant ESKOM	EIA documentation Specialist studies Framework EMP In-house procedures (were relevant and available) ESKOM EMS	Prior to the onset of operation	ESKOM
	Environmental management of the operational phase	Negative impacts on environment during operation	**Objective:** To ensure that the operation of the railway line and associated structures/ infrastructure does not result in avoidable impacts on the environment, and that any impacts that do occur are anticipated and managed **Mechanism:** 1) Implement the operational phase management procedures outlined in the Environmental Management Procedure 2) Comply with all requirements of all permits, authorisations and/ or licenses received	Environmental impacts effectively monitored and managed during the operational phase with no residual impacts on the environment Comprehensive record of compliance and remedial actions available to ESKOM and the authorities	ESKOM (in-house environmental staff)	Environmental Management Procedure ESKOM EMS	During operation	ESKOM

ACTIVITY	ASPECT	IMPACT	MITIGATION MEASURE: (objective and mechanism)	PERFORMANCE INDICATOR	RESPONSIBILITY	RESOURCES	SCHEDULE	VERIFICATION
	Environmental management of the decom.	Negative impacts on environment during decom.	**Objective:** To ensure that the decom. of the railway line and associated structures/ infrastructure does not result in avoidable impacts on the environment, and that any impacts that do occur are anticipated and managed **Mechanism:** 1) Implement the decom. phase management procedures outlined in the Environmental Management Procedure	Environmental impacts effectively monitored and managed during the decom. phase with no residual impacts on the environment Comprehensive record of compliance and remedial actions available to ESKOM and the authorities	ESKOM	Environmental Management Procedure ESKOM EMS	During decom.	ESKOM

[i] EIA = Environmental Impact Assessment
[ii] DEA = Department of Environmental Affairs

[iv] SAHRA = South African Heritage Resources Agency
[v] NHRA = National Heritage Resources Act
[vi] DWA = Department of Water Affairs
[vii] The in-house EMPs may need to be augmented with project specific "project specifications" to ensure that the environmental issues are comprehensively addressed in the Tender Document.
[viii] Within this context BPEO, or Best Practicable Environmental Option, is defined as "for a given set of objectives, the option that provides the most benefits or least damage to the environment as a whole, a acceptable cost, in the long term as well as in the short term" (Royal Commission on Environmental Pollution, 1988). Here environment includes both the social and biophysical components.
[ix] It is understood that effect will be given to the requirements listed here by ensuring that they are integrated as specifications (where appropriate) into the Tender Document, as highlighted under Section 2.
[x] MDALA = Mpumalanga Department of Agriculture and Land Affairs
[xi] GDARD = Gauteng Department of Agriculture and Rural Development
[xii] Abbreviated to decom.