APPENDIX F: IMPACT ASSESSMENT

Terrestrial Biodiversity Assessment.

Potential Impacts during the Construction Phase

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
CONSTRUCTION PHASE						
Habitat loss and fragmentation	*Status*	*Negative*	*Moderate*	• *No High sensitivity areas have been identified for the EGI project. As far as possible, the Watercourse habitat should be avoided for the placement of pylons and roads.* • *With appropriate mitigation and rehabilitation impacts can be reduced for other habitats.* • *No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in Watercourses.* • *The topsoil and vegetation disturbed for the for the preparation of foundations and temporary infrastructure must be replaced and rehabilitated where necessary.* • *Only the planned placement of powerlines must be disturbed.*	*Low*	*Medium*
	Spatial Extent	*Site specific*				
	Duration	*Medium term*				
	Consequence	*Severe*				
	Probability	*Very Likely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Moderate*				

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
				Vegetation and topsoil removal outside of these areas must be avoided.		
Loss of species of conservation concern	*Status*	*Negative*	*Low*	• *Avoidance is the best measure.* • *No plant SCC were recorded or likely to be present on the site.*	*Low*	*High*
	Spatial Extent	*Site specific*				
	Duration	*Long term*				
	Consequence	*Moderate*				
	Probability	*Unlikely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Moderate*				
Loss of protected species	*Status*	*Negative*	*Moderate*	*Where the approved layout designs impact on provincially protected species permit applications are required for either the relocation or destruction of provincially protected species (Free State Nature Conservation Ordinance 8 of 1969).* *This is also relevant to protected trees such as Boscia albitrunca which could be impacted on by the proposed development.*	*Low*	*High*
	Spatial Extent	*Site specific*				
	Duration	*Long term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Moderate*				
Increased alien invasive species	*Status*	*Negative*	*Moderate*	*Compile an alien and invasive species control and monitoring plan in terms of NEMBA.*	*Moderate to Low*	*Medium*
	Spatial Extent	*Local*				
	Duration	*Medium term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*Moderate reversibility*				
	Irreplaceability	*Low irreplaceability*				
	Status	*Negative*	*Moderate*		*Low*	*Medium*

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
Increased erosion and soil compaction	*Spatial Extent*	*Site specific*		• *Utilise existing access routes as far as possible.* • *Confine the movement of vehicles to the access routes to and from the site and to the construction and operation areas.* • *Do not drive in the natural veld.* • *Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible.* • *Monitor the entire site for signs of erosion throughout the construction, operational and decommissioning phases of the project.* • *Refer to Aquatic Report mitigation measures relevant to watercourse crossings and development close to watercourses.*		
	Duration	*Medium term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*Moderate reversibility*				
	Irreplaceability	*Low irreplaceability*				
Littering and general pollution	*Status*	*Negative*	*Moderate*	• *The site camp must not be located in high sensitivity areas and their buffer zones.* • *Dangerous goods may not be stored within 100 m of a watercourse – refer to the BESS assessment for more details.*	*Low*	*Medium*
	Spatial Extent	*Local*				
	Duration	*Short to Medium term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*Moderate reversibility*				
	Irreplaceability	*Low irreplaceability*				

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
				• *Hydrocarbon fuels must be stored in a secure, bunded area.* • *Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis.* • *Ablution facilities must be located outside sensitive areas and their buffer zones.* • *Portable ablution facilities must be regularly cleaned and maintained in good working condition.* • *Any spillage from ablution facilities must be cleaned up immediately and disposed of in an* • *appropriate manner.* • *Vehicles must be in good working condition, with no oil, water or fuel leaks. Vehicles must be regularly inspected and any problems corrected.* • *Refuelling may only take place in an appropriate, bunded area.*		

Impact	Impact Criteria		Significance (Pre-Mitigation)	Potential mitigation measures	Significance (Post-Mitigation)	Confidence Level
				Refuelling may not take place in sensitive areas. • *Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.*		

Potential Impacts during the Operational Phase

Impact	Impact Criteria		Significance (Pre-Mitigation)	Potential mitigation measures	Significance (post-mitigation)	Confidence Level
OPERATIONAL PHASE						
Loss of species composition and diversity	*Status*	*Negative*	*Moderate*	• *The loss of species composition and diversity cannot be fully mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation.* • *A rehabilitation plan is required to restore each habitat to a natural state that is representative of the respective vegetation type after decommissioning.*	*Low*	*Medium*
	Spatial Extent	*Site specific*				
	Duration	*Long term*				
	Consequence	*Moderate*				
	Probability	*Likely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Low*				
Increased alien invasive species	*Status*	*Negative*	*Moderate*	*Compile an alien and invasive species control and monitoring plan in terms of NEMBA.*	*Low*	*High*
	Spatial Extent	*Local*				
	Duration	*Long term*				
	Consequence	*Moderate*				

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (post-mitigation)*	*Confidence Level*
	Probability	*Likely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Low*				
Littering and general pollution	*Status*	*Negative*	*Moderate*	• *Vehicles must be in good working condition, with no oil, water or fuel leaks.* • *Vehicles must be regularly inspected, and any problems corrected.* • *Refuelling may only take place in an appropriate, designated bunded area.* • *Any spillages must be reported immediately and dealt with appropriately.* • *Spill kits must be available on site in case of accidental spillage.* • *Sufficient waste disposal bins must be available on site and clearly marked.*	*Low*	*High*
	Spatial Extent	*Local*				
	Duration	*Medium term*				
	Consequence	*Moderate*				
	Probability	*Unlikely*				
	Reversibility	*High*				
	Irreplaceability	*Replaceable*				

Potential Impacts during the Decommissioning Phase

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
DECOMMISSIONING PHASE						
Loss of habitat	*Status*	*Negative*	*Low*	*The loss of vegetation is unavoidable within the approved layout development*	*Very Low*	*Medium*
	Spatial Extent	*Site specific*				
	Duration	*Short term*				

Impact	*Impact Criteria*		*Significance (Pre-Mitigation)*	*Potential mitigation measures*	*Significance (Post-Mitigation)*	*Confidence Level*
	Consequence	*Moderate*		*footprint, but sensitive areas must be avoided.* *A rehabilitation plan is required to restore each habitat to a natural state after decommissioning.*		
	Probability	*Likely*				
	Reversibility	*Low*				
	Irreplaceability	*Moderate*				
Increased alien invasive species	*Status*	*Negative*	*Moderate*	*Compile an alien and invasive species control and monitoring plan in terms of NEMBA.*	*Low*	*Medium*
	Spatial Extent	*Local*				
	Duration	*Medium term*				
	Consequence	*Substantial*				
	Probability	*Likely*				
	Reversibility	*Moderate*				
	Irreplaceability	*Low*				

Aquatic Biodiversity Impacts

NEMA Impact Assessment – Linear, Infrastructure and MTS Activities – Water and Habitat impacts – Pre-Mitigation

Phase	**Construction**					**Operation**		
Activity	**Operation of equipment and machinery**	**Clearing vegetation**	**Stockpiling of and placement construction materials**	**Excavating/shaping landscape**	**Final landscaping, backfilling and postconstruction rehabilitation**	**Alteration of drainage**	**Alteration of surface water flow dynamics**	**Establishment of alien plants on disturbed areas**
Spatial Scale	1	1	1	1	1	1	1	1

Duration	3	3	3	3	3	4	4	4
Severity	1	2	1	2	2	3	2	2
Frequency	1	1	1	1	1	5	5	5
Probability	4	4	4	4	4	4	4	4
Significance Rating	25	30	25	30	30	72	63	63
Significance interpretation	Low	Low	Low	Low	Low	Low	Low	Low

NEMA Impact Assessment – Linear, Infrastructure and MTS Activities – Water and Habitat impacts – Post Mitigation

Phase	**Construction**				**Operation**			
Activity	**Operation of equipment and machinery**	**Clearing vegetation**	**Stockpiling of and placement construction materials**	**Excavating/shaping landscape**	**Final landscaping, backfilling and postconstruction rehabilitation**	**Alteration of drainage**	**Alteration of surface water flow dynamics**	**Establishment of alien plants on disturbed areas**
Spatial Scale	1	1	1	1	1	1	1	1
Duration	3	3	3	3	3	4	4	4
Severity	1	2	1	2	2	3	2	2
Frequency	1	1	1	1	1	5	5	5
Probability	1	1	1	1	1	1	1	1
Significance Rating	10	12	10	12	12	48	42	42
Significance interpretation	Low	Low	Low	Low	Low	Low	Low	Low

NEMA Impact Assessment –Cumulative – Water and Habitat impacts Pre-Mitigation

Phase	**Construction**					**Operation**		
Activity	**Operation of equipment and machinery**	**Clearing vegetation**	**Stockpiling of and placement construction materials**	**Excavating/shaping landscape**	**Final landscaping, backfilling and postconstruction rehabilitation**	**Alteration of drainage**	**Alteration of surface water flow dynamics**	**Establishment of alien plants on disturbed areas**
Spatial Scale	1	1	1	1	1	1	1	1
Duration	3	3	3	3	3	4	4	4
Severity	2	3	2	3	2	3	3	3
Frequency	1	1	1	1	1	5	5	5
Probability	4	4	4	4	4	4	4	4
Significance Rating	30	35	30	35	30	72	72	72
Significance interpretation	Low	Low	Low	Low	Low	Low-medium	Low-medium	Low-medium

NEMA Impact Assessment –Cumulative – Water and Habitat impacts Post Mitigation

Phase	**Construction**	**Operation**

Activity	Operation of equipment and machinery	Clearing vegetation	Stockpiling of and placement construction materials	Excavating/shaping landscape	Final landscaping, backfilling and postconstruction rehabilitation	Alteration of drainage	Alteration of surface water flow dynamics	Establishment of alien plants on disturbed areas
Spatial Scale	1	1	1	1	1	1	1	1
Duration	3	3	3	3	3	4	4	4
Severity	2	3	2	3	2	3	3	3
Frequency	1	1	1	1	1	5	5	5
Probability	1	1	1	1	1	1	1	1
Significance Rating	12	14	12	14	12	48	48	48
Significance interpretation	Low	Low	Low	Low	Low	Low	Low	Low

AVIFAUNAL IMPACTS

Habitat Loss

IMPACT NATURE	Direct loss of avifaunal habitat	STATUS	NEGATIVE
Impact Description	Clearing natural vegetation for the construction of the OHPL and associated infrastructure (roads and substations) will lead to the loss, degradation and fragmentation of foraging and breeding habitats for avifauna species of conservation concern (SCC). Clearing of habitat in the optimal foraging habitats around the drainage areas (including the 100 m buffer) cannot be avoided but must be limited as much as possible. While there may be some loss of breeding or mating display habitats for SCC or the loss of habitat for important bird congregations, this is unlikely to be significant given the small footprint of the OHPL and associated infrastructure. Although no nests were found during site surveys, the presence of scrubland and grassland for regular foraging suggests potential for nearby nesting for Secretarybirds, which were recorded during both surveys, indicating the area is attractive to them and they may be locally impacted by habitat loss. Furthermore, the Kareekloof EGI study area does not support significant congregations of waterbirds or migratory species at any global, national or regional scale. While the no-go alternative will not require construction activities associated with the proposed development to take place and therefore will not result in any additional loss of avifaunal habitats, grazing of livestock and game, as well as the presence of alien trees, in the study area are already contributing to habitat loss in the study area.		

Impact Source(s)	Site clearing and preparation for pylon construction, laydown areas, roads (servitudes), substations.			
Receptor(s)	Secretarybird and Ludwig's Bustard.			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	4	Preferred Alternative:	4
	No-Go Alternative:	3	No-Go Alternative:	3
PROBABILITY (C)	Preferred Alternative:	4	Preferred Alternative:	3
	No-Go Alternative:	2	No-Go Alternative:	2
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	-1
	No-Go Alternative:	+1	No-Go Alternative:	+1
SIGNIFICANCE RATING (F) = A*B*D*C	Preferred Alternative:	**-32**	Preferred Alternative:	**-12**
	No-Go Alternative:	**6**	No-Go Alternative:	**6**
CUMULATIVE IMPACTS	Existing and planned activities and developments in the study area and its surroundings have likely already led to some loss of avifaunal habitats. However, the habitat loss expected from the construction and operation of the OHPL is minimal, as the pylon footprints are very small, and the servitudes are not extensive roads. As such, the cumulative impacts on receptor species are unlikely to be significant.			
CONFIDENCE	High			
MITIGATION MEASURES	• Limit the areas cleared for construction purposes (e.g. laydown areas) and avoid this in all the medium sensitivity areas (where possible). • Avoid all nesting and lekking habitats for Ludwig's Bustard (high sensitivity habitat in **Error! Reference source not found.**). • Demarcate such areas on the ground during construction and sign post them as "Environmentally sensitive areas - keep out!". • Rehabilitate all areas disturbed immediately after construction. • Prioritise existing roads for access routes. • Keep servitudes as a two-tyre track (instead of wide, fully graded road) wherever possible to limit habitat loss. • Develop and implement an Alien and Invasive Plant Control Plan.			

Collision and Electrocution

IMPACT NATURE	Direct mortality through collision and electrocution		STATUS	NEGATIVE
Impact Description	Mortality from collision and electrocution is a potential impact to avifauna from OHPLs, including the proposed Kareekloof OHPL. This risk is highest where electrical transmission infrastructure is placed near areas of higher habitat complexity and resource availability, such as wetlands, rivers, and rocky ridges, where bird abundances are greater or where bird species prone to collisions with OHPLs are nesting or displaying for breeding purposes. Electrocution of birds within the substations/switching zones is also possible. Additionally, vehicle-induced collisions, whether direct (i.e., roadkill) or caused by birds being flushed into fence infrastructure, can pose a significant mortality risk, especially to large ground-dwelling species. Several SCC likely or known to occur in the proposed development region have wingspans large enough (>1.5 m) to bridge gaps between live and earthed components or between powerline phases. This impact can be reduced through careful planning of OHPL infrastructure layout to avoid highly sensitive areas, such as Ludwig's Bustard breeding and lekking sites, and through designing the OHPL to limit electrocutions risks (e.g., wings and faecal streamers) and increasing wire visibility with appropriate bird flight diverters (BFDs). Additionally, bird electrocution within substations or switching zones can be reduced through proper infrastructure layout planning based on the SEI evaluation. While the no-go alternative will not require construction activities associated with the proposed development to take place and therefore will not result in greater collision or electrocution risks, electricity powerlines and fences in the study area and surroundings have already resulted in bird mortalities, for example a Jackal Buzzard carcass was found under a powerline and a Secretarybird carcass was found trapped in a fence.			
Impact Source(s)	Electrical transmission line infrastructure			
Receptor(s)	All birds but particularly waterbirds, raptors and other large-bodied species with low power to weight ratios and in-flight manoeuvrability. Major receptors include Ludwig's Bustard and Secretarybird.			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	2	Preferred Alternative:	2
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	4	Preferred Alternative:	4

	No-Go Alternative:	4	No-Go Alternative:	4
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	4	No-Go Alternative:	4
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-3	Preferred Alternative:	-1
	No-Go Alternative:	+1	No-Go Alternative:	+1
SIGNIFICANCE RATING (F) = A*B*D*C	Preferred Alternative:	**-72**	Preferred Alternative:	**-16**
	No-Go Alternative:	**16**	No-Go Alternative:	**16**
CUMULATIVE IMPACTS	Existing powerlines and fences in the development region have already resulted in mortalities of birds, including one SCC (see **Error! Reference source not found.**). The construction of the Kareekloof OHPL and associated infrastructure will further increase the risk of collision and electrocution. Numerous existing ESKOM OHPLs are already present in the landscape and currently causing negative impacts to avifauna (**Error! Reference source not found. Error! Reference source not found.**). Without appropriate mitigation, the cumulative impacts on the receptors most at risk (bustards) from collisions with powerlines in the region will be extreme and unsustainable, particularly as the planned EGI alignment is perpendicular to that of the existing Eskom lines. Even with typical mitigation such as spiral bird flight diverters, collisions are not unavoidable and there is likely to be an appreciable cumulative impact on bustard species in the region, unless the latest recommendations on BFDs for Ludwig's Bustards are followed (see discussion on Ludwig's Bustards in **Error! Reference source not found. Error! Reference source not found.**).			
CONFIDENCE	High			
MITIGATION MEASURES	• Attempts should be made to minimise the OHPL route length and for the route to be aligned with existing powerlines as far as possible. • The route should avoid or minimise wetland/riverine crossings. • Rocky ridges/rises (delineated in red in **Error! Reference source not found.**) must be avoided. • Increase the visibility of transmission lines, especially the thinner earth line with which most collisions tend to be associated, by the application of appropriate illuminated/highly reflective BFDs – this must be done in consultation with EWT (Matt Pretorius) and ESKOM, as discussed in **Error! Reference source not found. Error! Reference source not found.**. Spacing of BFDs must follow the recommended guidance from EWT in relation to the habitat, considering that OHPL alignment sections near sensitive habitats require denser application of BFDs. • Design of OHPLs must consider potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal "streamers" or large open wings creating a short.			

	• Installation of bird deterrent devices on transmission line poles, pylons and monopoles, as well as security/boundary fences, will be required to limit collision and electrocution risk. • In all areas where service roads intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 m from the edge of every service road to allow for vulnerable species such as bustards, cranes and Secretarybirds to obtain adequate height after being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 m buffer and marked with fence flappers in order to reduce flush related collisions.

Disturbance

IMPACT NATURE	**Sensory disturbance**		**STATUS**	**NEGATIVE**
Impact Description	Sensory disturbances to avifauna are inevitable and can negatively impact upon breeding or nesting SCC and is mainly likely to be restricted to the construction phase. Although dust, noise and human activity during construction is unavoidable, much can be done to reduce the effect of these sensory disturbance impacts on avifauna. During operation, impacts associated with sensory disturbance are expected to be negligible. The no-go alternative, which avoids construction and operational activities of the proposed development, will not increase sensory disturbances. However, ongoing farming activities in the study area and surroundings are likely to continue causing disturbances to some species. Although, these are also considered negligible due to the low intensity impact.			
Impact Source(s)	Machinery, construction staff, noise, dust, light.			
Receptor(s)	All avifauna, particularly large terrestrial birds and raptors.			
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**
EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	3	No-Go Alternative:	3
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	2
	No-Go Alternative:	2	No-Go Alternative:	2
	Preferred Alternative:	-2	Preferred Alternative:	-1

INTENSITY OR MAGNITUDE (D)	No-Go Alternative:	+1	No-Go Alternative:	+1
SIGNIFICANCE RATING (F) = A*B*D*C	Preferred Alternative:	**-6**	Preferred Alternative:	**-2**
	No-Go Alternative:	**6**	No-Go Alternative:	**6**
CUMULATIVE IMPACTS	Disturbances to birds from the construction of renewable energy facilities and associated grid infrastructure in the region is likely to be short lived and very occasional and therefore unlikely to represent a significant cumulative impact.			
CONFIDENCE	High			
MITIGATION MEASURES	• Adopt temporal avoidance strategies. In the Nama Karoo, Ludwig's Bustards perform lekking displays for 6 weeks following spring rains and nest September to February (Chittenden *et al*., 2016). Attempt, as far as practically possible, to conduct most of the highly disturbing activities outside of this period and > 1 km from potential nesting sites to minimize disturbance to this species during sensitive life stages such as lekking, courting, nesting and fledging. • Minimise light pollution and fit external lighting with downward facing hoods. • Train staff and contractors on the importance of birds and other biodiversity and the sensitive areas for these species which should be avoided. • Introduce and enforce a speed limit (40 km/h) on site.			

Attraction to the OHPL

IMPACT NATURE	**Attraction of birds**	**STATUS**	**NEGATIVE**
Impact Description	Certain species are attracted by the establishment of OHPLs as it presents additional resources in the form of perches, nesting habitat, shade and often food availability (collisions). The attraction of opportunistic species and their predators increases the at risk of collision and electrocution. Existing electricity powerlines and pylons have been identified as attractants for avifauna in the development region (**Error! Reference source not found.** and **Error! Reference source not found.**).		
Impact Source(s)	OHPL infrastructure.		
Receptor(s)	Commensal and opportunistic species, as well as their predators, including raptors such as Cape Vulture, Verreaux's Eagle, Martial Eagle, Tawny Eagle, and Lanner Falcon.		
PARAMETER	**WITHOUT MITIGATION**	**SCORE**	**WITH MITIGATION**	**SCORE**

EXTENT (A)	Preferred Alternative:	1	Preferred Alternative:	1
	No-Go Alternative:	1	No-Go Alternative:	1
DURATION (B)	Preferred Alternative:	2	Preferred Alternative:	1
	No-Go Alternative:	2	No-Go Alternative:	2
PROBABILITY (C)	Preferred Alternative:	3	Preferred Alternative:	1
	No-Go Alternative:	4	No-Go Alternative:	4
INTENSITY OR MAGNITUDE (D)	Preferred Alternative:	-2	Preferred Alternative:	-1
	No-Go Alternative:	+1	No-Go Alternative:	+1
SIGNIFICANCE RATING (F) = A*B*D*C	Preferred Alternative:	**-12**	Preferred Alternative:	**-1**
	No-Go Alternative:	**8**	No-Go Alternative:	**8**
CUMULATIVE IMPACTS	Expected to be low.			
CONFIDENCE	High			
MITIGATION MEASURES	• Use infrastructure design that is not conducive to perching or nesting by birds. • Install bird deterrent devices on transmission line poles, pylons and monopoles to limit perching and minimise collision and electrocution risk.			

VISUAL IMPACTS

Construction Phase Impacts Table

Project phase	**Construction Phase**
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**
Description of impact	• Loss of site landscape character due to the removal of vegetation and the construction of the MTS and OHPL structures and associated infrastructure. • Wind-blown dust due to the removal of large areas of vegetation at the MTS making use of large earth moving equipment. • Possible soil erosion from temporary roads along the OHPL. • Wind-blown litter from the laydown and construction sites.

Mitigation Viability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts		
Potential mitigation	• Wind blown dust mitigation. • Dust mitigation for moving vehicles. • Structures at the substations need to be painted mid-grey colour. • 50m setback from farm roads for the placement of monopoles.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last approximately 12 months.	Short term	Impact will last approximately 12 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are clearly altered.	Medium to Low	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The landscape change is reversible but only with time and rehabilitation.	Medium	The landscape change is reversible but only with time and rehabilitation.
Significance	**Medium (-ve)**		**Medium to Low (-ve)**	
Comment on significance	Although for a shorter time period, the full extent development with close proximity to the road receptors, will result in Strong levels of visual contrast during construction. The area is remote, and utilisation of the road is limited.		With mitigation and the reduction in the development area with visual setbacks, the construction phase impact will be Medium, with dust likely to be a residual nuisance factor to some degree.	
Cumulatives	**Medium (-ve)**		**Low (-ve)**	
Cumulative impacts	The development without mitigation will set a precedent for development of further PV projects in this area with associated grid infrastructure, creating increased potential for intervisibility that will strongly change the rural karoo landscape With mitigation and retaining the visual setback buffers, intervisibility could be reduced. The area is also remote and already strongly visual associated with OHPL.			

Operation Phase Impacts Table

Project phase	Operation Phase			
Impact	**Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape.**			
Description of impact	• Loss of site landscape character due to the operation of the MTS structures and associated infrastructure.			
Mitigation Viability	Medium	The mitigation will partially reduce the significance of the visual and landscape impacts.		
Potential mitigation	• Lights at night management and no overhead lighting at the substations. • Continued dust suppression as required.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Long term	Impact will last approximately 20 years	Long term	Impact will last approximately 20 years
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Strong	Natural and/ or social functions and/ or processes are clearly altered.	Medium to Strong	Natural and/ or social functions and/ or processes are partially altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	High	The affected landscape will be able to recover from the impact.	Medium	The affected landscape will be able to recover from the impact.
Significance	**High (-ve)**		**Medium (-ve)**	
Comment	Over a long-time period, the light spillage from the over-head security lights has the potential to significantly degrade the existing karoo dark sky sense of place.		With mitigation and the reduction in the development area with visual setbacks, the Operational Phase impact will be moderated to some degree, with careful use of lights at night to ensure that the current dark-sky sense of place is retained.	
Cumulatives	**Medium (-ve)**		**Low (-ve)**	
Comment	The development without mitigation could set a precedent for development of further substation and OHPL projects in this area		With mitigation and retaining the visual setback buffers and limited light spillage, intervisibility could be reduced. The area is	

	with light spillage detracting from the local landscape character form intervisibility.	also remote with the local landscapes not being utilised as a visual resource.

Decommissioning Phase Impacts Table

Project phase	**Decommissioning Phase**			
Impact	**Short-term landscape change from the removal of the PV structures, followed by rehabilitation of the impacted areas back to agricultural lands.**			
Description of impact	• Movement of large vehicles required for the removal of the monopole structure and substations. • Wind-blown dust from impacts to vegetation. • Wind-blown litter from the laydown and construction sites.			
Mitigation Viability	Medium	The mitigation will reduce the significance of the visual and landscape impacts		
Potential mitigation	• Dust suppression measures. • Litter management measures. • Removal of all structures and processing in terms of according to NEMWA specifications. • Rehabilitation of impacted areas to veld grasses.			
Assessment	**Without mitigation**		**With mitigation**	
Nature	Negative		Negative	
Duration	Short term	Impact will last approximately 8 months.	Short term	Impact will last approximately 8 months.
Extent	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)	Local	Contained within the Foreground/ Mid Ground (approx. 6km from site)
Intensity	Medium	Natural and/ or social functions and/ or processes are moderately altered.	Medium	Natural and/ or social functions and/ or processes are moderately altered.
Probability	Likely	The impact is likely to occur	Likely	The impact is likely to occur.
Confidence	Sure	Substantive supportive data exists to verify the assessment	Sure	Substantive supportive data exists to verify the assessment
Reversibility	Medium	The affected landscape will be able to recover from the impact.	Medium	The affected landscape will be able to recover from the impact.
Significance	**Medium (-ve)**		**Low (-ve)**	

Comment on significance	The dust and vehicle movement impacts are short-term in Duration, and outside the main views of the receptor residences.	Visual Intrusion from wind blown dust and from vehicle movement is limited and short-term in Duration. With the removal of the structures and the monopoles, the area can be restored to rural karoo landscape.
Cumulatives	**Medium (-ve)**	**Low (+ve)**
Cumulative impacts	Without rehabilitation, the return of the vegetation to the site and the associated visual impacts would last a longer time period.	Effective management of rehabilitation can result in the return of the landscape to that of a functional agricultural area.

IMPACT SUMMARY

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
Construction Phase			
Habitat loss and fragmentation	Negative	Low	- No High sensitivity areas have been identified for the EGI project. As far as possible, the Watercourse habitat should be avoided for the placement of pylons and roads. - With appropriate mitigation and rehabilitation impacts can be reduced for other habitats. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in Watercourses. - The topsoil and vegetation disturbed for the for the preparation of foundations and temporary infrastructure must be replaced and rehabilitated where necessary. - Only the planned placement of powerlines must be disturbed. Vegetation and topsoil removal outside of these areas must be avoided.
Loss of species of conservation concern	Negative	Low	- Avoidance is the best measure. - No plant SCC were recorded or likely to be present on the site.
Loss of protected species	Negative	Low	- Where the approved layout designs impact on provincially protected species permit applications are required for either the relocation or destruction of provincially protected species. - This is also relevant to protected trees such as Boscia albitrunca which could be impacted on by the proposed development
Increased alien invasive species	Negative	Low	- Compile an alien and invasive species control and monitoring plan in terms of NEMBA.
Increased erosion and soil compaction	Negative	Low	- Utilise existing access routes as far as possible. - Confine the movement of vehicles to the access routes to and from the site and to the construction and operation areas. - Do not drive in the natural veld.

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
			- Rehabilitate new vehicle tracks and areas where the soil has been compacted as soon as possible. - Monitor the entire site for signs of erosion throughout the construction, operational and decommissioning phases of the project. - Refer to Aquatic Report mitigation measures relevant to watercourse crossings and development close to watercourses
Littering and general pollution	Negative	Low	- The site camp must not be located in high sensitivity areas and their buffer zones. - Dangerous goods may not be stored within 100 m of a watercourse – refer to the BESS assessment for more details. - Hydrocarbon fuels must be stored in a secure, bunded area. - Sufficient waste disposal bins must be available on site and clearly marked. Skip bins may be required during the construction phase which must be emptied on a regular basis. - Ablution facilities must be located outside sensitive areas and their buffer zones. - Portable ablution facilities must be regularly cleaned and maintained in good working condition. - Any spillage from ablution facilities must be cleaned up immediately and disposed of in an-appropriate manner. - Vehicles must be in good working condition, with no oil, water or fuel leaks. Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, bunded area. Refuelling may not take place in sensitive areas. - Hydrocarbon spills must be contained and cleaned up immediately. Spill kits must be available on site in case of accidental spillage.
Short-term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape	Negative	Medium -Low	- Windblown dust mitigation. - Dust mitigation for moving vehicles. - Structures at the substations need to be painted mid-grey colour. - 50m setback from farm roads for the placement of monopoles
Alteration of runoff velocity	Negative	Low	- Where culverts are required, it is recommended that these are spread across the wetland units and not directed through single culverts. - Pylon foundations should not cause erosion where energy dissipation of runoff is recommended. - Where drifts are utilised for crossings, it is recommended that these structures are reinforced with erosion control measures that
Production of sediment	Negative	Low	

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
Increasing erosion downslope	Negative	Low	protect downstream riverine substrates and riparian habitats. - All contractors and staff are to be familiarised with the method statement and have undergone an induction / training on the location of sensitive No-Go areas and basic environmental awareness using the mitigation provided in this report. - Areas where construction is to take place must be clearly demarcated. Any areas not demarcated must be avoided; - Stormwater generated from roadways must be captured and buffered, where flow velocities are to be significantly reduced before discharge into the environment. - Storm-water verges as well as other denuded areas must be grassed (re-vegetated) with local indigenous grasses to protect against erosion; - Any materials excavated must not be deposited in the wetlands or areas where it is prone to being washed downstream or impeding natural flow; - Stockpiling or storage of materials and/or waste must be placed beyond the defined buffers in this report for each respective activity; - No vehicles shall enter watercourse buffer zones outside of construction footprints; - No vehicles shall be serviced on site; a suitable workshop with appropriate pollution control facilities should be utilised offsite; - Hydrocarbons for refuelling purposes must be stored in a suitable storage device on an impermeable surface outside of the delineated wetland buffer zone; - Disturbed areas must be re-vegetated after completion of the phase; - A three-month timeframe for the initiation of this action; - Ripping of the soils should occur in two directions; and - Removed vegetation and topsoil can be harvested and applied here. - Drainage channels constructed for the access roads must be constructed so as not to result in erosion; - An alien vegetation removal and management plan must be implemented along the verges of the roads and crossing points; - General storm-water management practices should be included in the design phase and implemented during the construction phase of this project; and - Following the completion of the phase, all construction materials and debris should be removed and disposed of in a suitable area. An inspection should be completed within 8 weeks after the phase is completed

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
Direct loss of avifaunal habitat	Negative	Low	- Limit the areas cleared for construction purposes (e.g. laydown areas) and avoid this in all the medium sensitivity areas (where possible). - Avoid all nesting and lekking habitats for Ludwig's Bustard (high sensitivity habitat). - Demarcate such areas on the ground during construction and sign post them as "Environmentally sensitive areas - keep out!". - Rehabilitate all areas disturbed immediately after construction. - Prioritise existing roads for access routes. - Keep servitudes as a two-tyre track (instead of wide, fully graded road) wherever possible to limit habitat loss. - Develop and implement an Alien and Invasive Plant Control Plan.
Operational Phase Impacts			
Loss of species composition and diversity	Negative	Low	- The loss of species composition and diversity cannot be fully mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. - A rehabilitation plan is required to restore each habitat to a natural state that is representative of the respective vegetation type after decommissioning
Increased alien invasive species	Negative	Low	- Compile an alien and invasive species control and monitoring plan in terms of NEMBA
Littering and general pollution	Negative	Low	- Vehicles must be in good working condition, with no oil, water or fuel leaks. - Vehicles must be regularly inspected, and any problems corrected. - Refuelling may only take place in an appropriate, designated bunded area. - Any spillages must be reported immediately and dealt with appropriately. - Spill kits must be available on site in case of accidental spillage. - Sufficient waste disposal bins must be available on site and clearly marked.
Long Term landscape change from the current rural agricultural sense of place to the semi-industrial RE landscape	Negative	Medium	- Lights at night management and no overhead lighting at the substations. - Continued dust suppression as required.
Hydrological process alteration	Negative	Low	- The implementation of a suitable storm-water management plan for the disturbance footprint must be in place and implemented by this phase; - An annual audit of the servitude roads and MTS areas for signs of environmental disturbance
Establishment of alien plants on disturbed areas	Negative	Low	

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
Alteration of surface drainage	Negative	Low	outside and within the footprint area must be conducted; and - Alien invasive management programmes should continue throughout the duration of the activity. - Watercourse monitoring should take place at least every three years as part of the environmental management plan.
Alteration of instream habitats	Negative	Low	
Establishment of alien plants on disturbed areas	Negative	Low	
Direct avifaunal mortality through collision and electrocution	Negative	Low	- Attempts should be made to minimise the OHPL route length and for the route to be aligned with existing powerlines as far as possible. - The route should avoid or minimise wetland/riverine crossings. - Rocky ridges/rises as delineated by the specialist must be avoided. - Increase the visibility of transmission lines, especially the thinner earth line with which most collisions tend to be associated, by the application of appropriate illuminated/highly reflective BFDs – this must be done in consultation with EWT (Matt Pretorius) and ESKOM. Spacing of BFDs must follow the recommended guidance from EWT in relation to the habitat, considering that OHPL alignment sections near sensitive habitats require denser application of BFDs. - Design of OHPLs must consider potential for electrocution by large species and pre-emptively avoid the likelihood of this by increasing distances between spans to avoid faecal “streamers” or large open wings creating a short. - Installation of bird deterrent devices on transmission line poles, pylons and monopoles, as well as security/boundary fences, will be required to limit collision and electrocution risk. - In all areas where service roads intersect with semi natural or natural habitat, all fences must be set back at least (strictly) 75 m from the edge of every service road to allow for vulnerable species such as bustards, cranes and Secretarybirds to obtain adequate height after being flushed by vehicle traffic. Alternatively, the fences must be placed completely adjacent to the roads with a maximum of 3 m buffer and marked with fence flappers in order to reduce flush related collisions.
Sensory disturbance to Avifaunal Species	Negative	Low	- Adopt temporal avoidance strategies. In the Nama Karoo, Ludwig’s Bustards perform lekking displays for 6 weeks following spring

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
			rains and nest September to February (Chittenden et al., 2016). Attempt, as far as practically possible, to conduct most of the highly disturbing activities outside of this period and > 1 km from potential nesting sites to minimize disturbance to this species during sensitive life stages such as lekking, courting, nesting and fledging. - Minimise light pollution and fit external lighting with downward facing hoods. - Train staff and contractors on the importance of birds and other biodiversity and the sensitive areas for these species which should be avoided. - Introduce and enforce a speed limit (40 km/h) on site.
Attraction of birds	Negative	Low	- Use infrastructure design that is not conducive to perching or nesting by birds. - Install bird deterrent devices on transmission line poles, pylons and monopoles to limit perching and minimise collision and electrocution risk.
Decommissioning Phase			
Loss of habitat	Negative	Very Low	- The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided. - A rehabilitation plan is required to restore each habitat to a natural state after decommissioning.
Increased alien invasive species	Negative	Low	- Compile an alien and invasive species control and monitoring plan in terms of NEMBA.
Short-term landscape change from the removal of the EGI structures, followed by rehabilitation of the impacted areas back to agricultural lands.	Negative	Low	- Dust suppression measures. - Litter management measures. - Removal of all structures and processing in terms of according to NEMWA specifications. - Rehabilitation of impacted areas to veld grasses.
Alteration of runoff velocity	Negative	Low	- The same mitigations as for the construction phase apply.
Production of sediment	Negative	Low	- The same mitigations as for the construction phase apply.
Increasing erosion downslope	Negative	Low	- The same mitigations as for the construction phase apply.
Production of fines and contaminants	Negative	Low	- The same mitigations as for the construction phase apply.

Nature of Impact	Status	Significance after Mitigation	Mitigation Measures.
Increasing erosion downslope	Negative	Low	- The same mitigations as for the construction phase apply.