



IMPACT ASSESSMENT REPORT

September 2023

THE CONNECTION INFRASTRUCTURE FOR THE
RUDOLPH SOLAR POWER PLANT NEAR
VILJOENSKROON, FREE STATE PROVINCE

PROJECT DETAIL

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1 DESCRIPTION OF THE IMPACTS AND RISKS

1.1 Matrix Analysis

The matrix describes the relevant listed activities, the aspects of the development that will apply to the specific listed activity, a description of the environmental issues and potential impacts, the significance and magnitude of the potential impacts and possible mitigation measures. The matrix also highlights areas of particular concern (see Table 2) for more in-depth assessment. An indication is provided of the specialist studies which were conducted and that informed the initial assessment. Each cell is evaluated individually in terms of the nature of the impact, duration and its significance – should no mitigation measures be applied. This is important since many impacts would not be considered insignificant if proper mitigation measures were implemented.

In order to conceptualise the different impacts, the matrix specifies the following:

- **Stressor:** Indicates the aspect of the proposed activity, which initiates and causes impacts on elements of the environment.
- **Receptor:** Highlights the recipient and most important components of the environment affected by the stressor.
- **Impacts:** Indicates the net result of the cause-effect between the stressor and receptor.
- **Mitigation:** Impacts need to be mitigated to minimise the effect on the environment.

1.2 Method of Environmental Assessment

The environmental assessment aims to identify the various possible environmental impacts that could result from the proposed activity. Different impacts need to be evaluated in terms of their significance and in doing so highlight the most critical issues to be addressed.

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale i.e., site, local, national or global whereas intensity is defined by the severity of the impact e.g., the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in Table 4.1.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

1.3 Impact Rating System

The Impact assessment must take account of the nature, scale, duration, extent of impacts on the

environment whether such impacts are positive or negative. Each impact is also assessed according to the project phases:

- planning
- construction
- operation
- decommissioning

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance should also be included. The rating system is applied to the potential impacts on the receiving environment and includes an objective evaluation of the mitigation of the impact. In assessing the significance of each impact, the following criteria is used:

Table 1: The Impact Rating System

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be experienced.		
1	Site	The impact will only affect the site.
2	Local/district	Will affect the local area or district.
3	Province/region	Will affect the entire province or region.
4	International and National	Will affect the entire country.
DURATION		
This describes the duration of the impacts. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact will either disappear with mitigation or will be mitigated through natural processes in a span shorter than the construction phase (0 – 1 years), or the impact will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).

2	Medium term	The impact will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 30 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered indefinite.

REVERSIBILITY

This describes the degree to which an impact can be successfully reversed upon completion of the proposed activity.

1	Completely reversible	The impact is reversible with implementation of minor mitigation measures.
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible, and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

CUMULATIVE EFFECT

This describes the cumulative effect of the impacts. A cumulative impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects.
2	Low cumulative impact	The impact would result in insignificant to minor cumulative effects.
3	Medium cumulative impact	The impact would result in minor to moderate cumulative effects.
4	High cumulative impact	The impact would result in significant cumulative effects
PROBABILITY	PROBABILITY	PROBABILITY
This describes the chance of occurrence of an impact.	This describes the chance of occurrence of an impact.	This describes the chance of occurrence of an impact.
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
INTENSITY/ MAGNITUDE		
Describes the severity of an impact.		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/component still continues to function in a moderately modified way and maintains general integrity (some impact on

		integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired. Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.

SIGNIFICANCE

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The calculation of the significance of an impact uses the following formula: **(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.**

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact significance rating	Description
6 to 28	Negative low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative high impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.

51 to 73	Positive high impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive very high impact	The anticipated impact will have highly significant positive effects.

1.4 Mitigation Confidence

The significance of the impact is assessed following the implementation of mitigation measures, based on the confidence levels that the mitigation measures will reduce and/or enhance the impact.

Mitigation Confidence - Negative and Positive Impacts

1	Very low	There is no confidence that the mitigation measures will reduce/enhance the impact.
0.8	Low	20% confidence that the mitigation measures will reduce/enhance the impact
0.5	Moderate	50% confidence that the mitigation measures will reduce/enhance the impact
0.2	High	80% confidence that the mitigation measures will reduce/enhance the impact

Table 2: Matrix Analysis

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
CONSTRUCTION PHASE															
<p>GN.R. 327 - Activity 11(i): “The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</p> <p>GN.R. 327 - Activity 12(ii)(a)(c): “The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (c) within 32 meters of a watercourse, measured from the edge of a watercourse.”</p> <p>GN.R. 327 - Activity 24(ii): “The development of a road (ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 meters.”</p> <p>GN.R. 327 - Activity 28: “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p>GN.R. 324 - Activity 4(b)(i)(ee): “The development of a road wider than 4 metres with a reserve less than 13.5 metres in the (b) Free State, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<ul style="list-style-type: none"> • Site clearance and vegetation removal • Earthworks and Vehicles • Road Construction • Civil Works • Transportation and Installation of the powerlines • Construction site camp and material laydown area 	Flora and Habitat	Destruction, loss and fragmentation of habitats, ecosystems and vegetation community	2	3	3	2	3	3	3	48	Refer to Table 3	0.5	24	Terrestrial Biodiversity Assessment
			Introduction of IAP species and invasive fauna.	2	3	2	2	3	3	3	45		0.2	9	
		Fauna	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	2	3	2	2	3	2	3	42		0.5	21	
		Surface Water Resources / Wetlands / Riparian areas	Disturbance of aquatic habitat; water quality impacts	1	2	2	2	2	2	2	22		0.5	11	Aquatic Assessment

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
<p>GN.R. 324 - Activity 10 (b)(i)(bb)(ee)(hh): “The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in the (b) Free State, (i) outside urban areas, within (bb) National Protected Area Expansion Strategy Focus areas, (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 12(b)(ii)(iv): “The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State (ii) within critical biodiversity areas identified in bioregional plans and (iv) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 14(ii)(a)(c)(i)(ff): “The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse, or (c) within 32 meters of a watercourse, measured from the edge of a watercourse, within (b) the Free State, (i) outside urban areas, (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans</p>	-	Avifauna	Loss of priority avian species from important habitats Loss of resident avifauna through increased disturbance Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats	1	2	2	3	4	2	3	42		0.5	21	Avifauna Impact Assessment
		Soil and Agriculture	Loss of land capability during the construction phase – Grid Connection	1	2	1	1	3	2	2	20		0.5	10	Soil and Agricultural Compliance Statement
		Visual Landscape	Change in the landscape character of the study area. Loss of the visual resource. Change in the sense of place of the area. Increase in the visibility of the project. Bad housekeeping can result to dust, waste/ litter on site and therefore create an eyesore.	2	1	1	2	4	3	2	26		0.8	20.8	Visual Impact Assessment

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		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
	-	Traffic	Increase in traffic volumes leading to and surrounding the Powerline	3	2	1	1	2	2	2	22		1	22	Traffic Assessment
OPERATIONAL PHASE															
<p>GN.R. 327 - Activity 11(i): “The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts.”</p> <p>GN.R. 327 - Activity 12(ii)(a)(c): “The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (c) within 32 meters of a watercourse, measured from the edge of a watercourse.”</p> <p>GN.R. 327 - Activity 24(ii): “The development of a road (ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 meters.”</p> <p>GN.R. 327 - Activity 28: “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p>GN.R. 324 - Activity 4(b)(i)(ee): “The development of a road wider than 4 metres with a reserve less than 13.5 metres in the (b) Free State, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans</p>	<ul style="list-style-type: none"> • Site clearance and vegetation removal • Earthworks and Vehicles • Road Construction • Civil Works • Transportation and Installation of PV Panels • Wiring to Central Inverters • Storage and Use of Hazardous substances and Equipment 	Flora and Habitats	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive rocky areas, and protected plants).	2	3	2	2	3	3	3	45	Refer to Table 4	0.5	22.5	Terrestrial Biodiversity Assessment
		Flora and Habitats	Continuing spread of IAP and weed species	3	3	2	2	3	2	3	45		0.5	22.5	
		Fauna	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	2	3	2	2	3	2	3	42		0.5	21	
		Surface Water Resources / Wetlands / Riparian areas	Disturbance of aquatic habitat; water quality impacts	1	3	2	2	3	2	2	26		0.5	13	Aquatic Assessment

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION	
		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation		
<p>adopted by the competent authority or in bioregional plans.</p> <p>GN.R. 324 - Activity 10 (b)(i)(bb)(ee)(hh): “The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in the (b) Free State, (i) outside urban areas, within (bb) National Protected Area Expansion Strategy Focus areas, (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 12(b)(ii)(iv): “The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State (ii) within critical biodiversity areas identified in bioregional plans and (iv) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 14(ii)(a)(c)(i)(ff): “The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such</p>	-	Avifauna	<p>Loss of priority avian species from important habitats</p> <p>Loss of resident avifauna through increased disturbance</p> <p>Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats</p>	1	2	2	3	4	2	3	42		0.5	21	Avifauna Impact Assessment	
		Soil and Agriculture	Loss of land capability during the construction phase – Grid Connection	1	2	1	1	3	2	2	2	20		0.5	10	Soil and Agricultural Compliance Statement
		Palaeontologic heritage	Destruction of significant archaeological and palaeontological heritage	1	4	4	4	1	2	1	1	16		0.5	8	Heritage Impact Assessment

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/ Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
development occurs (a) within a watercourse, or (c) within 32 meters of a watercourse, measured from the edge of a watercourse, within (b) the Free State, (i) outside urban areas, (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans	-	Visual Landscape	Change in the landscape character of the study area. Loss of the visual resource. Change in the sense of place of the area. Increase in the visibility of the project.	2	1	1	3	4	4	2	30		0.8	24	Visual Impact Assessment
	-	Traffic	Increase in traffic volumes leading to and surrounding the Powerline	3	2	1	1	2	2	2	22		1	22	Traffic Assessment
DECOMMISSIONING															
GN.R. 327 - Activity 11(i): "The development of facilities or infrastructure for the transmission and distribution of electricity outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts." GN.R. 327 - Activity 12(ii)(a)(c): "The development of (ii) infrastructure or structures with a physical footprint of 100 square meters or more (a) within a watercourse or (c) within 32 meters of a watercourse, measured from the edge of a watercourse." GN.R. 327 - Activity 24(ii):	<ul style="list-style-type: none"> Removal and Dismantlement of infrastructure Vehicles and Equipment on roads Rehabilitation of biophysical environment 	Flora Habitats and	Continued fragmentation and degradation of natural habitats and ecosystems (including sensitive rocky areas, and protected plants).	2	3	2	2	3	3	3	45	Refer to Table 5	0.5	22.5	Terrestrial Biodiversity Assessment
		Flora Habitats and	Continuing spread of IAP and weed species	3	3	2	2	3	2	3	45		0.5	22.5	Terrestrial Biodiversity Assessment

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		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
<p>“The development of a road (ii) with a reserve wider than 13.5 meters, or where no reserve exists where the road is wider than 8 meters.”</p> <p>GN.R. 327 - Activity 28: “Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture or afforestation on or after 1998 and where such development (ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare.”</p> <p>GN.R. 324 - Activity 4(b)(i)(ee): “The development of a road wider than 4 metres with a reserve less than 13.5 metres in the (b) Free State, (i) outside urban areas, within (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p>GN.R. 324 - Activity 10 (b)(i)(bb)(ee)(hh): “The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres in the (b) Free State, (i) outside urban areas, within (bb)</p>	Fauna	Ongoing displacement and direct mortalities of the faunal community (including SCC) due to continued disturbance (road collisions, noise, light, dust, vibration, poaching, etc.)	2	3	2	2	3	2	3	42		0.5	21	Terrestrial Biodiversity Assessment	
	Surface Water Resources / Wetlands / Riparian areas	Disturbance of aquatic habitat; water quality impacts	1	1	1	2	2	2	2	18		0.5	9	Aquatic Assessment	
	Soil and Agriculture	Loss of land capability during the construction phase – Grid Connection	1	2	1	1	3	2	2	20		0.5	10	Soil and Agricultural Compliance Statement	
	Palaeontologic heritage	Destruction of significant archaeological and palaeontological heritage	1	4	4	4	1	2	1	16		0.5	8	Heritage Impact Assessment	

LISTED ACTIVITY	ACTIVITIES	POTENTIAL IMPACTS		IMPACT ASSESSMENT MATRIX								MITIGATION OF POTENTIAL IMPACTS			SPECIALIST STUDIES / INFORMATION
		Aspect	Impact description	Extent	Duration	Reversibility	Irreplaceable loss of resources	Probability	Cumulative Impact	Magnitude/Intensity	Significance	Mitigation measures	Mitigation Confidence	Significance after Mitigation	
<p>National Protected Area Expansion Strategy Focus areas, (ee) critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans and (hh) areas within a watercourse or wetland; or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 12(b)(ii)(iv): “The clearance of an area of 300 square meters or more of indigenous vegetation in the (b) Free State (ii) within critical biodiversity areas identified in bioregional plans and (iv) areas within a watercourse or wetland, or within 100 metres from the edge of a watercourse or wetland.”</p> <p>GN.R. 324 - Activity 14(ii)(a)(c)(i)(ff): “The development of (ii) infrastructure or structures with a physical footprint of 10 square metres or more, where such development occurs (a) within a watercourse, or (c) within 32 meters of a watercourse, measured from the edge of a watercourse, within (b) the Free State, (i) outside urban areas, (ff) critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans</p>	Visual Landscape	Change in the landscape character or the views from sensitive viewing points. Bad housekeeping can result to dust, waste/litter on site and therefore create an eyesore.	2	1	1	1	4	3	1	12		0.8	9.6	Visual Impact Assessment	
	Traffic	Increase in traffic volumes leading to and surrounding removal	3	2	1	1	2	2	2	22		1	22		

The recommended mitigation measures are included in the Environmental Management Programme for the project. The EMPs for the development is included in Appendix F.

1.2 KEY ISSUES IDENTIFIED

From the above it is evident that mitigation measures should be available for potential impacts associated with the proposed activity and development phases. The scoping methodology identified the following key issues which were addressed in more detail in the BA report.

Table 3: Impacts and the mitigation measures during the construction phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment	Destruction, further loss and fragmentation of the of habitats, ecosystems and vegetation community, including protected tree species;	Negative Medium	Negative Low	<ul style="list-style-type: none"> All 'Very High' SEI habitats are to be avoided and declared No-Go. Demarcate work areas during the construction phase to avoid affecting outside surrounding areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. These areas should be conserved and allow natural ecosystem processes to continue as normal. Avoid the disturbance or destruction of High SEI areas , as far as possible. Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the 'Very Low' and 'Low' sensitivity areas. The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. Indigenous vegetation to be maintained under the solar panels as much as possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018).

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<ul style="list-style-type: none"> • Compile and implement a rehabilitation plan from the onset of the project. Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover • Existing access routes, especially roads, must be made use of. • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. <ul style="list-style-type: none"> ○ Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. ○ No servicing of equipment on site unless necessary. ○ All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. ○ Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>etc.) in such a way as to prevent them from leaking and entering the environment.</p> <ul style="list-style-type: none"> ○ Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. ○ All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. ● It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. ● Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site ● Any individual of the protected trees/plants that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants should be avoided. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	<ul style="list-style-type: none"> • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changes in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative Medium	Negative Low	<ul style="list-style-type: none"> • A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>relevant specialists must be contacted to advise on how the species can be relocated.</p> <ul style="list-style-type: none"> • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and • Signs must be put up to enforce this. Monitoring must take place in this regard. • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<ul style="list-style-type: none"> • Schedule activities and operations during least sensitive periods. • All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).
Aquatic Assessment	Disturbance of aquatic habitat; water quality	NegativeLow	Negative Low	<ul style="list-style-type: none"> • The recommended buffers of about 100 m between the delineated aquatic ecosystems and all the proposed activities should be maintained.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
	impacts			<ul style="list-style-type: none"> • Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. • The existing road infrastructure to access new infrastructure should be utilised as far as possible to minimise the overall disturbance. • During the decommissioning phase, site management must be undertaken at the construction sites. This should specifically address any potential pollution sources during construction activities such as hydrocarbon spills. • Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.
Avifaunal SSV	<p>Loss of priority avian species from important habitats</p> <p>Loss of resident avifauna through increased disturbance</p> <p>Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important</p>	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Indigenous herbaceous and graminoid vegetation should be maintained under the connection grid to maintain biodiversity and prevent soil erosion—Environmental Officer (EO) to supervise and oversee vegetation clearing activities. • Once confirmed, avoid ‘High’ SEI water resources, including the ‘Very High’ buffer around the active Grass Owl nest close to the substation. Due to the number of power lines within this buffer, the buffer will most likely act as a seasonal buffer. • A walk-down needs to be conducted 2 weeks before construction. Minimal vegetation clearing should be considered within the buffer area. • The proposed Power line and other lines within the buffer must be mitigated to reduce the cumulative effect. • Compile and implement a Rehabilitation Plan from the onset of the project. • A Solid Waste Management Plan must be developed and implemented to avoid impacts on surrounding habitats.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
	avian habitats			<ul style="list-style-type: none"> • Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic devices) and thickened wire spirals (static devices) that increase the visibility of the lines should be fitted along the entire length of overhead lines. • Environmental Awareness Training for all staff and contractors. Hunting of species must be made a punishable offence. This is especially pertinent to avifauna SCC.
Agricultural Compliance Statement	Loss of land capability during the construction phase – Grid Connection	Negative Low	Negative Low	<ul style="list-style-type: none"> • A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Heritage Impact Assessment	Loss of land capability during the construction phase – Grid Connection	Negative Low	Negative Low	<ul style="list-style-type: none"> • The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence. • When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted. • Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites or microbially features (trails, curls, rip-ups, mudcracks) trace fossils in the dolomites, limestones, shales and mudstones. This information will be built into the EMP’s training and awareness plan and procedures. • Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. • If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. • Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. • If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>must be sent to SAHRA once the project has been completed and only if there are fossils.</p> <ul style="list-style-type: none"> If no fossils are found and the excavations have finished then no further monitoring is required
Visual Impact Assessment	Visual impact of construction activities of the solar facility	Negative Low	Negative Low	<ul style="list-style-type: none"> Good housekeeping to reduce impacts that could cause a nuisance. Dust suppression proper waste collection clean and neat site camp/office shade net to block views towards site camp/office Retain the vegetation, especially along the boundary of the site
Traffic Impact Assessment	Affects on road networks, surrounding the Rudolph Cluster	Negative Low	Negative Low	<ul style="list-style-type: none"> All operations and maintenance vehicles must be roadworthy, and drivers must have the relevant licences for the type of vehicles they are operating, and All vehicle drivers need to strictly adhere to the rules of the road. Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. Only existing access routes and walking paths may be made use of as far as possible
Avifauna Impact Assessment	Habitat destruction within the project footprint	Negative Medium	Negative Low	<ul style="list-style-type: none"> Indigenous herbaceous and graminoid vegetation should be maintained under the connection grid to maintain biodiversity and prevent soil erosion—Environmental Officer (EO) to supervise and oversee vegetation clearing activities. Once confirmed, avoid 'High' SEI water resources, including the 'Very High' buffer around the active Grass Owl nest close to the substation. Due to the

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>number of power lines within this buffer, the buffer will most likely act as a seasonal buffer.</p> <ul style="list-style-type: none"> • A walk-down needs to be conducted 2 weeks before construction. Minimal vegetation clearing should be considered within the buffer area. • The proposed Power line and other lines within the buffer must be mitigated to reduce the cumulative effect. • Compile and implement a Rehabilitation Plan from the onset of the project. • A Solid Waste Management Plan must be developed and implemented to avoid impacts on surrounding habitats. • Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic devices) and thickened wire spirals (static devices) that increase the visibility of the lines should be fitted along the entire length of overhead lines. • Environmental Awareness Training for all staff and contractors. Hunting of species must be made a punishable offence. This is especially pertinent to avifauna SCC.

Table 4: Impacts and the mitigation measures during the operational phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment	Destruction, further loss and fragmentation of the habitats, ecosystems and vegetation community, including protected tree species;	Negative Medium	Negative Low	<ul style="list-style-type: none"> • All ‘Very High’ SEI habitats are to be avoided and declared No-Go. Demarcate work areas during the construction phase to avoid affecting outside surrounding areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. These areas should be conserved and allow natural ecosystem processes to continue as normal. • Avoid the disturbance or destruction of High SEI areas , as far as possible. • Laydown and construction preparation activities (such as cement mixing, temporary toilets, etc.) must be limited to the ‘Very Low’ and ‘Low’ sensitivity areas. • The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • Indigenous vegetation to be maintained under the solar panels as much as possible to ensure biodiversity is maintained and to prevent soil erosion (Beatty et al, 2017; Sinha et al, 2018). • Compile and implement a rehabilitation plan from the onset of the project. Progressive rehabilitation will enable topsoil to be returned more rapidly, thus ensuring more recruitment from the existing seedbank. Surplus rehabilitation material can be applied to other others in need of stabilisation and vegetation cover • Existing access routes, especially roads, must be made use of.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<ul style="list-style-type: none"> • Any materials may not be stored for extended periods of time and must be removed from the PAOI once the construction phase has been concluded. No permanent construction phase structures should be permitted. Construction buildings should preferably be prefabricated or constructed of re-usable/recyclable materials. No storage of vehicles or equipment will be allowed outside of the designated laydown areas. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. <ul style="list-style-type: none"> ○ Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use. ○ No servicing of equipment on site unless necessary. ○ All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. ○ Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. ○ Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. ○ All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants.</p> <ul style="list-style-type: none"> • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site • Any individual of the protected trees/plants that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants should be avoided. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.
	Introduction of IAP species and invasive fauna.	Negative Medium	Negative Low	<ul style="list-style-type: none"> • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changes in IAP composition. • The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. Footprints of the roads must be kept to prescribed widths. • Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. • A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
	<p>Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).</p>	<p>Negative Medium</p>	<p>Negative Low</p>	<p>presence of SCC.</p> <ul style="list-style-type: none"> • A qualified environmental control officer must be on site when activities begin. A site walk through is recommended by a suitably qualified ecologist prior to any activities taking place and any SSC or protected species should be noted. In situations where these species are observed and must be removed, the proponent may only do so after the required permission/permits have been obtained in accordance with national and provincial legislation. In the abovementioned situation the development and implementation of a search, rescue and recovery program is suggested for the protection of these species. Should animals not move out of the area on their own relevant specialists must be contacted to advise on how the species can be relocated. • Clearing and disturbance activities must be conducted in a progressive linear manner, always outwards and away from the centre of the PAOI and over several days, so as to provide an easy escape route for all small mammals and herpetofauna. • The areas to be disturbed must be specifically and responsibly demarcated to prevent the movement of staff or any individual into the surrounding environments, signs must be put up to enforce this. • The duration of the activities should be minimized to as short a term as possible, to reduce the period of disturbance on fauna. • Noise must be kept to an absolute minimum during the evenings and at night to minimize all possible disturbances to reptile species and nocturnal mammals. • No trapping, killing, or poisoning of any wildlife is to be allowed and • Signs must be put up to enforce this. Monitoring must take place in this

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>regard.</p> <ul style="list-style-type: none"> • Outside lighting should be designed and limited to minimize impacts on fauna. All outside lighting should be directed away from any sensitive areas. Fluorescent and mercury vapor lighting should be avoided, and sodium vapor (green/red) lights should be used wherever possible. • All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. • Schedule activities and operations during least sensitive periods. • All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected. • Any holes/deep excavations must be dug in a progressive manner and shouldn't be left open overnight. Should any holes remain open overnight they must be properly covered temporarily to ensure that no small fauna species fall in. Holes must be subsequently inspected for fauna prior to backfilling. • Wildlife-permeable fencing with holes large enough for mongoose and other smaller mammals should be installed, the holes must not be placed in the fence where it is next to a major road as this will increase road killings in the area. • Use environmentally friendly cleaning and dust suppressant products. • Once the development layout has been confirmed, the footprint area must be fenced off appropriately in segments pre-construction to allow animals to move or be moved out of these areas before breaking

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				ground activities occur. Construction activities must take place systemically and the perimeter fence should not be completed (i.e., leaving sections unfenced to allow fauna to escape) until systematic clearing is completed. Drilling etc. should start one side of the site and progress towards the section of the site where fences are incomplete (away from the center of the PAOI).
Aquatic Assessment	Disturbance of aquatic habitat; water quality impacts	Negative Low	Negative Low	<ul style="list-style-type: none"> The recommended buffers of about 100 m between the delineated aquatic ecosystems and all the proposed activities should be maintained. Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. The existing road infrastructure to access new infrastructure should be utilised as far as possible to minimise the overall disturbance. During the decommissioning phase, site management must be undertaken at the construction sites. This should specifically address any potential pollution sources during construction activities such as hydrocarbon spills. Any stormwater that does arise within the construction sites must be handled appropriately to trap sediments and reduce flow velocities.
Avifaunal SSV	Loss of priority avian species from important habitats Loss of resident avifauna through increased disturbance	Negative Medium	Negative Low	<ul style="list-style-type: none"> Indigenous herbaceous and graminoid vegetation should be maintained under the connection grid to maintain biodiversity and prevent soil erosion—Environmental Officer (EO) to supervise and oversee vegetation clearing activities. Once confirmed, avoid 'High' SEI water resources, including the 'Very High' buffer around the active Grass Owl nest close to the substation. Due to the number of power lines within this buffer, the buffer will most likely act as a seasonal buffer. A walk-down needs to be conducted 2 weeks before construction.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
	Long-term or permanent degradation and modification of the receiving environment resulting to in the loss of important avian habitats			<p>Minimal vegetation clearing should be considered within the buffer area.</p> <ul style="list-style-type: none"> • The proposed Power line and other lines within the buffer must be mitigated to reduce the cumulative effect. • Compile and implement a Rehabilitation Plan from the onset of the project. • A Solid Waste Management Plan must be developed and implemented to avoid impacts on surrounding habitats. • Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic devices) and thickened wire spirals (static devices) that increase the visibility of the lines should be fitted along the entire length of overhead lines. • Environmental Awareness Training for all staff and contractors. Hunting of species must be made a punishable offence. This is especially pertinent to avifauna SCC.

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Agricultural Compliance Statement	Loss of land capability during the construction phase – Grid Connection	Negative Low	Negative Low	<ul style="list-style-type: none"> • A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. • Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.
Heritage Impact Assessment	Loss of land capability during the construction phase – Grid Connection	Negative Low	Negative Low	<ul style="list-style-type: none"> • The following procedure is only required if fossils are seen on the surface and when drilling/excavations commence. • When excavations begin the rocks must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted. • Photographs of similar fossils must be provided to the developer to assist in recognizing the trace fossils such as stromatolites or microbially features (trails, curls, rip-ups, mudcracks) trace fossils in the

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>dolomites, limestones, shales and mudstones. This information will be built into the EMP's training and awareness plan and procedures.</p> <ul style="list-style-type: none"> • Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. • If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. • Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a suitable institution where they can be made available for further study. Before the fossils are removed from the site a SAHRA permit must be obtained. Annual reports must be submitted to SAHRA as required by the relevant permits. • If no good fossil material is recovered then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to SAHRA once the project has been completed and only if there are fossils. • If no fossils are found and the excavations have finished then no further monitoring is required
Visual Impact Assessment	Visual impact of construction activities of the solar facility	Negative Low	Negative Low	<ul style="list-style-type: none"> • Good housekeeping to reduce impacts that could cause a nuisance. • Dust suppression • proper waste collection • clean and neat site camp/office • shade net to block views towards site camp/office • Retain the vegetation, especially along the boundary of the site
Traffic Impact	Affects on road	Negative Low	Negative Low	<ul style="list-style-type: none"> • All operations and maintenance vehicles must be roadworthy, and drivers

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Assessment	networks, surrounding the Rudolph Cluster			<p>must have the relevant licences for the type of vehicles they are operating, and</p> <ul style="list-style-type: none"> • All vehicle drivers need to strictly adhere to the rules of the road. • Speed limits must be put in place to reduce erosion. Soil surfaces must be wetted as necessary to reduce the dust generated by the project activities. Speed bumps and signs must be erected to enforce slow speeds. • Only existing access routes and walking paths may be made use of as far as possible
Avifauna Impact Assessment	Habitat destruction within the project footprint	Negative Medium	Negative Low	<ul style="list-style-type: none"> • Indigenous herbaceous and graminoid vegetation should be maintained under the connection grid to maintain biodiversity and prevent soil erosion—Environmental Officer (EO) to supervise and oversee vegetation clearing activities. • Once confirmed, avoid 'High' SEI water resources, including the 'Very High' buffer around the active Grass Owl nest close to the substation. Due to the number of power lines within this buffer, the buffer will most likely act as a seasonal buffer. • A walk-down needs to be conducted 2 weeks before construction. Minimal vegetation clearing should be considered within the buffer area. • The proposed Power line and other lines within the buffer must be mitigated to reduce the cumulative effect. • Compile and implement a Rehabilitation Plan from the onset of the project. • A Solid Waste Management Plan must be developed and implemented to avoid impacts on surrounding habitats. • Bird Flappers and diverters must be placed along the entire length of powerlines and must be placed at 5 m intervals. Recommended bird diverters such as flapping devices (dynamic devices) and thickened wire

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
				<p>spirals (static devices) that increase the visibility of the lines should be fitted along the entire length of overhead lines.</p> <ul style="list-style-type: none"> • Environmental Awareness Training for all staff and contractors. Hunting of species must be made a punishable offence. This is especially pertinent to avifauna SCC.

Table 5: Impacts and the mitigation measures during the decommissioning phase

SPECIALIST STUDY	IMPACT	PRE-MITIGATION RATING	POST MITIGATION RATING	SUMMARY OF MITIGATION MEASURES
Terrestrial Biodiversity Impact Assessment	Destruction, loss and fragmentation of habitats (including wetlands), ecosystems and the vegetation community.	Negative medium	Negative low	<ul style="list-style-type: none"> • All 'Very High' SEI habitats are to be avoided as much as reasonably possible. Demarcate work areas during the construction phase to avoid affecting outside surrounding areas. Use physical barriers e.g., safety tape, not painted lines, and use signage. These areas should be conserved and allow natural ecosystem processes to continue as normal. • Avoid the disturbance or destruction of High SEI areas , as far as possible. • The clearing of vegetation must be minimized where possible. All activities must be restricted to within the authorised areas. It is recommended that areas to be developed be specifically and responsibly demarcated so that during the construction phase only the demarcated areas be impacted upon. • Any woody material removed, if necessary, can be shredded and used in conjunction with the topsoil to augment soil moisture and prevent further erosion or could be sustainably provided to the surrounding communities. • Existing access routes, especially roads, must be made use of. • A hydrocarbon spill management plan must be put in place to ensure that should there be any chemical spill out or over that it does not run into the surrounding areas. The Contractor shall be in possession of an emergency spill kit that must always be complete and available on site. • Drip trays or any form of oil absorbent material must be placed underneath vehicles/machinery and equipment when not in use.

				<ul style="list-style-type: none"> • No servicing of equipment on site unless necessary. • All contaminated soil / yard stone shall be treated in situ or removed and be placed in containers. • Appropriately contain any generator diesel storage tanks, machinery spills (e.g., accidental spills of hydrocarbons oils, diesel etc.) in such a way as to prevent them from leaking and entering the environment. • Construction activities and vehicles could cause spillages of lubricants, fuels and waste material negatively affecting the functioning of the ecosystem. • All vehicles and equipment must be maintained, and all re-fuelling and servicing of equipment is to take place in demarcated areas outside of the project area. • It must be made an offence for any staff to take/ bring any plant species into/out of any portion of the project area. No plant species whether indigenous or exotic should be brought into/taken from the project area, to prevent the spread of exotic or invasive species or the illegal collection of plants. • Consult a fire expert and compile and implement a fire management plan to minimise the risk of veld fires around the Project site • Any individual of the protected trees/plants that were observed needs a relocation or destruction permit in order for any individual that may be removed or destroyed due to the development. Preferably, the trees/plants should be avoided. Hi visibility flags must be placed near any protected plants in order to avoid any damage or destruction of the species. If left undisturbed the sensitivity and importance of these species needs to be part of the environmental awareness program.
	Introduction of IAP species and invasive fauna.	Negative medium	Negative low	<ul style="list-style-type: none"> • An Invasive Alien Plant Management Plan must be compiled and implemented. This should regularly be updated to reflect the annual changes in IAP composition.

				<ul style="list-style-type: none"> Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. A location specific waste management plan must be put in place to limit the presence of rodents and pests and waste must not be allowed to enter surrounding areas. A pest control plan must be put in place and implemented; it is imperative that poisons not be used to control pests due to the likely occasional presence of SCC.
	Displacement of the indigenous faunal community (including SCC) due to habitat loss, direct mortalities, and disturbance (road collisions, noise, dust, light, vibration, and poaching).	Negative medium	Negative low	<ul style="list-style-type: none"> No trapping, killing, or poisoning of any wildlife is to be allowed and Signs must be put up to enforce this. Monitoring must take place in this regard. All construction and maintenance motor vehicle operators should undergo an environmental induction that includes instruction on the need to comply with speed limits, to respect all forms of wildlife. Speed limits must be enforced to ensure that road killings and erosion is limited. Schedule activities and operations during least sensitive periods. All vehicles should adhere to a speed limit of maximum 40 km/h to avoid collisions. Appropriate speed control measures and signs must be erected.
Aquatic Impact Assessment	Disturbance of aquatic habitat; water quality impacts	Negative Low	Negative Low	<ul style="list-style-type: none"> The recommended buffers between the delineated aquatic ecosystems and all the proposed project activities should be maintained. Clearing of indigenous vegetation should not take place within the aquatic features and the recommended buffers. The existing road infrastructure should be utilised as far as possible to minimise the overall disturbance.

				<ul style="list-style-type: none"> • During the decommission phase, site management must be undertaken. This should specifically address on-site stormwater management and prevention of pollution from any potential pollution sources during activities such as hydrocarbon spills. • Any stormwater that does arise within the site must be handled appropriately to trap sediments and reduce flow velocities."
Visual Impact Assessment	Change in the landscape character or the views from sensitive viewing points.	Negative Low	Negative Low	<ul style="list-style-type: none"> • Good housekeeping to reduce impacts that could cause a nuisance. • Dust suppression • Proper waste collection • Neat stockpiling of material.
Traffic Impact Assessment	Affects on road networks, surrounding the Rudolph Cluster	Negative Low	N/A	<ul style="list-style-type: none"> • All operations and maintenance vehicles must be roadworthy, and drivers must have the relevant licences for the type of vehicles they are operating, and • All vehicle drivers need to strictly adhere to the rules of the road.

2 CUMULATIVE EFFECTS ASSESSMENT

2.1.1 Potential Cumulative Effects

activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities." Cumulative impacts can be incremental, interactive, sequential or synergistic. EIAs have traditionally failed to come to terms with such impacts, largely as a result of the following considerations:

- Cumulative effects may be local, regional or global in scale and dealing with such impacts requires coordinated institutional arrangements;
- Complexity - dependent on numerous fluctuating influencing factors which may be completely independent of the controllable actions of the proponent or communities; and
- Project level investigations are ill-equipped to deal with broader biophysical, social and economic considerations.

Despite these challenges, cumulative impacts have been afforded increased attention in this Basic Assessment Report and for each impact / field of study a separate section has been added which discusses any cumulative issues, and where applicable, draws attention to other issues that may contextualise or add value to the interpretation of the impact. This chapter analyses the proposed project's potential cumulative impacts in more detail by: (1) defining the geographic area considered for the cumulative effects analysis; (2) providing an overview of relevant past and present actions in the project vicinity that may affect cumulative impacts; (3) presenting the reasonably foreseeable actions in the geographic area of consideration; and (4) determining whether there are adverse cumulative effects associated with the resource areas analysed.

The term "Cumulative Effect" has for the purpose of this report been defined as: the summation of effects over time which can be attributed to the operation of the Project itself, and the overall effects on the ecosystem of the grid connection corridor that can be attributed to the project and other existing and planned future projects.

The geographic area of evaluation is the spatial boundary in which the cumulative effects analysis was undertaken. The spatial boundary evaluated in this cumulative effects analysis generally includes an area of a 30km radius surrounding the proposed development – refer to Figure 1 below.

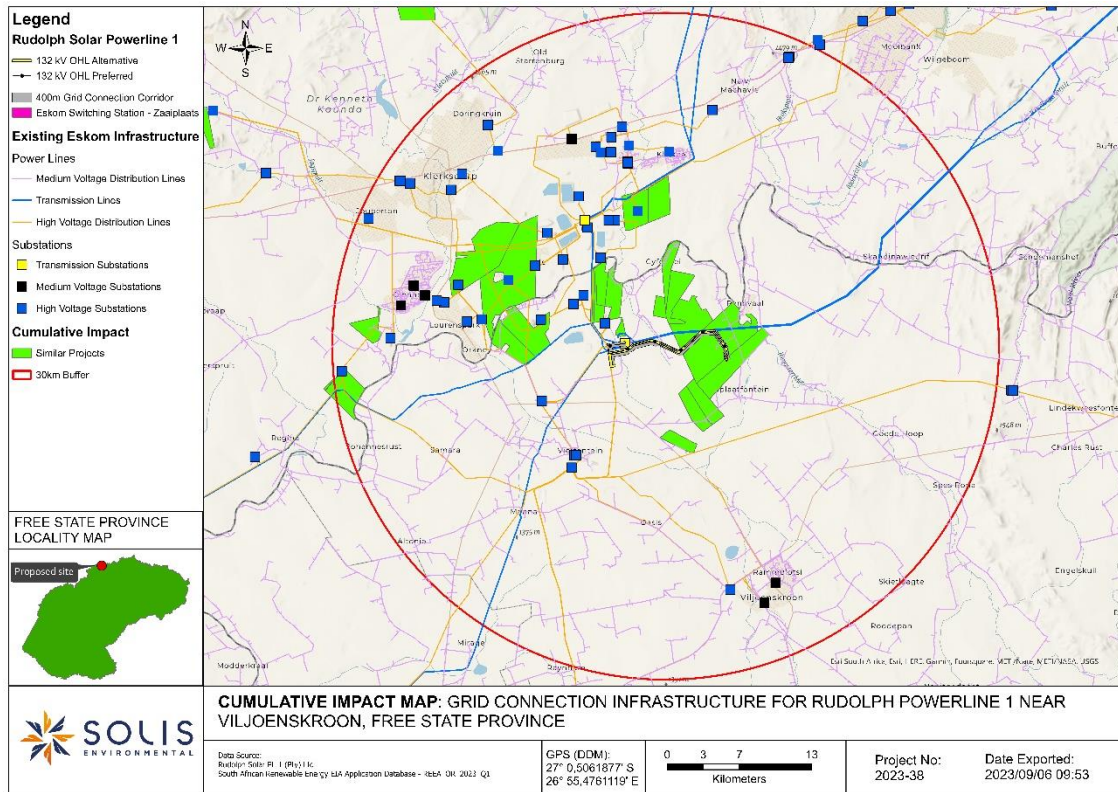


Figure 1: Cumulative Impacts Map

It is unclear whether other projects not related to renewable energy is or has been or will be constructed in this area. In general, development activity in the area is focused on mining and agriculture. Agriculture in the area is primarily associated with cattle grazing and cultivation. The next section of this report will aim to evaluate the potential for solar projects (including the associated grid connection infrastructure) for this area in the foreseeable future.

The receptors have been examined alongside other past, present and future projects for potential adverse cumulative effects. A summary of the cumulative effects discussed are summarized in Table 6.

Table 6: Potential Cumulative Effects for the proposed project

Valued Ecosystem Components (VECs)	Rationale for Inclusion / Exclusion	Level of Cumulative Effect
Construction Phase		
Loss or fragmentation of indigenous natural fauna and flora	The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on fauna and flora.	- Low

Impacts to Avifauna	Development of multiple solar energy facilities, and the associated grid connection infrastructure, in this region may have cumulative impacts on birds. During the construction phase this will include:	- Medium to Low
	<ul style="list-style-type: none"> • Cumulative displacement of priority avian species from important habitats • Cumulative displacement of resident avifauna 	
Impacts to riparian and wetland systems	The development of linear developments such as power lines along roads will limit impacts to roadside servitudes and small sections of the drainage ecosystems and therefore the impacts will be lower compared to when bisecting areas with pristine drainage ecosystems.	- Low
Loss or fragmentation of habitats	Removal of large areas of habitats may have a significant effect on loss of habitats.	- Medium
Soil erosion	The largest risk factor for soil erosion will be during the construction phase. Should these impacts occur, there may be a cumulative impact on storm water runoff in the corridor.	- Medium
Impacts of the geology on the proposed development	A fatal flaw cannot be identified that may prematurely terminate the development of the proposed solar farm.	N/A
Generation of waste	An additional demand for landfill space could result in cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	- Low

	have the opportunity to upgrade and improve skills levels in the area.	
Visual intrusion	The construction of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming and mining activities and people using the regional road adjacent to site. Dust will be the main factor to take into account.	- Low
Increase in construction vehicles	If damage to roads is not repaired, then this will affect the farming and mining activities in the area and result in higher maintenance costs for vehicles of locals and other road users. The costs will be borne by road users who were no responsible for the damage.	- Negligible
Impact of construction workers on local communities and influx of job seekers	Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	- Low
Risk to safety, livestock and farm infrastructure	If fire spreads to neighbouring properties, the effects will be compounded. Negligible cumulative effects, provided losses are compensated for.	- Low
Increased risks of grass fires	The risk of grass fires can be mitigated and managed.	- Negligible
Operational Phase		
Loss of agricultural land	Because of the location of the corridor parallel to a regional road its	- Low

	contribution to any cumulative impact is considered to be low.	
Loss or fragmentation of indigenous natural fauna and flora	The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on fauna and flora.	- Low
Impacts to avifauna	<p>Development of multiple solar energy facilities, and the associated grid connection infrastructure, in this region may have cumulative impacts on birds. During the construction phase this will include:</p> <ul style="list-style-type: none"> • Cumulative displacement of priority avian species from important habitats • Cumulative displacement of resident avifauna • Cumulative collisions when flying into power line infrastructure • Cumulative electrocutions when perched on power line infrastructure 	-Medium
Impacts to riparian and wetland systems	The development of linear developments such as power lines along roads will limit impacts to roadside servitudes and small sections of the drainage ecosystems and therefore the impacts will be lower compared to when bisecting areas with pristine drainage ecosystems.	- Low
Change in land use	Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. The impacts is however mitigated with the placement of the grid connection corridor adjacent to the existing R30 regional road.	- Low

Visual intrusion	The operation of the 132kV evacuation line may increase the cumulative visual impact together with the existing Eskom power infrastructure, mining in the area and agricultural infrastructure.	- Low
Consumption of water	An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water. However, the power line will not use water during the operational phase.	- Negligible
Generation of additional electricity	The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).	+ Low
Change in the sense of place	The construction of the power line will increase the cumulative change in the sense of place due to industrial type infrastructure that is being proposed and the existing mining infrastructure in the region. Since the area is already largely transformed, the impact will be limited.	- Low
Development of infrastructure for the generation of clean, renewable energy	Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.	+ Medium
Decommissioning Phase		
Visual intrusion	The decommissioning of the PV plant and 132kV evacuation line may increase the cumulative visual impact together with farming and people using the existing roads adjacent to site. Dust and housekeeping will be the main factors to take into account.	- Low
Generation of waste	An additional demand on municipal services could result in significant	- Medium

	cumulative impacts with regards to the availability of landfill space.	
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2.2 CONCLUSION

The cumulative environmental effects of the construction, operation and decommissioning project phases have been assessed. The information to date has shown that no significant adverse residual impacts are likely. However, cumulative impacts could arise as other similar projects are constructed in the area. All cumulative impacts will be of a medium or low significance.

The cumulative impact for the proposed development is medium to low and no high, unacceptable impacts related to the project is expected. Considering the extent of the project and information presented in this report, it can be concluded that the cumulative impacts will not result in large scale changes and impacts on the environment. The proposed project will contribute to local economic growth by supporting industry development in line with provincial and regional goals and ensuring advanced skills are drawn to the Free State Province. No cumulative impacts with a high residual risk have been identified.