
Appendix F *Impact Assessment Methodology & Tables*



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APPENDIX F: IMPACT RATING METHODOLOGY AND ASSESSMENT TABLES

1. Impact Rating Methodology

The assessment of the potential environmental and social impacts was based on the project team's professional judgement, field observations and desk-top analysis..

The standard Legacy EMC impact/risk rating method has been adopted to enable the EAP and Specialists to determine the overall impact of the proposed activities by collating the information at hand into a uniform rating matrix.

The following methodology has been applied to the prediction and assessment of impacts. Potential impacts have been rated in terms of the direct, indirect and cumulative nature of the impact:

- **Direct** impacts – are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable;
- **Indirect** impacts – of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity;
- **Cumulative** impacts – are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.

The significance of each potential impact, with and without the implementation of the proposed mitigation measures, will be assessed based on the following variables (evaluation components):

- Spatial extent – The size of the area that will be affected by the impact;
- Intensity – The anticipated severity of the impact;
- Duration – The timeframe during which the impact will be experienced;
- Probability – The probability of the impact occurring;
- Reversibility – The “reversibility” of the environmental impacts of the proposed development after project cessation or decommissioning; and
- Irreplaceability – The “irreplaceability” of natural characteristics in the area that may be impacted upon by the proposed development.

Using the criteria above, the impacts will further be assessed with the use of quantifiable values as described below:

Table 1: Evaluation of criteria by means of quantitative ratings and descriptions.

Criteria	Description	Quantitative Rating
Duration	Temporary (less than a year)	1
	Short term (1 to 6 years)	2

Criteria	Description	Quantitative Rating
	Medium term (6 to 15 years)	3
	Long term (the impact will cease after the operational life of the activity)	4
	Permanent (mitigation will not occur in such a way or in such a time span than the impact can be considered transient)	5
Spatial extent	Site specific	1
	Local (less than 2 km from the site);	2
	Regional (within 30 km of the site)	3
	National (beyond Provincial boundaries and within National boundaries)	4
	International / Transboundary (Beyond National boundaries)	5
Intensity / Magnitude Applicable to Negative Impacts (at indicated spatial extent)	None (Biophysical and/or social functions and/or processes will remain unaltered)	0
	Very Low (Biophysical and/or social functions and/or processes might be negligibly altered)	2
	Low (Biophysical and/or social functions and/or processes might be slightly altered)	4
	Medium (Biophysical and/or social functions and/or processes might be notably altered)	6
	High (Biophysical and/or social functions and/or processes might be considerably altered)	8
	Very High (Biophysical and/or social functions and/or processes might be severely altered)	10
Intensity / Magnitude Applicable to Positive Impacts (at indicated spatial extent)	None (Biophysical and/or social functions and/or processes will remain unaltered)	0
	Very Low (Biophysical and/or social functions and/or processes might be negligibly enhanced)	2
	Low (Biophysical and/or social functions and/or processes might be slightly enhanced)	4
	Medium (Biophysical and/or social functions and/or processes might be notably enhanced)	6
	High (Biophysical and/or social functions and/or processes might be considerably enhanced)	8
	Very High (Biophysical and/or social functions and/or processes might be substantially enhanced)	10
Probability	Improbable (5% to no chance of occurring)	1
	Probable (5% - 25% chance of occurring)	2
	Medium Probability (25% - 75% chance of occurring)	3
	Highly probable (75% - 95% chance of occurring)	4
	Definite (greater than 95% chance of occurring)	5
Reversibility	No impact	0
	Impact will be reversible	1

Criteria	Description	Quantitative Rating
Irreplaceability	High potential that impact might be reversed	2
	Moderate potential that impact might be reversed	3
	Low potential that impact might be reversed	4
	Impact cannot be reversed	5
	None	0
	Very low potential for loss of irreplaceable resources	1
	Low potential for loss of irreplaceable resources	2
	Moderate potential for loss of irreplaceable resources	3
	High potential for loss of irreplaceable resources.	4
	Definite loss of irreplaceable resources	5
CUMULATIVE impact	High: The activity is one of several similar pasts, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.	
	Medium: The activity is one of a few similar pasts, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.	
	Low: The activity is localised and might have a negligible cumulative impact.	
	None: No cumulative impact on the environment.	

Once the evaluation components have been ranked for each impact, the significance of the potential impact is assessed (or calculated) using the following formula:

$$SP \text{ (significance points)} = (\text{intensity} + \text{duration} + \text{spatial extent} + \text{irreplaceable} + \text{reversibility}) \times \text{probability.}$$

The maximum value is 150 SP (significance points). The unmitigated and mitigated scenarios for each environmental impact should be rated as per the table below (Table 8).

Table 2: Definition of significance ratings (positive and negative)

Significance Points	Environmental Significance	Description
125 – 150	Very high (VH)	An impact of high or very high significance could influence a decision about whether or not to proceed with the proposed Project, regardless of available mitigation options.
100 – 124	High (H)	Cumulative Impacts: The activity is one of several similar pasts, present or future activities in the same geographical area, and might contribute to a very significant combined impact on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
75 – 99	Moderate-high (MH)	If left unmanaged, an impact of moderate-high significance could influence a decision about whether or not to proceed with the proposed Project. Mitigation options should be re-evaluated.

Significance Points	Environmental Significance	Description
40 – 74	Moderate (M)	If left unmanaged, an impact of moderate significance could influence a decision about whether or not to proceed with the proposed Project. Cumulative Impacts: The activity is one of a few similar pasts, present or future activities in the same geographical area, and might have a combined impact of moderate significance on the natural, cultural, and/or socio-economic resources of local, regional or national concern.
<40	Low (L)	An impact of low significance is likely to contribute to positive decisions about whether or not to proceed with the proposed Project. It will have little real effect and is unlikely to have an influence on project design or alternative motivation. Cumulative Impacts: The activity is localised and might have a negligible cumulative impact.
+	Positive impact (+)	A positive impact is likely to result in a positive consequence/effect and is likely to contribute to positive decisions about whether or not to proceed with the proposed Project.

2. Impact Assessment

This section of the Report aims to assess and describe potential negative and positive impacts relating to the affected environment that may occur due to the proposed development of the Carpe Diem North Solar Photovoltaic Plant (SPP) & Associated Infrastructure on the Portion 5 of Farm Varksenlaagte No. 119 and Portion 23 of Farm Doornfontein No. 118, Merafong City Local Municipality, West Rand District Municipality, Gauteng (hereafter referred to as 'the site' or 'the SPP'). The identification of impacts covers the construction, operational and decommissioning phases of impacts.

The proposed development, known as the Carpe Diem North SPP on Portion 5 of Farm Varksenlaagte No. 119, spans approximately 290 hectares (ha). It is proposed that the Carpe Diem North SPP will have an electricity generation capacity of up to 150 MW. The bulk of the SPP falls outside of the town's urban edge and the SPP is located immediately north of and adjacent to, Eskom's Carmel Main Transmission Substation (MTS).

Grid connection will be obtained via either a Loop-in, Loop-out (LiLo) tie-in to Eskom's existing 132 kV high voltage (HV) Overhead Power Line (OPL), which runs through the development site, or via a direct connection to Carmel MTS which lies on Eskom's property, Portion 23 of the Farm Doornfontein No. 118, to the immediate south of the SPP. The Carpe Diem North SPP OPL component for the most preferred route, Alternative 1, the LiLo connection, while Alternative 2 (next preferred connection) is approximately 150 m in length and lies primarily on the SPP development property itself, i.e., Portion 5 of the Farm Varksenlaagte No. 119. The least preferred grid connection option, Alternative 3, is approximately 1.5 km long and lies on the SPP development property itself and the Eskom-owned, Carmel MTS property Portion 23 of the Farm Doornfontein No. 118.

The grid connection corridor and the on-site MTS footprint form part of the Carpe Diem North SPP's footprint which has been fully assessed during the EIA process for the intended EA application but will be handed over to Eskom once construction is complete.

The proposed Carpe Diem North SPP development entails permanent and temporary/construction infrastructure:

- Permanent infrastructure development consists of the PV solar panel array, the BESS, fencing, 4 m to 8 m wide internal (dirt/gravel) access roads, SPP inverter-transformer stations, an on-site substation including offices, control room, ablutions, storage buildings, a conservancy tank, step-up transformers, water storage facilities, and pylons for the OPL which would run from the on-site substation to the LiLo tie-in point. The on-site substation will comprise a collector station portion and a switching station portion. The switching station portion will form part of the MTS mentioned above.

Access to the Carpe Diem North SPP will be directly off the public R501 tar road for the portion of the SPP that is located to the south of the R501, and via Onyx Road off the R501 for the bulk of the SPP which lies to the north of the R501. A new internal road network will be established with the SPP but where possible, existing roads/tracks will be utilised.

Electricity for the SPP will be sourced from the facility itself. All cabling within the SPP facility will be underground except at the substation where the electricity collected from the SPP inverter-transformer stations will be 'stepped-up' to 132kV before being evacuated off the SPP. Only connection at the on-site collector substation, switching station and MTS, (or Eskom's Carmel Substation), will be via OPLs.

Water required for the construction and operation phases will be sourced from the nearest registered water supplier and will be trucked in via a third-party service provider.

All solid waste produced during the construction and operational phases will be removed for disposal at an appropriately registered waste disposal facility via a registered service provider.

- Temporary infrastructure includes construction lay down and staging area/s, construction site offices, storage buildings, water storage area, as well as a batching plant and stockpile area. Construction ablutions would be provided by means of regularly serviced portable toilets and tanker trucks would supply water to the development.

The Carpe Diem North SPP EA application consists of three main components:

- i. The 150MW Carpe Diem North SPP panel array, which generate electricity;
- ii. the on-site Carpe Diem North SPP Substation, which is divided into two functional portions viz.
 - a) the Independent Power Producer (IPP) 'collector substation' portion where evacuated electricity from the SPP facility will be collected via 33 kV underground cables, and
 - b) the 'switching station' substation portion where the 33 kV of evacuated electricity will be stepped-up/transformed to a higher voltage such as 132kV, before it ties into the LiLo point on Eskom's existing HV OPL.
- iii. the OPL where electricity conductors/power lines are strung on lattice steel pylons which will conduct electricity towards the point of connection with the national grid via a LiLo tie-in point on Eskom's existing HV OPL.

As is common for these types of projects, the bulk of the permanent grid connection infrastructure which connects the SPP to the national grid, will be handed over to Eskom once built. Future Eskom infrastructure are the portions ii(b) and iii, as listed above.

The Proponent plans to submit this project in Bid Window 8 of the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP). In the event of an unsuccessful bid, the Proponent intends to pursue the project in subsequent REIPPPP bidding windows.

The following alternatives are considered in this application:

- **Alternative 1 (most preferred alternative)** - SPP development on Portion 5 of the Farm Varkenslaagte No. 119 using all developable land on the property, with a less than 100 m long **LiLo** OPL connection to the existing Eskom 132 kV OPL.
- **Alternative 2 (next preferred alternative)** - SPP using all developable land on the property with a less than 150 m Underground Power Line (**UPL**) connecting to the northern section of Carmel MTS where the UPL becomes an OPL. The UPL will be developed using trenchless excavation i.e., pipe-jacking.
- **Alternative 3 - (least preferred alternative)** - SPP array with a longer grid connection (less than 900 m) comprising an initial underground section (approximately 520 m), which partially follows Alternative 2's UPL route before continuing to run underground along and within the southern boundary of Portion 5 of the Farm Varkenslaagte No. 119, and surfacing as an OPL (approximately 360 m in length) skirting around the eastern boundary of the Carmel MTS boundary and connecting to the southern section of the MTS. The UPL becomes an OPL **only after** it has crossed under the existing Eskom HV OPLs, which enter Carmel MTS property from the North-east.
- **No-go Alternative:** The development does not take place and the *status quo* is maintained.

The impacts assessed for each alternative, including the No-Go alternative, are as follows:

Biophysical Issues/Impacts:

- Impacts on the Aquatic Ecosystems - ***N/A since no natural wetlands or aquatic features (watercourses) are present on the Carpe Diem North site;***
- Impacts on Terrestrial Biodiversity (e.g. habitat loss and fragmentation; loss of Species of Conservation Concern [SCC]; increased alien invasive species; increased erosion and soil compaction; littering and general pollution; loss of vegetation during the construction phase; and loss of species composition and diversity);
- Impacts on Avifauna (e.g. habitat destruction, disturbance of bird roosts and breeding sites; disturbance due to noise; collision mortality with vehicles and infrastructure; loss of bird foraging habitat; attraction of some novel bird species and chemical pollution spills);

Geohydrological Impacts (e.g. groundwater quality impacts from accidental oil spills, fuel leakages, leakages from the BESS or from

Socio-Economic Issues/Impacts:

- Agricultural impacts (no loss of viable agricultural land – hence no agricultural impacts were assessed for the proposed development; instead, a compliance statement was undertaken);

- Visual impacts (e.g. visual scarring from clearing of vegetation; visibility of construction on activities; dust; excavations for underground cabling and the erection/persistence of tower structures);
- Social and economic impacts (e.g. provision of renewable electricity, contribution towards local economic income and employment; nuisance factors affecting nearby receptors; influx of job seekers disruption within local communities; increase in local crime, impact on sense of place and surrounding property values); and
- Traffic impacts (e.g. traffic congestion).

Heritage Issues/Impacts:

- Impacts on heritage resources (e.g. disturbance to unidentified heritage resources; impact on the burial ground and, paleontologically sensitive impacts).

The following **specialist and technical studies** have been commissioned for this project:

- Agricultural Compliance Statement;
- Aquatic Biodiversity Impact Assessment;
- Avifaunal Impact Assessment;
- Geohydrological Impact Assessment;
- Heritage and Archaeological Impact Assessment;
- Socio-Economic Impact Assessment;
- Terrestrial Biodiversity and Plant Species Impact Assessment;
- Animal Species Compliance Statement;
- Traffic Impact Assessment;
- Visual Impact Assessment;
- Engineering Services Report including a Geotechnical Investigation and Stormwater Management Plan;
- Glint and Glare Assessment.

The EMPr elaborates on the mitigation measures associated with the relevant impacts.

2.1. Construction Phase Impacts

Biophysical Issues / Impacts

2.1.1. Direct Impact: Aquatic Ecosystem Impacts

N/A – since no natural wetlands or watercourses are present on site.

2.1.2.1. Direct Impact: Avifaunal Impacts

Construction related Avifauna Impacts –		
<u>Nature of Impact:</u> Habitat Destruction		
Significant habitat loss (including foraging and breeding) and fragmentation due to displacement (avoidance of disturbance) because of infrastructure installation (panels, powerlines, roads, fences and sub surface cables) and associated dust effects. Habitat loss has the tendency to not only destroy existing habitat but also displace bird species from large areas of natural habitat. This specifically has a greater impact on bird species restricted to a specific habitat and its requirements.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Medium term (3)
Spatial extent	Local (2)	Local (2)

Construction related Avifauna Impacts –		
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Definite (5)	Highly probable (4)
TOTAL (SP) / Significance	Moderate-High Negative (90)	Moderate Negative (52)
Proposed Mitigation Measures	• Impacts associated with the loss of bird foraging habitat due to construction activity cannot be mitigated in relation to the majority of the habitats but can be mitigated by avoiding avifaunal specific highly sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans. The overall severity of the impact can be reduced to being insignificant if avoidance mitigation is applied related to the positioning of the panels and supporting infrastructure and minimisation mitigation is applied.	
<u>Nature of Impact:</u> Disturbance of bird roosts and breeding sites		
The destruction or disturbance of bird roosts during the construction phase.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Very High (10)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	High (4)	Low (2)
Reversibility of impact	Low potential (4)	High potential (2)

Construction related Avifauna Impacts –		
Probability of impact occurring	Definite (5)	Medium Probability (3)
TOTAL (SP) / Significance	High Negative (115)	Low Negative (36)
Proposed Mitigation Measures	As with other impacts, this impact can be mitigated by preferably timing high impact construction (including to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. If construction takes place outside of May, June, July and August, all noise generated by machinery and maintenance operations must be kept to a minimum.	
<u>Nature of Impact:</u> Disturbance due to noise such as machinery movements and maintenance operations		
Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	High (4)	Low (2)
Reversibility of impact	Low potential (4)	High potential (2)
Probability of impact occurring	Definite (5)	Medium Probability (3)
TOTAL (SP) / Significance	High Negative (105)	Low Negative (36)

Construction related Avifauna Impacts –

Proposed Mitigation Measures

- As with other impacts, this impact can be mitigated by preferably timing construction to May, June, July and August in order to avoid breeding periods of species within the sensitive drainage lines, wetlands and the general region. If construction takes place outside of May, June, July and August, all noise generated by machinery and maintenance operations must be kept to a minimum.

2.1.2.2. Indirect Impact: Cumulative Avifaunal Impacts

Construction and Operational phase CUMULATIVE impacts on avifauna

Nature of Impact: There are a number of existing renewable energy projects (currently only solar Energy Facilities (SPPs) that already have/ will show quantified negative impacts on the avifauna community in the region. Therefore, any impacts anticipated from the proposed solar facility will add to these existing impacts and require assessment under a Cumulative Impacts assessment. Results obtained during this preconstruction survey and from the subsequent impact analysis should be considered in conjunction with the impacts created by the proposed development. The current developments within the region raise the possibility of significant cumulative impacts, especially concerning collision risk, habitat loss and fragmentation and loss of suitable habitat for threatened species.

PREFERRED ALTERNATIVE

Nature of Impact: Habitat Loss

Regional Saturation of SPP facilities causing habitat loss.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	Moderate (3)	Low (2)

Construction and Operational phase CUMULATIVE impacts on avifauna		
Reversibility of impact	Low potential (4)	Low potential (4)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate-High Negative (80)	Moderate Negative (42)
Proposed Mitigation Measures	Not able to be mitigated quantitatively. Mitigation measures are similar to the SPP facility. Where possible, apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of panels and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible. All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface slow. All roads and crossings must be engineered not to impede surface or subsurface flow in any way.	
<u>Nature of Impact:</u> Collision mortality (vehicles) Increased roadkill due to higher traffic volumes.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Medium term (3)
Spatial extent	National (4)	Regional (3)
Irreplaceability of resources	High (4)	Moderate (3)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Medium Probability (3)	Probable (2)
TOTAL (SP) / Significance	Moderate Negative (66)	Low Negative (36)
Proposed Mitigation Measures	Strict enforcement of speed limits in the PAOI as well saturation of fence infrastructure with reflective diverters and maintaining fence set aside distances (75/ 2-5 metres).	

Construction and Operational phase CUMULATIVE impacts on avifauna		
<u>Nature of Impact:</u> Collision mortality (Infrastructure) Increased mortalities due to collisions with SPP infrastructure, especially powerlines and fences.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Long term (4)
Spatial extent	Regional (3)	National (4)
Irreplaceability of resources	Moderate (3)	High (4)
Reversibility of impact	Low potential (4)	Low potential (4)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate-High Negative (80)	Moderate Negative (66)
Proposed Mitigation Measures	- Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. All new powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds. However, unmitigated (flapped/marked) powerline infrastructure should be subject to retrofitting if collision mortality thresholds of SCC are met during the Operations Phase. As stated above, positive and/ or rectification Cumulative Mitigation will be the retrofitting of existing powerline infrastructure (in consultation with Eskom) which currently does not have diverter infrastructure in place. - Retrofitting of diverters will be based on carefully considered if in fact new infrastructure radically influences flight paths of birds which will avoid the new infrastructure and fly into the old unmitigated. infrastructure in which case this will have to be addressed. A suggested standard is 1500 metres either side of high-density collision points registered as part of the monitoring during the operations phase using retrofitting techniques approved by the EWT and Birdlife.	

2.1.3. Direct Impact: Terrestrial Biodiversity Impacts

2.1.3.1. Direct Impact: Terrestrial Biodiversity Impacts

Construction related Terrestrial Biodiversity Impacts –

Nature of Impact: Habitat loss and fragmentation (especially primary grassland, watercourses and ridge / bushveld habitat)

- The solar arrays will be positioned ~ 5m above ground. The panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west, or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun. Groundwork is anticipated to be high for the installation as approximately 105 ha will be transformed. Post-construction, vegetation cover will return underneath the PV arrays, albeit at a lower species composition and structure.
- The access road will comprise a new road, as well as the expansion of sections of the existing farm road. The access roads as well as internal roads will range from 5 -8m in width. It is estimated that approximately 5 ha will be cleared for internal roads. This will result in loss of vegetation and will increase habitat fragmentation as small islands of vegetation will remain. The functionality of these vegetation patches will be reduced.
- The construction camp and laydown area will further transform approximately 6 ha. This must be located outside of the sensitive features. These areas during the construction phase must be located in medium to low impact areas.
- The Grassland and Watercourse habitats were identified as high sensitivity features. Only the Watercourse should be avoided by the development, and an effort must be made to avoid the Grassland, where possible. Appropriate mitigation measures and rehabilitation can reduce the impact on the Grassland to moderate.
- These habitats have moderate habitat connectivity with potentially functional ecological corridors with moderate current negative ecological impacts.
- The Watercourse habitat will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, where species have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed. Accordingly, their resilience is considered to be medium.
- The Grassland habitat is unlikely to be able to recover fully after a relatively long period, where species have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species have a low likelihood of returning to a site once the disturbance or impact has been removed. Accordingly, the resilience is low.

PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Medium (6)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	High (4)	Low (2)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Definite (5)	Highly probable (4)
TOTAL (SP) / Significance	High Negative (110)	Moderate Negative (64)
Proposed Mitigation Measures	- No new development should take place within High sensitivity areas or buffer zones. This is specific to the Watercourse, Bushveld (intersecting with Ridges) and specific Grassland patches. - Placement of permanent infrastructure which causes irreversible transformation of the system within High Sensitivity areas must be avoided as far as possible. - The Grassland and bushveld should be avoided where possible, but with appropriate mitigation and significant rehabilitation the limited impacts can be reduced. - No construction related activities, such as the site camp, storage of materials, temporary roads or ablution facilities may be located in the high sensitivity areas. - Linear infrastructure such as roads and overhead powerlines can cross the Watercourse habitat as delineated and	

mapped by the Aquatic specialist, but it is advised to construct pylons outside the buffer areas, where possible.

- The topsoil must not be disturbed, and heavy machinery must only be utilised to only drill holes for the erection of the PV panels, approximately 2m above ground.
- Approximately 105 ha, including grassland will be transformed. Should CBA grassland be transformed, a biodiversity offset agreement must be put into place prior to the commencement of development activities.
- A rehabilitation management plan must be in place prior to commencement of construction activities.
- It is advised that the developer undertake an agreement with the landowner to assist with active eradication of alien invasive species in the surrounding grasslands and watercourses, as well as rehabilitating secondary grasslands and/or old agricultural fields.
- Restoring species composition and structure post construction, includes removing species such as geophytes, succulents and forbs from site prior to construction and replant them after construction. The species can be kept in a nursery on site or similar in order to protect them during the construction period
- Rehabilitate disturbed areas that are no longer required by the operational phase of the development immediately after construction is completed for a PV facility. Inadequate rehabilitation could result in limited revegetation of indigenous species and/or an invasion of alien vegetation which will result in long term ecological degradation and damage.
- Demarcate all areas to be cleared with construction tape or other appropriate and effective means. However, caution should be exercised to avoid using material that might entangle fauna.
- An Environmental Control Officer (ECO) must be appointed to monitor the clearing of vegetation within demarcated areas and oversee the implementation of the rehabilitation management plan.

Nature of Impact: Loss of species of conservation concern (SCC)

- No species of conservation concern are expected or were recorded during the survey.

- Several provincially protected species occur on site which must either be relocated prior to construction or alternative measures made (depending on comments received from the provincial authority). A permit application is required from the provincial department where the development impacts on these species.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Low (4)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Definite (5)	Moderate (3)
Reversibility of impact	Impact cannot be reversed (5)	Moderate potential (3)
Probability of impact occurring	Definite (5)	Medium Probability (3)
TOTAL (SP) / Significance	High Negative (120)	Moderate Negative (45)
Proposed Mitigation Measures	• Avoidance is the best measure. • The Grassland, Bushveld and Watercourse habitats where suitable habitat is present has been indicated as high sensitivity, and a 15m buffer has been applied. • <i>P. viridiflorum</i> (cheesewood) occurs in the bushveld habitat, especially rocky outcrops. • Some species must be protected in situ and cannot be removed with a species permit. • A comprehensive Plant Search and Rescue Operation must be undertaken by a suitably qualified botanical specialist prior to vegetation clearance during the construction phase, specifically related to permit applications (provincially and protected trees) and locating all individuals of SCC within the development footprint. • All relevant plant permits must be obtained from the provincial authority prior to the removal or relocation of SCC, including provincially protected species and protected tree.	

- Replanting of protected SCC as part of rehabilitation efforts post-construction, where applicable.
- A walkdown of the approved layout in terms of the National Forest Act (Act 84 of 1998) is required where individuals are enumerated and recorded with a GPS. For the purposes of the EIA process, the EMPr must include the species and the requirement to do a walkdown of the approved development footprint within the bushveld habitat to comply with the NFA regulations.
- Where the approved layout designs impact on individuals, permit applications are required for either the relocation or destruction of provincially protected species and protected trees.

Nature of Impact: Increased alien invasive species

- Alien and invasive species are more likely to establish in disturbed areas due to construction activities.
- Alien invasive species density and distribution is high in certain areas, especially where existing infrastructure are located, such as homesteads, roads, dumping sites and mining activities.
- Vehicles can also transport seeds from other areas and introduce new species previously unknown to the area.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate-High Negative (72)	Moderate Negative (42)

Proposed Mitigation Measures

- A site-specific Alien Invasive Species (AIS) Management Plan must be compiled prior to the commencement of construction activities and implemented during the construction phase and continued monitoring and eradication needs to take place throughout the life of the project.
- Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.
- The development footprints and immediate surroundings should be monitored for the growth/regrowth of alien vegetation throughout the construction and operation phases of the project.

Nature of Impact: Increased erosion and soil compaction

- Erosion is likely to occur where vegetation has been cleared.
- Heavy machinery and vehicles operated during the construction phase will lead to soil compaction. Plants cannot readily establish in compacted soil, since the soil is too hard for root penetration.
- Water infiltration is less in compacted areas and the runoff is higher, which could lead to increased erosion.
- Where internal routes cross watercourses, this may result in damage to the habitat, including changes in flow patterns, functionality and erosion.
- Erosion increases the sediment load in the watercourses, resulting in increased sedimentation downstream of the disturbance. Sedimentation may cause a blockage and alter the characteristics of the watercourse.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Low potential (4)	Moderate potential (3)

Probability of impact occurring	Highly probable (4)		Medium Probability (3)	
TOTAL (SP) / Significance	Moderate-High Negative (76)		Moderate Negative (42)	
Proposed Mitigation Measures	• 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 (Appendix D2 of the DSR) mitigation measures relevant to watercourse crossings and development close to watercourses.			
<u>Nature of Impact:</u> Littering and general pollution • The site camp and construction activities are potential sources of pollution, including hydrocarbons, construction material, domestic waste and sewage. • Pollution may inhibit plant growth. • It can cause soil and water pollution if not managed appropriately. • Pollution will be localised to the site, but several pollutants may spread due to water runoff.				
Criteria	Rating Before mitigation		Rating After mitigation	
Status and Nature of the Impact	Negative		Negative	
Magnitude	Low (3)		Very Low (2)	
Duration	Long term (4)		Long term (4)	

Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (60)	Low Negative (33)
Proposed Mitigation Measures	• The site camp must not be located in very high sensitivity areas and their buffer zones. • Dangerous goods may not be stored within 100 m of a watercourse. • 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.	

2.1.3.2. Cumulative Impact: Loss of vegetation

Construction-related cumulative Impact of the Loss of Vegetation

Nature of Impact: Cumulative impacts that may arise should the development be approved in relation to other renewable energy facilities within a 30km radius. The PV development is not located in a REDZ. Approximately four solar PV development projects are located within a 30km radius from the proposed Carpe Diem North SPP.

Many more renewable energy projects are anticipated owing to the proximity of the Carmel Substation.

- The vegetation types are not considered threatened, but sensitive features still exist within these vegetation types and on the study area.
- The total developable area for all PV facilities and associated infrastructure is about 650 ha, but the entire site will not be cleared of vegetation. The basal layer will still maintain the grass and herbaceous layer, but trees and shrubs will be removed which will alter the vegetation structure and species composition. In addition, additional loss will be due to internal road network.
- Grassland and Watercourse habitats remain important ecological features in terms of ecosystem functioning, climate refugia, landscape corridors and harbouring endemic species. Avoiding these habitats as indicated, will reduce the total sensitive areas for development which in turn will reduce the overall cumulative impacts.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Medium (6)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Moderate (3)	Moderate (3)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)

TOTAL (SP) / Significance	Moderate Negative (88)	Moderate Negative (57)
Proposed Mitigation Measures	Transformation is considered low for this vegetation type but increased renewable developments could change this.	

2.1.4. Direct Impact: Geohydrological Impacts

Construction related Geohydrological Impacts		
Nature of Impact: Potential impact on groundwater quality due to accidental oil spillage/fuel leakage Accidental oil spillage/fuel leakage associated with construction can result in contaminated groundwater and surrounding environment.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Low (4)
Duration	Long term (4)	Short term (2)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	High potential (2)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Improbable (1)
TOTAL (SP) / Significance	Moderate Negative (42)	Low Negative (11)

Cumulative impacts

-

Proposed Mitigation Measures

- Vehicles must be regularly serviced and maintained to check and ensure there are no leakages.
- Any engines that stand in one place for an excessive length of time must have drip trays.
- Diesel fuel storage tanks, if required, should be above ground on an impermeable surface in a bunded area. Vehicles and equipment should also be refuelled on an impermeable surface.
- A designated area should be established at the construction site camp for this purpose, if off-site refuelling is not possible.
- If spillages occur, they should be contained and removed as rapidly as possible, with correct disposal procedures of the spilled material, and reported.
- Proof of disposal (waste disposal slips or waybills) should be obtained and retained on file for auditing purposes.
- Impact can be minimized if an appropriate management plan at the construction camps is implemented with the above-mentioned procedures.

Nature of Impact: Impact on groundwater quality due to leakage from BESS

The proposed development will require a Battery Energy Storage System (BESS) at the facility. There are usually electrolytes of an environmentally harmful chemical composition that are used within the BESS, especially for Redox Flow BESS (whereas Lithium Ion BESS are solid state containerized systems). With any chemical storage, there is always a risk of contamination to soils and groundwater. It is, therefore, recommended that all BESS's are placed a minimum distance of 50 m from any borehole and placement should include effective bunding and secondary containment structures. With adherence to the proposed mitigation measures, the significance of this impact would be considered very low.

Chemical leakages from the BESS may lead to contamination of the groundwater resource.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Short term (2)

Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	High potential (2)	High potential (2)
Probability of impact occurring	Highly probable (4)	Improbable (1)
TOTAL (SP) / Significance	Moderate Negative (64)	Very Low Negative (11)
Cumulative impacts	-	-
Proposed Mitigation Measures	• Ensure that all electrolyte or chemicals stored or used on site have secondary containment systems in place with reliable leak detection, annunciation in place. Ensure that all chemicals are handled on concrete bunded surfaces and not on bare soil. • Any waste products produced from the BESS systems should be removed and disposed of appropriately. • Waste water produced by fire hydrants should not be allowed to runoff into the environment. It is recommended that all BESS's are placed a minimum of 50 m from any borehole.	

Socio-Economic Issues/Impacts:

2.1.5. Direct Impact: Visual Impacts

2.1.5.1. Direct Impact: Visual Impact of the SPP

Construction related visual impacts of the SPP –

Nature of Impact: Change to the landscape characteristics and key views caused by the physical presence of project activities during the construction phase.

Construction activities include the removal of vegetation, earthworks required to create building terraces for internal substations and preparation of the internal roads as well as excavations for the array structures foundations, and the erection of the PV arrays and associated infrastructure. Construction activities would potentially negatively affect the landscape's visual quality and sense of place relative to its baseline. They would contrast with the patterns that define the structure of the landscape.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Definite (5)	Definite (5)
TOTAL (SP) / Significance	Moderate Negative (75)	Moderate Negative (75)
Proposed Mitigation Measures	1. Planning and site development - With the preparation of the land within the full extent of the servitude onto which activities will take place, the minimum amount of existing vegetation and topsoil should be removed. - Specifications with regards to the placement of construction camps (if required), as well as a site plan of the construction camp, indicating waste areas, storage areas and placement of ablution facilities, should be included in the EMP. These areas should either be screened or positioned in areas where they would be less visible from the public road west of the Project site.	

- Construction activities should be limited to between 08:00 and 17:00 or in conjunction with the ECO.
- Adopt responsible construction practices that strictly contain the construction/establishment activities to demarcated areas.
- Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas.

2. Earthworks and vegetation

- Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the site(s).
- All cut and fill slopes (if any) and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible.
- Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation.

3. Structures and associated infrastructure

- Paint all structures (structural support for the arrays) with colours that reflect and compliment the colours of the surrounding landscape.

4. Good housekeeping

- "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.
- During construction, temporary fences surrounding the material storage yards and laydown areas should be covered with 'shack' cloth (khaki coloured) or shade cloth.

5. Lighting

- Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are generally not wanted.
- Of all the pollutions faced, light pollution is perhaps the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The following are



measures that must be considered in the lighting design of the Project, particularly at the management and service platforms:

- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site i.e. lights are to be aimed away from adjacent farmsteads areas, specifically west and north of the Project site.
- Minimize the number of light fixtures to the bare minimum, including security lighting.
- Avoid high pole top security lighting along the periphery of the site and use only lights activated on illegal entry to the site.

2.1.5.2. Direct Impact: Visual Impacts of the Overhead Power Line Alternatives

Construction related visual impacts of the OPL Alternatives –

Nature of Impact: Change to the landscape characteristics and key views caused by the physical presence of project activities during the construction phase.

The visual impact during the construction phase is caused by the activities associated with erecting the tower structures or excavations for the underground cabling. The estimated time for this phase is eighteen months.

Activities associated with Alternatives 2 and 3 would not be visible after the construction phase.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Very Low (2)	Very Low (2)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)

Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Low Negative (36)	Low Negative (36)
Proposed Mitigation Measures	1. Planning and site development - With the preparation of the land within the full extent of the servitude onto which activities will take place, the minimum amount of existing vegetation and topsoil should be removed. - Specifications with regards to the placement of construction camps (if required), as well as a site plan of the construction camp, indicating waste areas, storage areas and placement of ablution facilities, should be included in the EMP. These areas should either be screened or positioned in areas where they would be less visible from the public road west of the Project site. - Construction activities should be limited to between 08:00 and 17:00 or in conjunction with the ECO. - Adopt responsible construction practices that strictly contain the construction/establishment activities to demarcated areas. - Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas. 2. Earthworks and vegetation - Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the site(s). - All cut and fill slopes (if any) and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible. - Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation. 3. Structures and associated infrastructure - Paint all structures (structural support for the arrays) with colours that reflect and compliment the colours of the surrounding landscape.	

4. Good housekeeping

- "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.
- During construction, temporary fences surrounding the material storage yards and laydown areas should be covered with 'shack' cloth (khaki coloured) or shade cloth.

5. Lighting

- Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are generally not wanted.
- Of all the pollutions faced, light pollution is perhaps the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The following are measures that must be considered in the lighting design of the Project, particularly at the management and service platforms:
 - Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site i.e. lights are to be aimed away from adjacent farmsteads areas, specifically west and north of the Project site.
 - Minimize the number of light fixtures to the bare minimum, including security lighting.
 - Avoid high pole top security lighting along the periphery of the site and use only lights activated on illegal entry to the site.

2.1.6. Indirect Impact: Potential positive socio-economic impacts

Construction related impacts – Contribution towards local economic income and employment

Nature of Impact: The local and provincial economies will benefit from the procurement of goods and services and the spending of wages and salaries. Temporary employment opportunities for people with different

Construction related impacts – Contribution towards local economic income and employment

No-Go Alternative: No contribution towards economic income.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	Low (4)	N/A
Duration	Short term (2)	N/A
Spatial extent	Regional (3)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate Positive (45)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	

CUMULATIVE IMPACTS

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None

Construction related impacts – Contribution towards local economic income and employment		
Magnitude	Very High (10)	N/A
Duration	Short term (2)	N/A
Spatial extent	Regional (3)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate-High Positive (75)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A

Construction related impacts – Contribution towards local economic income and employment		
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Cumulative impacts	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

2.1.7. Indirect Impact: Potential Negative Socio-Economic Impacts

Construction related impacts – Nuisance Factors (dust and noise)		
<u>Nature of Impact:</u> Construction activities create dust and noise at the development site that would affect nearby receptors.		
<u>No-Go Alternative:</u> No increased traffic, dust and noise related to the development site, but other activities in the area could affect nearby receptors.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Short term (2)	Short term (2)

Construction related impacts – Nuisance Factors (dust and noise)		
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Definite (5)	Definite (5)
TOTAL (SP) / Significance	Moderate Negative (45)	Low Negative (35)
Proposed Mitigation Measures	- Dust and noise emissions during the construction period should be minimised by implementing a Construction Environmental Management Programme (CEMP_r). - Any stored building material from which dust could be generated, such as stockpiled building sand, should be covered or kept moist during windy periods to prevent dust from being generated. - The excavation, handling and transport of erodible materials must be avoided under high wind conditions. - Dust generated from the construction activities must comply with the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004), as amended (NEM:AQA), National Dust Control Regulation (GN No. R. 827) of 1 November 2013. These regulations prohibit a person from conducting any activity in such a way as to give rise to dust in such quantities and concentrations that the dust, or dust fall, has a detrimental effect on the environment and nearby receptors. - Use dust suppression techniques (e.g., spraying bare surfaces with non-potable water and limiting driving speeds). - Stockpiled materials from which dust could be generated should be covered or kept moist during windy periods. - Any complaints must be investigated, sources identified, and mitigation measures implemented. - All plant equipment, including vehicles, must be properly maintained to minimise noise generation. - To reduce the impact of vehicles and traffic the following recommendations apply: a) Avoid unnecessary revving of engines and switch off (especially buses) when not required. b) Hooting should not be permitted unless for safety.	

Construction related impacts – Nuisance Factors (dust and noise)

- c) Maintain internal road surfaces and avoid steep road gradients.
- d) Enforce speed limits.
- Keep a complaint register at the site access point. Any complaints must be investigated, sources identified, and mitigation measures implemented.
- Establish and maintain a complaint register where I&APs can lodge or review noise related complaints. The register should be made available from the day construction activities commence and be kept for logging complaints during the operational phases. The register is to be kept at the main security access or at the offices, and must include:
 - a) the name, contact and affiliation details of the complainant;
 - b) the date of the complaint as well as the date and time of the disturbing event;
 - c) the location where the event was observed, and
 - d) a detailed description of the event including details such as noise character, impulsiveness, and tonality.
- In response to a complaint, investigate possible causes and if required, make use of a specialist to determine the likely source through monitoring and/or a site inspection. Remedial actions to prevent such events in future can then be taken and communicated to the complainant.
- Limit working hours to daylight hours as far as possible. Heavy construction activities must, as planned, be limited to daytime working hours. Other low noise activities such as painting may continue into night-time hours.
- Ensure silencers are installed on all vehicles. All generators to be contained within fit for purpose acoustic enclosures.
- Cover exposed waste daily to limit odours.
- Communicate dates of events with interested and affected parties.
- Implement a regular inspection and maintenance plan to withdraw from service and fix equipment noted to generate excessive noise (such as pump stations, generators, site service vehicles etc.).

CUMULATIVE IMPACTS

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative

Construction related impacts – Nuisance Factors (dust and noise)		
Magnitude	Medium (6)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Definite (5)	Definite (5)
TOTAL (SP) / Significance	Moderate Negative (60)	Moderate Negative (50)
Proposed Mitigation Measures	Mitigation is as above for the mitigation proposed for the impact of nuisance factors for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A

Construction related impacts – Nuisance Factors (dust and noise)		
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

Construction related impacts – Influx of job seekers		
Nature of Impact: An influx of job seekers will lead to competition with local residents for employment opportunities.		
No-Go Alternative: There will be no influx of job seekers linked to the site, but other construction and/or operational activities in the area may attract job seekers.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)

Construction related impacts – Influx of job seekers		
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Low Negative (36)	Low Negative (28)
Proposed Mitigation Measures	Contractors must commit to employing people from the immediate area whenever possible.	
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)

Construction related impacts – Influx of job seekers		
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Moderate Negative (48)	Moderate Negative (40)
Proposed Mitigation Measures	Mitigation is as above for the mitigation proposed for the impact of influx of job seekers for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	N/A - Continue current practice.	-

Construction related impacts – Influx of job seekers

Proposed Mitigation Measures N/A - Continue current practice.

Construction related impacts – Local Communities

Nature of Impact: Incoming construction workers can disrupt family structures and social networks in local communities.

No-Go Alternative: No construction workers will be linked to the specific site.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Low Negative (36)	Low Negative (28)
Proposed Mitigation Measures	Local labour and local enterprises should be used, defined as residents and businesses in Merafong City.	

- Construction workers from outside should return home regularly.

CUMULATIVE IMPACTS

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Moderate Negative (48)	Moderate Negative (40)
Proposed Mitigation Measures	Mitigation is as above for the mitigation proposed for the impact on local communities for the Preferred Alternative.	

NO-GO ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None

Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

Construction related impacts – Local Crime

Nature of Impact: The presence of construction workers may increase the risk of criminal activities in the area.

No-Go Alternative: No increase in criminal activities linked to the site, but security problems remain sensitive to other activities.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)

Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Low Negative (36)	Low Negative (28)
Proposed Mitigation Measures	- Co-operation between Developer and contractors essential to ensure that the area remains secured during construction. - On-site security measures, such as perimeter fencing, controlled access, security guards and patrols, will minimise risk.	
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)

Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Highly probable (4)
TOTAL (SP) / Significance	Moderate Negative (48)	Moderate Negative (40)
Proposed Mitigation Measures	Mitigation is as above for the mitigation proposed for the impact of local crime for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	N/A	-
Proposed Mitigation Measures	N/A - Continue current practice.	

2.1.8. Direct Impact: Traffic Issues/Impacts

Construction related traffic impacts		
Nature of Impact: Traffic congestion on all access roads and roads in the vicinity of the site during construction with impacts on intersection capacity, road infrastructure adequacy and parking requirements.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	None
Magnitude	Very Low (2)	N/A
Duration	Short term (2)	N/A
Spatial extent	Regional (3)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	Impact will be reversible (1)	N/A
Probability of impact occurring	Highly probable (4)	N/A
TOTAL (SP) / Significance	Low Negative (32)	Negligible
Cumulative impacts	N/A	N/A
Proposed Mitigation Measures	No mitigation measures are necessary to be implemented during the construction phase, as the impacts on the road network will be minimal and it will not be necessary for any mitigation measures.	

No road upgrades were found to be required to accommodate the traffic generated from the development both during the construction and operational phases.

It is recommended that at least 10 parking bays be provided on site for private vehicles and trucks.

Heritage Issues/Impacts

2.1.9. Direct Impact: Heritage Resources

Construction related Heritage Resource impacts –		
<u>Nature of Impact:</u> Unidentified Heritage Resources		
Due to the size of the area assessed and the current vegetation cover, the possibility of encountering heritage features in un-surveyed areas does exist.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Very High (10)	Low (4)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	Definite (5)	Definite (5)
Reversibility of impact	Impact cannot be reversed (5)	Impact cannot be reversed (5)

Probability of impact occurring	Improbable (1)	
TOTAL (SP) / Significance	Low Negative (26)	Low Negative (20)
Proposed Mitigation Measures	- Implement a chance to find procedure in case where possible heritage finds are uncovered. - An appropriately qualified heritage practitioner / archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified. - Should an archaeological site or cultural material be discovered during construction (or operation), the area should be demarcated, and construction activities halted. - The qualified heritage practitioner / archaeologist will then need to come out to the site and evaluate the extent and importance of the heritage resources and make the necessary recommendations for mitigating the find and the impact on the heritage resource. - The contractor therefore should have some sort of contingency plan so that operations could move elsewhere temporarily while the materials and data are recovered. - Construction can commence as soon as the site has been cleared and signed off by the heritage practitioner / archaeologist. - A detailed “walk down” of the final approved footprints will be required before construction commences. - Any significant features of significance identified during this walkdown will require formal mitigation (i.e., permitting where required) or where possible a slight change in design could accommodate such resources. - A Heritage Management plan (HMP) for heritage resources needs to be compiled and approved for implementation during construction and operations where heritage features of significance are identified. <i>Note that the Heritage Management Plan compiled by the heritage specialist (see section 9.6 of the Heritage Impact Assessment – attached as Appendix D6.1 to the FSR).</i>	

2.1.10. Direct Impact: Palaeontological Resources

Construction related impacts – Impacts on Palaeontology		
<u>Nature of Impact:</u> Impacts on Palaeontological Heritage		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Low (4)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	Definite (5)	Definite (5)
Reversibility of impact	Impact cannot be reversed (5)	Impact cannot be reversed (5)
Probability of impact occurring	Medium Probability (3)	Probable (2)
TOTAL (SP) / Significance	Moderate Negative (72)	Moderate Negative (40)
Proposed Mitigation Measures	CHANCE FIND PROTOCOL • If a chance find is made, the person responsible for the find must immediately stop working and all work that could impact that finding must cease in the immediate vicinity of the find. • The person who made the find must immediately report the find to his/her direct supervisor which in turn must report the find to his/her manager and the ESO or site manager, who should then immediately report the find to the ECO. The ECO must report the find to the relevant Heritage Agency (South African Heritage Resources Agency, SAHRA).	

Construction related impacts – Impacts on Palaeontology

(Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za). The information to the Heritage Agency must include photographs of the find, from various angles, as well as the GPS coordinates.

- A preliminary report must be submitted to the Heritage Agency within 24 hours of the find and must include the following: 1) date of the find; 2) a description of the discovery and a 3) description of the fossil and its context (depth and position of the fossil), GPS co-ordinates.
- Photographs (the more the better) of the discovery must be of high quality, in focus, accompanied by a scale. It is also important to have photographs of the vertical section (side) where the fossil was found.
- Upon receipt of the preliminary report, the Heritage Agency will inform the ECO whether a rescue excavation or rescue collection by a palaeontologist is necessary. The ECO will communicate the need for a rescue excavation or rescue collection by a palaeontologist to the ESO or site manager.
- The site must be secured to protect it from any further damage. No attempt should be made to remove material from their environment. The exposed finds must be stabilized and covered by a plastic sheet or sand bags. The Heritage Agency will also be able to advise on the most suitable method of protection of the find.
- In the event that the fossil cannot be stabilized, the fossil may be collected with extreme care by the ECO. Fossils finds must be stored in tissue paper and in an appropriate box, while due care must be taken to remove all fossil material from the rescue site.
- Once the Heritage Agency has issued the written authorization, the developer may continue with the development on the affected area.

2.2. Operational Phase

2.2.2. Direct Impacts: Aquatic Ecosystem Impacts

N/A – since no natural wetlands or watercourses are present on site.

2.2.3. Direct Impacts: Avifaunal Impacts

Operational phase related impacts on avifauna		
<u>Nature of Impact:</u> Disturbance due to noise such as, machinery movements and maintenance operations. Disturbance (including of nesting SCC) due to noise such as, machinery movements and maintenance operations during the construction phase the proposed PV solar farm causing loss of offspring for a generation.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (3)	Low (3)
Duration	Short term (2)	Medium term (3)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Moderate potential (3)	Impact will be reversible (1)
Probability of impact occurring	Probable (2)	Probable (2)
TOTAL (SP) / Significance	Low Negative (24)	Low Negative (20)
Proposed Mitigation Measures	• No Mitigation Required other than avoidance during design.	
<u>Nature of Impact:</u> Bird mortalities		

Operational phase related impacts on avifauna		
Bird mortalities during the operational phase due to vehicle collisions, collisions with infrastructure and/or combustion.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	Moderate (3)	Moderate (3)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Definite (5)	Medium Probability (3)
TOTAL (SP) / Significance	High Negative (100)	Moderate Negative (42)
Proposed Mitigation Measures	- Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. It is likely that most of the avifaunal populations will be largely displaced from the majority of the project infrastructure, although significant risks are associated with the likelihood of project vehicles flushing birds into fencing infrastructure as well as collisions of large bodied species with powerlines. Although the current overall bird activity qualifies the proposed solar development boundary as a high-density area, there are certain times of the year (and day) when it appears that large flocks of birds (such as and smaller migratory birds of prey) are far more prevalent. - All powerline infrastructure must be fitted with approved bird diverters (including light reflecting/ emitting markers for nocturnal migrants) in order to provide visibility for large-bodied birds.	

Operational phase related impacts on avifauna

- In all areas where service road intersects with semi natural or natural habitat, all fences that are constructed (if any) must be set back at least (strictly) 75 metres from the edge of every service road in order to allow for vulnerable species such as coursers, francolins and korhaans to obtain adequate height after being flushed by vehicle traffic. An Alternative mitigation measure and where a 75 metre buffer is not possible, new fences must be set back preferably 2 m and no more than 5 metres (directly adjacent) from the edge of service roads. Through the essential elimination of habitat, this will limit any chance of vulnerable species foraging on verge side vegetation and causing subsequent fence collisions.
- Reflective diverters should be attached to new fencing alongside regular maintenance roads every 50 metres.
- Finally, mitigation may have to include the **retrofitting of existing powerline infrastructure within the Project Footprint (in consultation with Eskom)** which currently does not have diverter infrastructure in place. Retrofitting of diverters will be based on carefully considered if in fact new infrastructure radically influences flight paths of birds which will avoid the new infrastructure and fly into the old unmitigated infrastructure in which case this will have to be addressed. A suggested standard is 1500 metres either side of high-density collision points registered as part of the monitoring during the operations phase using retrofitting techniques approved by the EWT and Birdlife.

Nature of Impact: Loss of bird foraging habitat

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)

Operational phase related impacts on avifauna		
Reversibility of impact	High potential (2)	High potential (2)
Probability of impact occurring	Probable (2)	Probable (2)
TOTAL (SP) / Significance	Low Negative (24)	Low Negative (20)
Proposed Mitigation Measures	Impacts associated with the loss of bird foraging habitat due to operations can be mitigated by avoiding avifaunal specific sensitive areas and their associated buffers, such as the local drainage lines, impoundments, smaller watercourses, pans and. A green buffer should be maintained around all habitats designated as High Sensitivity or above.	
<u>Nature of Impact:</u> Disruption of bird migratory pathways		
Disruption of bird migratory pathways during the operational phase.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Medium term (3)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	Moderate (3)	Moderate (3)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)

Operational phase related impacts on avifauna		
TOTAL (SP) / Significance	Moderate-High Negative (76)	Moderate Negative (42)
Proposed Mitigation Measures	Migratory pathways of birds cannot be changed and the resulting impacts are unavoidable. However, severity of the impacts can be reduced with appropriate mitigation measures. Some significant discernible migratory flight pathways are predicted, especially flamingos moving through the areas which could be explained by large areas of generic habitats punctuated by some distinguishing geographic features in the landscape, such as large ridges, large impoundments, wetlands and drainage lines.	
Nature of Impact: The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect, perches, nest and shade opportunities. Cape Vulture is of particular concern.		
The attraction of some novel bird species due to the development of a solar farm with associated infrastructure such as lake effect perches, nest and shade opportunities may cause both damage to the infrastructure through acidic defecation by certain species but also draw birds closer to infrastructure and cause significant direct mortality risks.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Medium (6)
Duration	Short term (2)	Short term (2)
Spatial extent	Regional (3)	Local (2)
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)

Operational phase related impacts on avifauna		
TOTAL (SP) / Significance	Moderate-High Negative (80)	Moderate Negative (45)
Proposed Mitigation Measures	Essentially, all habitat attractants should be eliminated so that avifaunal populations will not embedded themselves within the infrastructure over time. This includes bird diverters, perch deterrents and the application of non-polarising white tape can be used around and/or across panels to minimise reflection which can attract aquatic birds and insects (food) as panels mimic reflective surfaces of waterbodies. An ECO can advise on the mitigations during operations.	
<u>Nature of Impact:</u> Chemical pollution spills		
Chemicals being used to keep the PV panels clean from dust (suppressants) etc.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Low potential (4)	High potential (2)
Probability of impact occurring	Highly probable (4)	Probable (2)
TOTAL (SP) / Significance	Moderate-High Negative (72)	Low Negative (24)

Operational phase related impacts on avifauna

Proposed Mitigation Measures

- Application of strict chemical control procedures as per the EMPr. Zero spills should be targeted and full clean up kits available in the event of any chemical spill. Soil testing subject to EMPr.

2.2.3.1. Indirect Impacts: Cumulative Avifaunal Impacts associated with the Carpe Diem North SPP

Construction and Operational phase CUMULATIVE impacts on avifauna

Nature of Impact: There are a number of existing renewable energy projects (currently only solar Energy Facilities (SPPs) that already have/ will show quantified negative impacts on the avifauna community in the region. Therefore, any impacts anticipated from the proposed solar facility will add to these existing impacts and require assessment under a Cumulative Impacts assessment. Results obtained during this preconstruction survey and from the subsequent impact analysis should be considered in conjunction with the impacts created by the proposed development. The current developments within the region raise the possibility of significant cumulative impacts, especially concerning collision risk, habitat loss and fragmentation and loss of suitable habitat for threatened species.

PREFERRED ALTERNATIVE

Nature of Impact: Habitat Loss

Regional Saturation of SPP facilities causing habitat loss.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Short term (2)
Spatial extent	Regional (3)	Local (2)

Construction and Operational phase CUMULATIVE impacts on avifauna		
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Low potential (4)	Low potential (4)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate-High Negative (80)	Moderate Negative (42)
Proposed Mitigation Measures	Not able to be mitigated quantitatively. Mitigation measures are similar to the SPP facility. Where possible, apply necessary buffers for roost sites and other sensitive bird habitat features, avoiding the construction of panels and access roads in these areas. Roads must utilise or upgrade existing farm roads as far as possible. All underground cables bisecting sensitive habitats must be placed below the subsurface flow of the ephemeral wetlands with the linear construction pits subjected to full rehabilitation in order to maintain normal subsurface slow. All roads and crossings must be engineered not to impede surface or subsurface flow in any way.	
<u>Nature of Impact:</u> Collison mortality (vehicles) Increased roadkill due to higher traffic volumes.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Medium term (3)
Spatial extent	National (4)	Regional (3)
Irreplaceability of resources	High (4)	Moderate (3)

Construction and Operational phase CUMULATIVE impacts on avifauna		
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Medium Probability (3)	Probable (2)
TOTAL (SP) / Significance	Moderate Negative (66)	Low Negative (36)
Proposed Mitigation Measures	Strict enforcement of speed limits in the PAOI as well saturation of fence infrastructure with reflective diverters and maintaining fence set aside distances (75/ 2-5 metres).	
<u>Nature of Impact:</u> Collision mortality (Infrastructure)		
Increased mortalities due to collisions with SPP infrastructure, especially powerlines and fences.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Long term (4)
Spatial extent	Regional (3)	National (4)
Irreplaceability of resources	Moderate (3)	High (4)
Reversibility of impact	Low potential (4)	Low potential (4)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate-High Negative (80)	Moderate Negative (66)

Construction and Operational phase CUMULATIVE impacts on avifauna

Proposed Mitigation Measures

- Impacts due to bird mortalities during the operational phase are practically unavoidable for any large facility, but with the appropriate mitigation measures these impacts can be minimised. All new powerline infrastructure must be fitted with approved bird diverters in order to provide visibility for large-bodied birds. However, unmitigated (flapped/marked) powerline infrastructure should be subject to retrofitting if collision mortality thresholds of SCC are met during the Operations Phase. As stated above, positive and/ or rectification Cumulative Mitigation will be the **retrofitting of existing powerline infrastructure (in consultation with Eskom)** which currently does not have diverter infrastructure in place.
- Retrofitting of diverters will be based on carefully considered if in fact new infrastructure radically influences flight paths of birds which will avoid the new infrastructure and fly into the old unmitigated. infrastructure in which case this will have to be addressed. A suggested standard is 1500 metres either side of high-density collision points registered as part of the monitoring during the operations phase using retrofitting techniques approved by the EWT and Birdlife.

2.2.4. Direct Impact: Terrestrial Biodiversity Impacts

2.2.4.1. Direct Impact: Terrestrial Biodiversity Impacts for the Carpe Diem North SPP Development

Operation related Terrestrial Biodiversity Impacts –

Nature of Impact: Loss of species composition and diversity

- The shading effect from solar panels is likely to affect the species composition and diversity and may result in some bare patches. Numerous shrubs will be removed, where only the herbaceous and grass layers remain.
- Emerging seedlings of protected species may also be affected by the shading. Sensitive species may therefore not regenerate in the developed area.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Long term (4)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	Moderate (3)	Low (2)
Reversibility of impact	Low potential (4)	Moderate potential (3)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (54)	Moderate Negative (42)
Proposed Mitigation Measures	• The loss of species composition and diversity cannot be mitigated due to a permanent structure which will change microclimatic conditions for the life of the facility operation. • Maintain plant composition and structure below overhead power line based on continuous maintenance as per the management plan. • A rehabilitation plan is required to restore each habitat to a natural state that is representative of the respective vegetation type after decommissioning. This is not possible for primary grasslands, which should be avoided as far as possible.	
<u>Nature of Impact:</u> Increased alien and invasive species • After construction, alien invasive species could have established in optimal conditions. • If not managed, these species can spread and reduce plant species diversity and could alter species composition.		
Criteria	Rating Before mitigation	Rating After mitigation

Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (45)	Low Negative (33)
Proposed Mitigation Measures	- Implement an AIS Management Plan in terms of National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA). - The site-specific AIS Management Plan must be implemented for the first year of the operational phase. Thereafter, alien vegetation must continue to be monitored and eradicated annually throughout the life of the project. - Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem species are already present in the area and are likely to increase rapidly if not controlled. - Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible. - Alien vegetation, within the development footprints, should be removed from the site and disposed of at a registered waste disposal site.	

Nature of Impact: Littering and general pollution

The most likely type of pollutants are hydrocarbons spilled when refuelling vehicles, leakages from poorly maintained vehicles, spillage from maintaining machinery on site and littering at the site office or security gate.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Long term (4)	Long term (4)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Probable (2)
TOTAL (SP) / Significance	Moderate Negative (42)	Low Negative (22)
Proposed Mitigation Measures	• 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.	

2.2.5. Direct Impact: Geohydrological Impacts

Operation related Geohydrological Impacts		
<u>Nature of Impact:</u> Potential impact on groundwater quality due to leakages from BESS Chemical leakages from the BESS may lead to contamination of the groundwater resource.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Long term (4)	Short term (2)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	High potential (2)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Improbable (1)
TOTAL (SP) / Significance	Moderate Negative (48)	Very Low Negative (11)
Cumulative impacts	-	-
Proposed Mitigation Measures	• Ensure that all electrolyte or chemicals stored or used on site have secondary containment systems in place with reliable leak detection, annunciation in place. Ensure that all chemicals are handled on concrete bunded surfaces and not on bare soil. • Any waste products produced from the BESS systems should be removed and disposed of appropriately. • Waste water produced by fire hydrants should not be allowed to runoff into the environment. It is recommended that all BESS's are placed a minimum of 50 m from any borehole.	

	• Impact can be minimized if an appropriate management plan for the BESS is implemented with the above-mentioned procedures.	
<u>Nature of Impact:</u> Potential impact on groundwater quality due to leakages from cleaning of solar panels Chemicals used for washing solar panels may lead to contamination of the groundwater resource.		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Low (4)
Duration	Long term (4)	Short term (2)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	High potential (2)	High potential (2)
Probability of impact occurring	Improbable (1)	Improbable (1)
TOTAL (SP) / Significance	Low Negative (14)	Very Low Negative (11)
Cumulative impacts	Low Negative	Low Negative
Proposed Mitigation Measures	Use environmentally safe cleaning agents that breakdown naturally and do not cause adverse effects. Impact can be minimized if an appropriate management plan for the facility is implemented with the above-mentioned procedures.	

Socio-Economic Issues/Impacts:

2.2.6. Indirect Impact: Potential Positive Socio-economic Impacts

Operational related impacts – Provision of renewable energy		
Nature of Impact: The local community and the rest of South Africa will benefit from providing renewable energy.		
No-Go Alternative: No contribution to renewable energy will be linked to the site without the proposed development.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	Low (3)	N/A
Duration	Permanent (5)	N/A
Spatial extent	National (4)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate Positive (60)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	

Operational related impacts – Provision of renewable energy

CUMULATIVE IMPACTS

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	Very High (10)	N/A
Duration	Permanent (5)	N/A
Spatial extent	International / Transboundary (5)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	High Positive (100)	-
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	

NO-GO ALTERNATIVE

Status and Nature of the Impact	None	None
Magnitude	N/A	N/A

Operational related impacts – Provision of renewable energy			
Duration	N/A	N/A	
Spatial extent	N/A	N/A	
Irreplaceability of resources	N/A	N/A	
Reversibility of impact	N/A	N/A	
Probability of impact occurring	N/A	N/A	
TOTAL (SP) / Significance	-	-	
Cumulative impacts	-	-	
Continue current practice.	N/A - Continue current practice.		

Operational related impacts – Contribution towards employment		
<u>Nature of Impact:</u> The project will support sustainable employment for people with different types and levels of skill.		
<u>No-Go Alternative:</u> No contribution towards temporary employment.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None

Operational related impacts – Contribution towards employment		
Magnitude	Very Low (0,5)	N/A
Duration	Permanent (5)	N/A
Spatial extent	Local (2)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Low Positive (37,5)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	Low (4)	N/A
Duration	Permanent (5)	N/A
Spatial extent	Regional (3)	N/A
Irreplaceability of resources	None (0)	N/A

Operational related impacts – Contribution towards employment		
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate Positive (60)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact.	
NO-GO ALTERNATIVE		
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Cumulative impacts	-	-
Continue current practice.	N/A - Continue current practice.	

Operational related impacts – Contribution towards employment

Operational related impacts – Contribution towards local economic income

Nature of Impact: The local and provincial economies will benefit from the procurement of goods and services and the spending of wages and salaries.

No-Go Alternative: No contribution towards economic income.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	Low (3)	N/A
Duration	Permanent (5)	N/A
Spatial extent	National (4)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate Positive (60)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact. However, the Developer should be cognisant of the importance of using local labour, goods and services as far as possible.	

CUMULATIVE IMPACTS

Operational related impacts – Contribution towards employment		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Positive	None
Magnitude	High (8)	N/A
Duration	Permanent (5)	N/A
Spatial extent	National (4)	N/A
Irreplaceability of resources	None (0)	N/A
Reversibility of impact	No impact (0)	N/A
Probability of impact occurring	Definite (5)	N/A
TOTAL (SP) / Significance	Moderate-High Positive (85)	N/A
Proposed Mitigation Measures	No mitigation applies as it represents a positive impact. However, the Developer should be cognisant of the importance of using local labour, goods and services as far as possible.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A

Operational related impacts – Contribution towards employment		
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Cumulative impacts	-	-
Continue current practice.	N/A - Continue current practice.	

2.2.7. Indirect Impact: Potential Negative Socio-Economic Impacts

Operational related impacts – Sense of Place		
<u>Nature of Impact:</u> The proposed development will affect the sense of place for surrounding land users.		
<u>No-Go Alternative:</u> The current sense of place will be retained, but other developments in the area may impact this .		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative

Magnitude	Low (4)	Very Low (2)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	No impact (0)	No impact (0)
Probability of impact occurring	Definite (5)	Highly probable (4)
TOTAL (SP) / Significance	Moderate Negative (55)	Low Negative (36)
Proposed Mitigation Measures	• The Developers should implement the mitigation measures proposed in the Visual Impact Assessment.	
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	High (8)	Medium (6)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)

Reversibility of impact	Impact will be reversible (1)	No impact (0)
Probability of impact occurring	Definite (5)	Highly probable (4)
TOTAL (SP) / Significance	Moderate-High Negative (85)	Moderate Negative (56)
Proposed Mitigation Measures	As above for the mitigation proposed for the impact of Sense of Place for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

Operational related impacts – Local Crime

Nature of Impact: The expensive equipment on-site may attract criminal activities.

No-Go Alternative: No criminal activities linked to the site, but existing security problems may continue or influenced by unrelated activities.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Very Low (2)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (44)	Low Negative (27)
Proposed Mitigation Measures	On-site security measures, such as perimeter fencing, controlled access and security guards, will minimise the on-site risk.	

Operational related impacts – Local Crime		
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	None (0)	None (0)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (60)	Low Negative (39)
Proposed Mitigation Measures	As above for the mitigation proposed for the impact of Local Crime for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None

Operational related impacts – Local Crime		
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

Construction related impacts – Surrounding Property Values		
Nature of Impact: A new development may affect the current and future perceived value of other properties in the surrounding area.		
No-Go Alternative: Real estate values would increase/decrease independently of the proposed project.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation

Construction related impacts – Surrounding Property Values		
Status and Nature of the Impact	Negative	Positive
Magnitude	Low (4)	Very Low (2)
Duration	Permanent (5)	Permanent (5)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Very low (1)	None (0)
Reversibility of impact	High potential (2)	No impact (0)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (42)	Low Positive (27)
Proposed Mitigation Measures	• Implementation of mitigation measures related to visual, traffic and nuisance factors will minimise negative impacts.	
CUMULATIVE IMPACTS		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Positive
Magnitude	Medium (6)	Low (4)
Duration	Permanent (5)	Permanent (5)

Construction related impacts – Surrounding Property Values		
Spatial extent	Regional (3)	Regional (3)
Irreplaceability of resources	Very low (1)	None (0)
Reversibility of impact	High potential (2)	No impact (0)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (51)	Low Positive (36)
Proposed Mitigation Measures	As above for the mitigation proposed for the impact on Local Communities for the Preferred Alternative.	
NO-GO ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	None	None
Magnitude	N/A	N/A
Duration	N/A	N/A
Spatial extent	N/A	N/A
Irreplaceability of resources	N/A	N/A
Reversibility of impact	N/A	N/A

Construction related impacts – Surrounding Property Values		
Probability of impact occurring	N/A	N/A
TOTAL (SP) / Significance	-	-
Proposed Mitigation Measures	N/A - Continue current practice.	

2.2.8. Direct Impact: Visual Impacts

2.2.8.1. Direct Impact: Visual Impact of the SPP

Operation related visual aspects of the SPP –		
Nature of Impact: Change to the landscape characteristics and key views caused by the physical presence of project activities during the operational phase. Operational activities include the routine cleaning of PV modules, managing vegetation beneath and around them, and maintaining all other infrastructural components. Security lighting, along with different lighting related to the movement of security vehicles at night, also contributes to the visual impact. Together, these activities and the physical presence of the project's components, both during the day and at night, form the visual effect. The impact on the visual environment during the operational phase is assessed to have a potential moderate intensity over a localised area. This impact is expected to occur over the long term (approximately 30 years).		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative

Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Medium term (3)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Highly probable (4)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (60)	Low Negative (36)
Proposed Mitigation Measures	1. Planning and site development - With the preparation of the land within the full extent of the servitude onto which activities will take place, the minimum amount of existing vegetation and topsoil should be removed. - Specifications with regards to the placement of construction camps (if required), as well as a site plan of the construction camp, indicating waste areas, storage areas and placement of ablution facilities, should be included in the EMP. These areas should either be screened or positioned in areas where they would be less visible from the public road west of the Project site. - Construction activities should be limited to between 08:00 and 17:00 or in conjunction with the ECO. - Adopt responsible construction practices that strictly contain the construction/establishment activities to demarcated areas. - Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas. 2. Earthworks and vegetation - Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the site(s).	

- Disturbed soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation.

3. Good housekeeping

- "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.
- Operating facilities should be actively maintained during operation.

4. Lighting

- Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Ill designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are generally not wanted.
- Of all the pollutions faced, light pollution is perhaps the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The following are measures that must be considered in the lighting design of the Project, particularly at the management and service platforms:
 - Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site i.e. lights are to be aimed away from adjacent farmsteads areas, specifically west and north of the Project site.
 - Minimize the number of light fixtures to the bare minimum, including security lighting.
 - Avoid high pole top security lighting along the periphery of the site and use only lights activated on illegal entry to the site.

CUMULATIVE IMPACTS

Nature of Impact: Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect how the landscape is experienced, and cumulative effects may be positive or negative. Where they comprise a range of benefits, they may form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility of a range of developments and the combined effects of individual components of the proposed development (all five phases of the project) occurring in different locations or over a period of time. The separate effects of such individual developments may not be significant, but they may adversely impact visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, vegetative cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions (LI-IEMA (2013)).

The intervisibility and the Project along with the other solar PV projects (solar projects are proposed to the north west and south west of the site and south of the R501), would over time, result in the nature and character of the sub-region being impacted in a manner beyond the anticipated moderate cumulative negative impact of the proposed Project alone. The combined effect of approved, pending and proposed solar power developments would cause a change the nature, sense of study and character of the sub-region's landscape's baseline.

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Medium (6)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Moderate (3)
Reversibility of impact	Moderate potential (3)	Impact will be reversible (1)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (64)	Moderate Negative (48)
Proposed Mitigation Measures	Good housekeeping "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to	

- control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.
- Operating facilities should be actively maintained during operation.

2.2.8.2. Direct Impact: Visual Impacts of the OPL Alternatives

Operation related visual aspects of the OPL Alternatives –

Nature of Impact: Change to the landscape characteristics and key views caused by the physical presence of project activities during the operational phase.

The physical presence of the towers and power lines (Alternative 1 - LiLo) would result in a minor visual impact during the operational phase, as the proposed OPL would be largely integrated into the existing scene and would not present a lingering visual impact.

The operational phase is approximately thirty years (same as the PV Solar Project).

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (3)	Low (3)
Duration	Long term (4)	Long term (4)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)

Operation related visual aspects of the OPL Alternatives –		
Probability of impact occurring	Probable (2)	Probable (2)
TOTAL (SP) / Significance	Low Negative (24)	Low Negative (24)
Proposed Mitigation Measures	1. Good housekeeping "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff. - Operating facilities should be actively maintained during operation.	

2.2.9. Direct Impact: Traffic Impacts

Operational Phase related traffic impacts –		
<u>Nature of Impact:</u> Impact on traffic volumes during the operational phase. The operational phase of this project is not expected to generate significant traffic volumes.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	-
Magnitude	Very Low (2)	-
Duration	Long term (4)	-

Spatial extent	Local (2)	-
Irreplaceability of resources	None (0)	-
Reversibility of impact	No impact (0)	-
Probability of impact occurring	Improbable (1)	-
TOTAL (SP) / Significance	Low Negative (8)	N/A
Cumulative impacts	Low Negative	-
Proposed Mitigation Measures	N/A	

3.1. Decommissioning Phase Impacts

3.1.1. Direct Impacts: Aquatic Impacts

N/A – since no natural wetlands or watercourses are present on site.

3.1.2. Direct Impact: Terrestrial Biodiversity

Decommissioning related Terrestrial Biodiversity impacts -
<u>Nature of Impact:</u> Loss of habitat Some vegetation may be destroyed during decommissioning, which may result in loss of species composition and diversity. Decommissioned areas must be rehabilitated to restore the habitats.
PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Very Low (2)
Duration	Medium term (3)	Short term (2)
Spatial extent	Site specific (1)	Site specific (1)
Irreplaceability of resources	Low (2)	Very low (1)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Probable (2)
TOTAL (SP) / Significance	Moderate Negative (45)	Low Negative (16)
Proposed Mitigation Measures	• The loss of vegetation is unavoidable within the approved layout development footprint, but sensitive areas must be avoided when dismantling of infrastructure. • The ecological impacts will be similar to those listed in the construction phase and the associated mitigations measures must be updated based on the findings of the operational phase monitoring and implemented to reduce potential adverse impacts. • The dismantling of the project will eventually contribute to the removal of all the implemented structures and the necessary rehabilitation needs to take place to return the land use and vegetation back to a functioning system.	
<u>Nature of Impact:</u> Increased alien invasive species		
• During this phase, machinery can disturb the soil which can create optimal conditions for seeds to sprout. • Vehicles can also transport seeds from other areas and introduce new species previously unknown to the area.		
Criteria	Rating Before mitigation	Rating After mitigation

Status and Nature of the Impact	Negative	Negative
Magnitude	Medium (6)	Low (4)
Duration	Medium term (3)	Short term (2)
Spatial extent	Local (2)	Site specific (1)
Irreplaceability of resources	Low (2)	Very low (1)
Reversibility of impact	Moderate potential (3)	High potential (2)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Moderate Negative (48)	Low Negative (30)
Proposed Mitigation Measures	- Implement an AIS Management Plan in terms of National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA) for the dismantling of infrastructure and as part of rehabilitation. - The site-specific AIS Management Plan must be implemented for the first year after decommissioning and must be monitored until satisfactory eradication and control has been reached and impacts are low.	

3.1.3. Direct Impact: Visual Aspects

3.1.3.1. Direct Impact: Visual Impacts of the SPP

Decommissioning related visual impacts of the SPP –
<u>Nature of Impact:</u> Change to the landscape characteristics and key views caused by the physical presence of Project activities.

Decommissioning and closure activities include the dismantling and removal of infrastructure and the rehabilitation of the site back to its current, mostly natural, state.

PREFERRED ALTERNATIVE

Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Low (4)	Low (4)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Probable (2)	Probable (2)
TOTAL (SP) / Significance	Low Negative (22)	Low Negative (22)
Proposed Mitigation Measures	Good housekeeping "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.	

3.1.3.2. Direct Impact: Visual Impacts of the OPL Alternatives

Decommissioning related visual aspects of the OPL Alternatives –		
<u>Nature of Impact:</u> Change to the landscape characteristics and key views caused by the physical presence of project activities. Decommissioning and closure activities include dismantling and removing infrastructure, as well as restoring the site to its current, primarily natural state.		
PREFERRED ALTERNATIVE		
Criteria	Rating Before mitigation	Rating After mitigation
Status and Nature of the Impact	Negative	Negative
Magnitude	Very Low (2)	Very Low (2)
Duration	Short term (2)	Short term (2)
Spatial extent	Local (2)	Local (2)
Irreplaceability of resources	Low (2)	Low (2)
Reversibility of impact	Impact will be reversible (1)	Impact will be reversible (1)
Probability of impact occurring	Medium Probability (3)	Medium Probability (3)
TOTAL (SP) / Significance	Low Negative (27)	Low Negative (27)
Proposed Mitigation Measures	Good housekeeping "Housekeeping" procedures should be developed for the Project to ensure that the project site and lands adjacent to it are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated on-site; procedures should extend	

Decomissioning related visual aspects of the OPL Alternatives –

to control of "track out" of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff.

4. Summary of Impacts Assessed

CONSTRUCTION PHASE		
PREFERRED ALTERNATIVE:		
Criteria	Rating Before mitigation	Rating After mitigation
TERRESTRIAL BIODIVERSITY		
Habitat loss and fragmentation		
Status and Nature of the Impact	Negative; High (H)	Negative; Moderate (M)
Loss of SCC		
Status and Nature of the Impact	Negative; High (H)	Negative; Moderate (M)
Increased alien invasive species		
Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
Increased erosion and soil compaction		
Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
Littering and general pollution		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
CUMULATIVE IMPACTS		
Loss of vegetation during construction phase		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
AVIFAUNAL IMPACTS		
Habitat Destruction		
Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
Disturbance of bird roosts and breeding sites		
Status and Nature of the Impact	Negative; High (H)	Negative; Low (L)
Disturbance due to noise such as machinery movements and maintenance operations		
Status and Nature of the Impact	Negative; High (H)	Negative; Low (L)
CUMULATIVE IMPACTS		
Habitat Loss		
Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
Collision mortality (vehicle)		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)

Collision mortality (infrastructure)		
Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
VISUAL IMPACTS		
Visual Impacts of the SPP		
Change to the landscape characteristics and key views caused by the physical presence of project activities during the construction phase.		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
Visual Impacts of the OPL		
Change to the landscape characteristics and key views caused by the physical presence of project activities during the construction phase.		
Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
HERITAGE IMPACTS		
Disturbance to unidentified heritage resources		
Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
Palaeontological sensitivity impact		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
SOCIO-ECONOMIC IMPACTS		
PREFERRED ALTERNATIVE		
Economic benefit from local procurement – contribution towards local economic income and employment		
Status and Nature of the Impact	Positive; Moderate (M)	N/A
CUMULATIVE IMPACTS		
Status and Nature of the Impact	Positive; Moderate-High (MH)	N/A
NO-GO ALTERNATIVE		
Status and Nature of the Impact	N/A	N/A
Nuisance Factors (Dust and Noise) affecting nearby receptors		
PREFERRED ALTERNATIVE		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
CUMULATIVE IMPACTS		
Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
NO-GO ALTERNATIVE		
Status and Nature of the Impact	N/A	N/A

Influx of job seekers increasing employment competition

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Incoming construction workers can disrupt family structures and social networks in local communities

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Potential increase in local crime

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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TRAFFIC IMPACTS

Increased traffic volume during construction

Status and Nature of the Impact	Negative; Low (L)	Negligible
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CUMULATIVE IMPACTS

Status and Nature of the Impact	N/A	N/A
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GEOHYDROLOGICAL IMPACT

Potential impact on groundwater quality from accidental oil spills or fuel leakage

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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Impact on groundwater quality due to leakage from BESS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Very Low (L)
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CUMULATIVE IMPACT

Status and Nature of the Impact	Negative; Low (L)	Negligible
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OPERATIONAL PHASE

PREFERRED ALTERNATIVE:

AVIFAUNAL IMPACTS

Disturbance due to noise such as machinery movements and maintenance operations

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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Bird Mortalities

Status and Nature of the Impact	Negative; High (H)	Negative; Moderate (M)
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Loss of Bird Foraging Habitat

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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Disruption of bird migratory pathways

Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
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Attraction of some novel bird species

Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
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Chemical Pollution Spills

Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Low (L)
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CUMULATIVE AVIFAUNAL IMPACTS

Criteria	Rating Before mitigation	Rating After mitigation
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Habitat Loss

Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
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Increased Collision Mortality (Vehicles)

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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Increased Collision Mortality (Infrastructure)

Status and Nature of the Impact	Negative; Moderate-High (MH)	Negative; Moderate (M)
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TERRESTRIAL BIODIVERSITY

Terrestrial Biodiversity Impacts

Loss of species composition and diversity

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
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Increased alien and invasive species

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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Littering and general pollution

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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GEOHYDROLOGICAL IMPACTS

Potential impact on groundwater quality due to leakages from BESS.

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Very Low (VL)
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Potential impact on groundwater quality due to leakages from cleaning of solar panels.

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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POTENTIAL POSITIVE SOCIO-ECONOMIC IMPACTS:

Provision of renewable electricity

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Positive; Moderate (M)	N/A
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Positive; High (H)	N/A
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Contribution towards employment

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Positive; Low (L)	N/A
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Positive; Moderate (M)	N/A
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Contribution towards local economic income

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Positive; Moderate (M)	N/A
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Positive; Moderate-High (MH)	N/A
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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POTENTIAL NEGATIVE SOCIO-ECONOMIC IMPACTS

Sense of Place

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate-High (HM)	Negative; Moderate (M)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Local Crime

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Very Low (L)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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Surrounding property values

PREFERRED ALTERNATIVE

Status and Nature of the Impact	Negative; Moderate (M)	Positive; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Positive; Low (L)
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NO-GO ALTERNATIVE

Status and Nature of the Impact	N/A	N/A
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VISUAL IMPACTS

Visual Impacts of the SPP

Change to the landscape characteristics and key views caused by the physical presence of project activities during the operational phase.

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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CUMULATIVE IMPACTS

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Moderate (M)
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Visual Impacts of the OPL Alternatives

Change to the landscape characteristics and key views caused by the physical presence of project activities during the operational phase.

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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TRAFFIC IMPACTS

Increased traffic volume during operation

Status and Nature of the Impact	Negative; Low (L)	N/A
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DECOMMISSIONING PHASE

TERRESTRIAL BIODIVERSITY IMPACTS

Loss of habitat

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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Increased alien invasive species

Status and Nature of the Impact	Negative; Moderate (M)	Negative; Low (L)
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VISUAL IMPACTS

Visual Impacts of the SPP

Change to the landscape characteristics and key views caused by the physical presence of Project activities

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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Visual Impacts of the OPL Alternatives

Change to the landscape characteristics and key views caused by the physical presence of Project activities

Status and Nature of the Impact	Negative; Low (L)	Negative; Low (L)
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