

APPENDIX G2 - SIGNIFICANCE OF POTENTIAL IMPACTS

The following sections present the outcome of the significance rating exercise. The results suggest that almost none of the key issues identified as part of the scoping process had a negative high environmental significance after mitigation. Instead the overall score indicates a low environmental significance score.

1. Impacts that may result from the construction phase

Direct impacts: During the construction phase minor negative impacts are foreseen over the short term. The latter refers to a period of months. The installation of services may result in the loss or fragmentation of indigenous natural fauna and flora, loss or fragmentation of habitats, , impacts of the geology on the proposed development, soil erosion, hydrology, temporary noise disturbance, generation of waste, impacts on heritage objects, visual intrusions, increase in construction vehicle traffic, impact of construction workers on local communities, influx of job seekers, risk to safety, livestock and farm infrastructure, and increased risk of veld fires. It is obvious that the construction phase will also have a direct positive impact through the provision of employment opportunities for its duration and technical advice for local farmers and municipalities. The abovementioned impacts are discussed in more detail below:

- Loss or fragmentation of habitats – In terms of the vegetation type to which the site belongs, Ghaap Plateau Vaalbosveld (SVk 7), is not listed as threatened ecosystem according to the National List of Threatened Ecosystems (2011). Vegetation at the site is in fairly natural condition for the vegetation type, with some bare areas but in general a high cover of indigenous plant species. In some areas the dense concentrations of *Tarchonanthus camphoratus* at the site point to bush encroachment. Vegetation at the site is a savanna mostly characterised by a shrub-height layer of indigenous woody plant species. *Tarchonanthus camphoratus* (Camphor Bush) and *Grewia flava* (Wild Raisin) are in particular conspicuous at many parts of the proposed footprint with a mosaic of areas where the one is more abundant than the other. Most conspicuous of the taller trees is *Vachellia tortilis* (Umbrella Thorn tree). An alien invasive tree species *Prosopis glandulosa* (Honey Mesquite tree) occurs in some of the areas near the proposed footprint, but is absent (or if present, very scarce) at the proposed footprint. The ecological habitat survey (refer to Appendix H2) confirmed no loss of particularly sensitive or localised habitat type of particular conservation importance is anticipated if the site is developed. No loss of corridors or connectivity of ecosystems is anticipated if the proposed footprint is developed. Ecological sensitivity at the site is medium to low. Average abundance of Camel Thorn trees at the proposed footprint per hectare is 0.04 which gives an indication of the absence of this species at most of the proposed footprint.

Loss or fragmentation of habitats	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)

Probability	Definite (4)	Definite (4)
Duration	Permanent (4)	Permanent (4)
Magnitude	Medium (2)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2), since the condition of the natural vegetation appears to be moderate.	
Significance	Negative medium (36)	Negative low (18)
Can impacts be mitigated?	<p>If the development is approved, contractors must ensure that no mammalian species are disturbed, trapped, hunted or killed during the construction phase. If the development is approved, every effort should be made to confine the footprint to the blocks allocated for the development and have the least possible edge effects on the surrounding area. The EMPr also provides numerous mitigation measures.</p> <p>The potential impacts associated with damage to and loss of farmland should be effectively mitigated. The aspects that should be covered include:</p> <ul style="list-style-type: none"> • Exotic and invasive plant species should not be allowed to establish, if the development is approved, especially an alien invasive tree species such as <i>Prosopis</i>. • Two wetland features are located within close proximity to the site and a 200m buffer is being proposed to conserve the wetland features • The site should be fenced off prior to commencement of construction activities. • The footprint associated with the construction related activities (access roads, construction platforms, workshop etc.) should be confined to the fenced off area and minimised where possible; • An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase; • All areas disturbed by construction related activities, such as access roads on the site, construction platforms, workshop area etc., should be rehabilitated at the end of the construction phase; 	

	<ul style="list-style-type: none"> • The implementation of a rehabilitation programme should be included in the terms of reference for the contractor/s appointed. Specifications for the rehabilitation are provided throughout the EMPr. • The implementation of the Rehabilitation Programme should be monitored by the ECO.
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- Destruction of Avifaunal Habitat: Destruction of approximately 285ha of grassland which is presently in a reasonably good condition and which provides habitat for a variety of widespread bird species— no Red Data species are known, or is suspected, to utilize this piece of grassland frequently. Numerous birds will be displaced and active nests will be destroyed during the habitat clearance process. This displacement may cause temporary upheaval in the surrounding area (or places further afield) as the displaced males/pairs compete with established individuals elsewhere for territories.

Loss of avifaunal habitat habitats	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2), since no other projects are proposed in the area	
Significance	Negative low (15)	Negative low (9)
Can impacts be mitigated?	<ul style="list-style-type: none"> • The footprint of construction related activities should be limited to the site and minimised where possible. • Clearance of the habitat should be timed to fall outside the main breeding season of as many of the affected species as possible. The Breeding Index for Gamma indicates the period from April to July/August to be the most suitable period for the clearance of habitat. • Trees and scrubs earmarked for removal should be examined for active nests by a knowledgeable person as soon as the project is approved. If no nests are found, the plants should be removed immediately, even if clearance of the area is scheduled for a later 	

	date. If this proactive approach is followed, it will prevent birds from nesting in the trees/scrubs later, and if any active nests are found it will allow sufficient time for the birds to complete their breeding cycle before the plants must eventually be removed.
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- Loss of sensitive species – Sensitive species are regarded here as those listed and constitutes the flora and fauna that are threatened or of other particular high conservation importance. The presence or not of all the species listed in the tables were investigated during the survey. None of the threatened and near-threatened plant species are likely to occur on the site. Apart from one Declining plant species and a Protected Tree species (also listed as Declining), none of the other plant species of particular conservation priority are likely to occur on the footprint proposed for development. Average abundance of Camel Thorn trees at the proposed footprint per hectare is 0.04 which gives an indication of the absence of this species at most of the proposed footprint. A Declining plant species *Boophone disticha* (Poison Bulb) is present at the site but not in any large concentrations.

Loss of sensitive species	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Permanent (4)	Permanent (4)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2), since no threatened species occur on site.	
Significance	Negative low (15)	Negative low (9)
Can impacts be mitigated?	<p><u>Recommendation for <i>Vachellia erioloba</i>:</u> Recommendation for Camel Thorn trees at the site if the development is approved. It is recommended that a permit should be applied for at the relevant authorities in case any removal or damage of Camel Thorn trees. If <i>Vachellia erioloba</i> is impacted upon it is also recommended that new (from nursery) Camel Thorn trees could be planted on site outside the present footprint.</p> <p><u><i>Boophone disticha</i> (Poison Bulb):</u> If the development is approved individuals of the Declining plant species <i>Boophone disticha</i> need to be</p>	

	relocated to a suitable site nearby before the construction phase, this could be on site outside the proposed footprint. <i>Boophone disticha</i> (Poison Bulb) contains highly poisonous substances and the translocation operation should be done with necessary care.
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- Impacts to habitat connectivity and open space – The Ecological Fauna & Flore Habitat Survey (Appendix H2) confirm that Corridors and linkages of areas with similar habitat are present in the local district where a number of solar power plants are planned. No particular habitats of threatened species that are easily isolated (e.g. beetles with flightless females) are known to be impacted locally in the larger study area where a number of solar power plants are planned to be developed.

Impacts to habitat connectivity and open space	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Permanent (4)	Permanent (4)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2)	
Significance	Negative low (16)	Negative low (16)
Can impacts be mitigated?	<ul style="list-style-type: none"> • If the development is approved, establishment of exotic and invasive plant species should be avoided and where these have been found at the site continuous eradication should take place. • Alien invasive species could compromise conservation corridors and buffers. It is in particular declared alien invasive species such as <i>Prosopis glandulosa</i> (Honey Mesquite) that should not be allowed to establish. 	

- Loss of topsoil – Caused by: poor topsoil management (burial, erosion, etc) during construction related soil profile disturbance (levelling, excavations, disposal of spoils from excavations etc.) And having the effect of: loss of soil fertility on disturbed areas after rehabilitation. (Refer to Appendix H5 for the Agricultural and Soils Impact Assessment).

Loss of topsoil	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative

Geographical extent	Site (1)	Site (1)
Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal (2)	Marginal (2)
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative low (22)	Negative low (20)
Can impacts be mitigated?	<p>The Agricultural and Soils Impact Assessment (refer to Appendix H5) provides the following mitigation or management measures:</p> <ul style="list-style-type: none"> • If an activity will mechanically disturb below surface in any way, then any available topsoil should first be stripped from the entire surface and stockpiled for re-spreading during rehabilitation. • Topsoil stockpiles must be conserved against losses through erosion by establishing vegetation cover on them. • Dispose of all subsurface spoils from excavations where they will not impact on undisturbed land. • During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface. • Erosion must be controlled where necessary on top soiled areas. <p>Establish an effective record keeping system for each area where soil is disturbed for constructional purposes. These records should be included in environmental performance reports, and should include all the records below.</p> <ul style="list-style-type: none"> • Record the GPS coordinates of each area. • Record the date of topsoil stripping. • Record the GPS coordinates of where the topsoil is stockpiled. • Record the date of cessation of constructional (or operational) activities at the particular site. • Photograph the area on cessation of constructional activities. • Record date and depth of re-spreading of topsoil. 	

	<ul style="list-style-type: none"> • Photograph the area on completion of rehabilitation and on an annual basis thereafter to show vegetation establishment and evaluate progress of restoration over time.
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- Impacts of the geology on the proposed development – A brief preliminary geotechnical assessment was conducted in order to determine the area’s suitability for the proposed development of a photovoltaic plant. The entire site is underlain by shallow, hard dolomite bedrock, with a thin covering (0-30cm) of unconsolidated, sandy soil over most of the site. The bedrock outcrops in a few places. In the south eastern part of the site, the depth of unconsolidated, sandy soil overlying the bedrock is deeper at 40-60 cm. This is the area of Hutton soils shown in Figure 3. There is also a small area where secondary hardpan carbonate formation has taken place above the bedrock. This is the area of Coega soils. The foundations for mounting structures will therefore need to be erected in unconsolidated, sandy material at the surface with underlying hardpan or rock at between 0 and 60 cm below surface. According to the specialist the site should be regarded as suitable for the proposed development – refer to Appendix H5.

Geological impacts	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Probable (3)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Medium (2)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative low (16)	Negative low (16)
Can impacts be mitigated?	It is recommended that a detailed engineering geological investigation be conducted prior to construction and that site-specific precautionary measures be implemented.	

- Soil erosion – Erosion due to alteration of the land surface run-off characteristics. Alteration of run-off characteristics may be caused by construction related land surface disturbance, vegetation removal, presence of panel surfaces, and the establishment of hard standing areas and roads. Erosion will cause loss and deterioration of soil resources. The erosion risk is low due to the low slope gradients and low to moderate erodibility of the soils. (Refer to Appendix H5 for the Agricultural and Soils Impact Assessment).

Soil erosion	Pre-mitigation impact rating	Post mitigation impact rating

Status (positive or negative)	Negative	Negative
Geographical extent	Site (1)	Site (1)
Probability	Possible (2)	Unlikely (1)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal (2)	Marginal (2)
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative low (20)	Negative low (18)
Can impacts be mitigated?	<p>The Agricultural and Soils Impact Assessment (refer to Appendix H5) provides the following mitigation or management measures: Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.</p> <p>Include periodical site inspection in environmental performance reporting that inspects the effectiveness of the run-off control system and specifically records the occurrence any erosion on site or downstream.</p>	

- Generation of alternative land use income – Generation of alternative land use income through rental for energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve its financial sustainability. (Refer to Appendix H5 for the Agricultural and Soils Impact Assessment).

Generation of alternative land use income	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	
Geographical extent	Site (1)	
Probability	Definite (4)	
Duration	Long term (3)	
Magnitude	Medium (2)	
Reversibility	Completely reversible (1)	
Irreplaceable loss of resources	None (1)	
Cumulative impact	Low cumulative impact (1).	
Significance	Positive low (24)	
Can impacts be mitigated?	N/A	

- Impacts on the sites hydrology – The ecological habitat survey confirmed that there are no water features found on the site. For this reason, it is not foreseen that there will be any significant impacts on the hydrology of the site.

Hydrological impacts	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Unlikely (1)	Unlikely (1)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Low (1)
Reversibility	Barely reversible (3)	Barely reversible (3)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2). Should these impacts occur, there may be a cumulative impact on the hydrology of the area.	
Significance	Negative low (10)	Negative low (10)
Can impacts be mitigated?	The EMPr provides mitigation measures for the management of surface and groundwater – refer to tables 9, 14, and 15 of the EMPr in Appendix F.	

- Temporary noise disturbance - Construction activities will result in the generation of noise over a period of months. Sources of noise are likely to include vehicles, the use of machinery such as drills and people working on the site. The noise impact is unlikely to be significant; but construction activities should be limited to normal working days and hours (7:00 – 17:00).

Temporary noise disturbance	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1).	
Significance	Negative low (20)	Negative low (9)
Can impacts be mitigated?	Yes, management actions related to noise pollution are included in the EMPr.	

- Generation of waste - general waste, construction waste, sewage and grey water - The workers on site are likely to generate general waste such as food wastes, packaging, bottles, etc. Construction waste is likely to consist of packaging, scrap metals, waste cement, etc. The applicant will need to ensure that general and construction waste is appropriately disposed of i.e. taken to the nearest licensed landfill. Sufficient ablution facilities will have to be

provided, in the form of portable/VIP toilets. No pit latrines, French drain systems or soak away systems shall be allowed.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/district (2)	Local/district (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand for landfill space could result in significant cumulative impacts if services become unstable or unavailable, which in turn would negatively impact on the local community.	
Significance	Negative medium (13)	Negative low (13)
Can impacts be mitigated?	Yes, it is therefore important that all management actions and mitigation measures included in the EMPr are implemented.	

- Impacts on heritage objects** – In accordance with Section 38 of the NHRA, an independent heritage consultant was therefore appointed to conduct a Heritage Impact Assessment (HIA) to determine if any sites, features or objects of cultural heritage significance occur within the boundaries of the area where it is planned to develop the photovoltaic power plant. The Heritage Impact Assessment (Refer to Appendix H7) A number of stone tools dating to the MSA were identified along the rim of a small natural pan. Fortunately, this site is located outside the development and would therefore not be impacted on. No further action is therefore required. According to the Paleaontological Heritage Assessment, (refer to Appendix H7) Field assessment suggests Densely-packed, well-preserved stromatolite assemblages are recorded within the Boomplaas Formation carbonate rocks in a small area of low-relief bedrock exposure just west of the farmstead. A range of stromatolitic growth forms is represented here. The Boomplaas Formation stromatolites recorded in the Vryburg area represent some of the oldest examples of these microbially generated fossils in South Africa but they have yet to be comprehensively described while their stratigraphic and geographical distributions are poorly understood. Most of the Boomplaas Formation outcrop area on Champions Kloof 731 is mantled by soils and surface gravels of low palaeontological sensitivity. Stromatolitic horizons may be present within the underlying bedrocks but these are not easily accessible for scientific research and are in part protected by the superficial sediments above. The south-eastern portion of the Gamma study area is underlain by Permo-Carboniferous glacial deposits of the Dwyka Group (c. 300 million years old). The bedrocks, overlying soils and downwasted gravels are not palaeontologically sensitive. It is recommended that the small rocky area of Boomplaas Formation bedrocks west of the farmstead be excluded from the solar plant footprint, with a buffer zone of 20 m.

Impacts on heritage objects	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Probable (3)	Possible (2)
Duration	Permanent (4)	Short term (1)
Magnitude	Very high (4)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impact (2). Should these impacts occur, there may be a cumulative impact on the preservation of heritage objects in the area.	
Significance	Negative high (64)	Negative low (12)
Can impacts be mitigated?	If archaeological sites or graves are exposed during construction work, it should immediately be reported to a heritage practitioner so that an investigation and evaluation of the finds can be made. Also refer to the mitigation measures provided in the EMPR.	

- Temporary employment and other economic benefits (business opportunities and skills development) – Approximately 350 temporary job opportunities will be created to undertake the construction activities. It is likely that local construction companies with the necessary expertise to construct solar facilities will be partnered with. The construction period is expected to extend over a period of 18-24 months. During that period security personnel will also be required to work at the site particularly after working hours. It is also likely that some materials such as fencing, and other construction related consumables will be sourced locally.

Temporary employment and other economic benefits	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Province (3)	Province (3)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	High (3)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) - The community will have an opportunity to better their social and economic well-being, since they will have the opportunity to upgrade and improve skills levels in the area.	
Significance	Positive Medium (30)	Positive Medium (45)

<p>Can impacts be mitigated?</p>	<p>In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented:</p> <p><u>Employment</u></p> <ul style="list-style-type: none"> • Where reasonable and practical Gamma Solar Power Plant should appoint local contractors and implement a ‘locals first’ policy, especially for semi and low-skilled job categories. Due to the low skills levels in the area, the majority of skilled posts are likely to be filled by people from outside the area; • Where feasible, efforts should be made to employ local contractors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria; • Before the construction phase commences Gamma Solar Power Plant should meet with representatives from the NLM to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase. • The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures that Gamma Solar Power Plant intends following for the construction phase of the project. • Where feasible a training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase. • The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. <p><u>Business</u></p> <ul style="list-style-type: none"> • Gamma Solar Power Plant should liaise with the NLM with regards the establishment of a database of local companies, specifically BBBEE
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	<p>companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work;</p> <ul style="list-style-type: none"> • Where possible, Gamma Solar Power Plant should assist local BBBEE companies to complete and submit the required tender forms and associated information. • The NLM, in conjunction with the local business sector and representatives from the local hospitality industry, should identify strategies aimed at maximising the potential benefits associated with the project.
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- Visual intrusion - The Visual Impact Assessment (Refer to Appendix H5) concluded that the The main town of Vryburg is located within a basin like landform and 11km from the proposed development, thus limited visibility. Huhudi, one of Vryburg’s low cost residential areas will be the most sensitive area of Vryburg. It is located approximately 7.5km from the proposed development with an amsl of approximately 1206m. Kloof Educational Institution and the D1196 gravel road will be most sensitive to the proposed development due to close proximity to site. The majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period and the lifespan of the development.

Visual intrusion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Medium (2)
Reversibility	Barely reversible (1)	Partly reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	High cumulative impact (4). The construction of the PV facility may increase the cumulative visual impact together with farming activities, dust on gravel roads, existing Eskom power infrastructure and the 16 proposed solar power facilities in the area.	

Significance	Negative medium (30)	Negative low (28)
Can impacts be mitigated?	<p data-bbox="767 239 1364 432">Yes, mitigation is possible. Dust generation will be the main factor/problem during the construction phase. Due to the rather level terrain, mitigation measures will only solve the problem to a certain extent. Measures include:</p> <ul data-bbox="818 465 1364 1653" style="list-style-type: none"> <li data-bbox="818 465 1364 622">• Dust suppression will play an important role to minimise the visibility of dust. ☒ Contractors must avoid using roads not relevant to the project. <li data-bbox="818 633 1364 745">• Construction vehicle must limit travelling on nearby roads and in Vryburg during peak hours when possible. <li data-bbox="818 757 1364 869">• Contractors should try using public roads not used that often by the residents of Vryburg. <li data-bbox="818 880 1364 992">• Construction vehicles must limit traveling on surrounding roads and in Vryburg during peak hours when possible. <li data-bbox="818 1003 1364 1070">• New road construction must be avoided if possible. <li data-bbox="818 1081 1364 1149">• Good housekeeping should be implemented. <li data-bbox="818 1160 1364 1227">• Proper rehabilitation of disturbed areas after construction. <li data-bbox="818 1238 1364 1350">• Risk assessments relating to fire hazards, “No Smoking” signs and the implementation of smoking areas. <li data-bbox="818 1361 1364 1563">• Proper firefighting equipment should be available on site. Not only fire extinguishers but also equipment like a water truck which can store large amounts of water. <li data-bbox="818 1574 1364 1641">• Partial screening is possible by adding indigenous flora. 	

Indirect impacts: The nuisance aspects generally associated with the installation of infrastructure will also be applicable to this development, which relates primarily to the increase in construction vehicle traffic, impacts of construction workers on local communities, the influx of job seekers to the area, risk to safety, livestock and farm infrastructure, and increased risk of veld fires.

- Technical advice for local farmers and municipalities - The establishment of a Solar PV plant in the area creates an opportunity for the technical staff involved in the project to provide local farmers in the area with advice regarding the installation of solar energy technology to

supplement their current and future energy needs. A number of farmers indicated that they would appreciate assistance in this regard in the form of expert opinion as to what type of solar technologies would be best suited to meet their needs and how best to install solar energy installations on their farms. This could be achieved via a workshop / discussion with the local farmers in the area. Local municipalities would also benefit from the knowledge of technical staff involved in the establishment of the project.

Technical advice for local farmers and municipalities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (1)	Local (1)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	Low (1)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2) – Positive cumulative impact associated with reduced reliance on coal generated energy and move towards renewable energy.	
Significance	Positive Low (10)	Positive Low (20)
Can impacts be mitigated?	Gamma Solar Power Plant in consultation with the contractor should hold a workshop/s with local farmers and representatives from NLM to discuss options for installing solar energy facilities and the technology and costs involved.	

- Increase in construction vehicle traffic – Building materials and infrastructure will be transported to site on a daily basis and there will be an increase in construction vehicles on access roads. The movement of heavy construction vehicles during the construction phase has the potential to damage local farm roads and create dust and safety impacts for other road users in the area. Access will be obtained via a local gravel road of the R34. While the volume of traffic along this road is low, the movement of heavy vehicles along this road is likely to damage the road surface and impact on other road users. The contractor should be required to ensure that damage to the road is repaired before the handover of the project.

Increase in construction vehicle traffic	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)

Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3). If damage to roads is not repaired, then this will affect the farming activities in the area and result in higher maintenance costs for vehicles of local farmers and other road users. The costs will be borne by road users who were no responsible for the damage.	
Significance	Negative low (22)	Negative low (11)
Can impacts be mitigated?	<p>The potential impacts associated with heavy vehicles can be effectively mitigated. The mitigation measures include:</p> <ul style="list-style-type: none"> • The contractor must ensure that damage caused by construction related traffic to the gravel access road off the R34 is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor; • Dust suppression measures must be implemented for heavy vehicles such as wetting of gravel roads on a regular basis and ensuring that vehicles used to transport sand and building materials are fitted with tarpaulins or covers; • All vehicles must be road-worthy and drivers must be qualified and made aware of the potential road safety issues and need for strict speed limits. 	

- Impact of construction workers on local communities - The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks.

Impacts of construction workers on local communities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (1)	Local (1)
Probability	Probable (3)	Probable (3)

Duration	Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STDs etc. (4)	Short term for community as a whole (1) Long term-permanent for individuals who may be affected by STDs etc. (4)
Magnitude	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)	Low for the community as a whole (4) High-Very High for specific individuals who may be affected by STDs etc. (10)
Reversibility	Completely reversible (1) but not in case of HIV and AIDS	Completely reversible (1) but not in case of HIV and AIDS
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative effects (3), impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	
Significance	Low for the community as a whole (13) Medium for specific individuals who may be affected by STDs etc. (52)	Low for the community as a whole (13) Medium for specific individuals who may be affected by STDs etc. (52)
Can impacts be mitigated?	<p>Yes, the potential risks associated with construction workers can be effectively mitigated. The detailed mitigation measures are outlined in the Environmental Management Programme (EMPr) for the Construction Phase. Aspects that should be covered include:</p> <ul style="list-style-type: none"> • Where possible Sobesie Solar Power Plant should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories; 	

	<ul style="list-style-type: none"> • Gamma Solar Power Plant should consider the need for establishing a Monitoring Forum (MF) in order to monitor the construction phase and the implementation of the recommended mitigation measures. The MF should be established before the construction phase commences, and should include key stakeholders, including representatives from the NLM, farmers and the contractor(s). The MF should also be briefed on the potential risks to the local community and farm workers associated with construction workers; • Gamma Solar Power Plant and the contractor(s) should, in consultation with representatives from the MF, develop a code of conduct for the construction phase. The code should identify which types of behaviour and activities are not acceptable. Construction workers in breach of the code should be dismissed. All dismissals must comply with the South African labour legislation; • Gamma Solar Power Plant and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase; • The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area; • The contractor should provide transport to and from the site on a daily basis for low and semi-skilled construction workers. This will enable the contractor to effectively manage and monitor the movement of construction workers on and off the site; • Where necessary, the contractors should make the necessary arrangements to enable low and semi-skilled workers from outside the area to return home over weekends and/ or on a regular basis. This would reduce the risk posed to local family structures and social networks; • It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.
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- Influx of job seekers - Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become “economically stranded” in the area or decide to stay on irrespective of finding a job

or not. While the proposed Gamma facility on its own does not constitute a large construction project, other facilities are proposed near Vryburg. When considered together these facility projects may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the manner in which they conduct themselves can impact on the local community.

Influx of job seekers	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative effects (3), Impacts on family and community relations that may, in some cases, persist for a long period of time. Also in cases where unplanned / unwanted pregnancies occur or members of the community are infected by an STD, specifically HIV and or AIDS, the impacts may be permanent and have long term to permanent cumulative impacts on the affected individuals and/or their families and the community.	
Significance	Negative low (22)	Negative low (11)
Can impacts be mitigated?	It is not possible to prevent job seekers from coming to the area in search of a job. The potential influx of job seekers to the area as a result of the proposed Gamma Solar Power Plant facility and other projects is likely to be low. The following mitigation measures are proposed: <ul style="list-style-type: none"> • Gamma Solar Power Plant should implement a “locals first” policy, specifically with regard to unskilled and low skilled opportunities; • Gamma Solar Power Plant should implement a policy that no employment will be available at the gate. 	

- Risk to safety, livestock and farm infrastructure - The presence on and movement of construction workers on and off the site poses a potential safety threat to local farmer's and farm workers in the vicinity of the site threat. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or

fences being damaged or stock theft linked either directly or indirectly to the presence of farm workers on the site.

Risk to safety, livestock and farm infrastructure	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Negligible cumulative effects (1), provided losses are compensated for.	
Significance	Negative low (22)	Negative low (11)
Can impacts be mitigated?	<p>Key mitigation measures include:</p> <ul style="list-style-type: none"> • Gamma Solar Power Plant should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences; • The construction area should be fenced off prior to the commencement of the construction phase. The movement of construction workers on the site should be confined to the fenced off area; • Contractors appointed by Gamma Solar Power Plant should provide daily transport for low and semi-skilled workers to and from the site. This would reduce the potential risk of trespassing on the remainder of the farm and adjacent properties; • Gamma Solar Power Plant should consider the option of establishing a MF (see above) that includes local farmers and develop a Code of Conduct for construction workers. This committee should be established prior to commencement of the construction phase. The Code of Conduct should be signed by the proponent and the contractors before the contractors move onto site; • Gamma Solar Power Plant should hold contractors liable for compensating farmers in full for any stock losses and/or damage to farm infrastructure that can be linked to construction workers. This should 	

	<p>be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover loses and costs associated with fires caused by construction workers or construction related activities (see below);</p> <ul style="list-style-type: none"> • The Environmental Management Programme (EMPr) should outline procedures for managing and storing waste on site, specifically plastic waste that poses a threat to livestock if ingested; • Contractors appointed by Gamma Solar Power Plant must ensure that all workers are informed at the outset of the construction phase of the conditions contained on the Code of Conduct, specifically consequences of stock theft and trespassing on adjacent farms. • Contractors appointed by Gamma Solar Power Plant must ensure that construction workers who are found guilty of trespassing, stealing livestock and/or damaging farm infrastructure are dismissed and charged. This should be contained in the Code of Conduct. All dismissals must be in accordance with South African labour legislation; • The housing of construction workers on the site should be strictly limited to security personnel.
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- Increased risk of veld fires - The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could in turn pose a threat to livestock, crops, wildlife and farmsteads in the area. In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. The potential risk of grass fires was heightened by the windy conditions in the area, especially during the dry, windy winter months from May to October. In terms of potential mitigation measures, fire-breaks should be constructed around the perimeter of the site prior to the commencement of the construction phase. In addition, fire-fighting equipment should be provided on site during the construction phase.

Increased risk of veld fires	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Region (3)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Medium term (2)	Short term (1)
Magnitude	High (3)	Low (1)

Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Negligible cumulative effects (1), provided losses are compensated for.	
Significance	Negative medium (33)	Negative low (9)
Can impacts be mitigated?	<p>The mitigation measures include:</p> <ul style="list-style-type: none"> • Gamma Solar Power Plant should enter into an agreement with the local farmers in the area whereby damages to farm property etc. during the construction phase will be compensated for. The agreement should be signed before the construction phase commences; • A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase; • Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas; • Contractor to ensure that construction related activities that pose a potential fire risk, such as welding, are properly managed and are confined to areas where the risk of fires has been reduced. Measures to reduce the risk of fires include avoiding working in high wind conditions when the risk of fires is greater. In this regard special care should be taken during the high risk dry, windy winter months; • Contractor to provide adequate firefighting equipment on-site, including a fire fighting vehicle; • Contractor to provide fire-fighting training to selected construction staff; • No construction staff, with the exception of security staff, to be accommodated on site over night; • As per the conditions of the Code of Conduct, in the advent of a fire being caused by construction workers and or construction activities, the appointed contractors must compensate farmers for any damage caused to their farms. The contractor should also compensate the firefighting costs borne by farmers and local authorities. 	

2. Impacts that may result from the operational phase

Direct impacts: During the operational phase the study area will serve as an electricity generation facility and the impacts are generally associated with soil erosion, change in land use, impacts associated with the surrounding land uses, increase in storm water runoff, increased consumption of water, visual intrusion, the generation of general waste, leakage of hazardous materials, and the change in the sense of place. The operational phase will also have a direct positive impact through the provision of permanent employment opportunities, the generation of additional electricity, the establishment of a community trust, financial implication to tourism in the area, and the development of infrastructure for the generation of clean, renewable energy. The abovementioned impacts are discussed in more detail below:

- **Avifaunal fatalities:** Operational PV facilities are known to cause fatalities among birds (Walston et al. 2015). One of the possible mechanism involve the glare, in combination with other characteristics, of PV panels which is interpreted by birds as coming from a wetland; this hypothesis still needs to be tested experimentally. Furthermore, PV panels, a known source of polarized light pollution (PLP), attract polarotactic insects, especially aquatic taxa, which in turn is known to attract terrestrial, aquatic and aerial avian predators. This is likely to cause birds to come into close contact with the PV arrays and may result in collisions with the PV arrays and associated infrastructure. Ecological light pollution (ELP) caused by security lighting may have a similar effect. In addition, ELP is known to attract nocturnal migrating birds and at least one of the species which could potentially occur in the Gamma Solar Power Plant, the Harlequin Quail R201 are known for this (Taylor 2005).

Avifaunal fatalities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Regional (3)	Regional (3)
Probability	Probable (3)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Barely reversible (3)	Barely reversible (3)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (2), since no other projects are proposed in the area	
Significance	Negative medium (34)	Negative medium (34)
Can impacts be mitigated?	<ul style="list-style-type: none"> • Implement a bird monitoring program (BMP) for Gamma Solar Power Plant. • Theoretically speaking, a continuous set of PV panels may be more likely to be confused with a large water body than would panels with spaces between them. The latter option would be preferable and should be included in the 	

	<p>selection criteria of the final design of the Gamma Solar PV arrays.</p> <ul style="list-style-type: none"> Increasing the fragmentation of polarizing surfaces on PV panels by a non-polarizing white grid has been shown to reduce the attractiveness of PV solar panels to polarotactic insects 10- to 26-fold. This could potentially make the PV facility less attractive to predators such as birds. In addition, the white markings alone may be sufficient to alerting birds of the presence of the panels, especially if they are spaced close together (10 cm). Therefore, if excessive mortality is recorded among birds during the BMP, corrective actions should include the installation of non-polarizing white grids over the PV panel arrays.
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- Nesting for birds:** Birds may use the PV arrays and fencing for nesting, perching and shade. Nests can potentially interfere with the workings of the panels or create a fire hazard, and bird droppings may have a negative impact on the effectiveness of the PV panels. The Common Myna R758 and House Sparrow R801 are both Category 3 introduced invasive species (National Environmental Management: Biodiversity Act (10 of 2004): Alien and Invasive Species List (2014). The proposed PV facility, which falls well within their respective current ranges, is likely to provide suitable nesting habitat for them. PLP & ELP both attract insect which in turn can be a good food source for birds. However, this can ultimately have a negative impact on the birds.

Avifaunal fatalities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Negative
Extent	Site (1)	Regional (3)
Probability	Probable (3)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Completely reversible (1)	Barely reversible (3)
Irreplaceable loss of resources	No loss (1)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3), since no other projects are proposed in the area	
Significance	Positive low (24)	Negative medium (30)
Can impacts be mitigated?	<ul style="list-style-type: none"> Avoid the use of lattice-type structures in order to minimize perching and nesting opportunities; 	

	<ul style="list-style-type: none"> • Minimize standing water. This will make it more difficult for the two swallow species to obtain mud for their nests. In addition, it will help to minimize the risk of large congregations of birds near the PV arrays. • Inspect each PV module at least once a month throughout the year for any nest-building activity. This can be accomplished by the staff working at the facility during other routine maintenance activities. However, they will first need basic training in order to ensure that they know what to look for and how to fill in the Bird Incident Forms • Remove nesting material when it appears, but only if it would interfere with the operation of the PV module and/or create a fire risk. In cases where a species other than the six indicated above is involved, permission should first be obtained from the person responsible for the BMP or local nature conservation authorities. If the surveys for nests are done regularly (at least once a month), then it would help minimize the risk of eggs or nestling being involved.
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- Soil erosion – The largest risk factor for soil erosion will be during the operational phase when storm water run-off from the surfaces of the photovoltaic panels will cause erosion. Erosion will be localised within the site boundary but will have a permanent effect that would stretch into the operational phase of the project. This will ultimately lead to the irretrievable commitment of this resource. The measurable effect of reducing erosion by utilizing mitigation measures may reduce possible erosion significantly (refer to Appendix H5 for the Agricultural and Soils Impact Assessment).

Soil erosion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Geographical extent	Site (1)	Site (1)
Probability	Possible (2)	Unlikely (1)
Duration	Medium term (2)	Medium term (2)
Magnitude	Medium (2)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal (2)	Marginal (2)
Cumulative impact	Negligible cumulative impact (1).	
Significance	Negative low (20)	Negative low (18)

Can impacts be mitigated?	<p>The Agricultural and Soils Impact Assessment (refer to Appendix H5) provides the following mitigation or management measures: Implement an effective system of run-off control, where it is required, that collects and safely disseminates run-off water from all hardened surfaces and prevents potential down slope erosion.</p> <p>Include periodical site inspection in environmental performance reporting that inspects the effectiveness of the run-off control system and specifically records the occurrence any erosion on site or downstream.</p>
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- Generation of alternative land use income – Generation of alternative land use income through rental for energy facility. This will provide the farming enterprise with increased cash flow and rural livelihood, and thereby improve its financial sustainability. (Refer to Appendix H5 for the Agricultural and Soils Impact Assessment).

Generation of alternative land use income	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	
Geographical extent	Site (1)	
Probability	Definite (4)	
Duration	Long term (3)	
Magnitude	Medium (2)	
Reversibility	Completely reversible (1)	
Irreplaceable loss of resources	None (1)	
Cumulative impact	Low cumulative impact (1).	
Significance	Positive low (24)	
Can impacts be mitigated?	N/A	

- Change in land-use – The use of the area for the construction and operation of the PV plant will result in the area not being used for livestock grazing anymore. Land capability is the combination of soil suitability and climate factors. The site and surrounds has a land capability classification, on the 8 category scale, of Class 5 – non-arable, moderate potential grazing land. The limitations to agriculture are both climate and soil related. The moisture availability class 4 classification, with high variability of rainfall is a severe limitation to cultivation, which is not viable without irrigation. The low water holding capacity of the soils and their limited depth further limits the dryland potential. Potential maize yield on AGIS (Schulz) is given as low at 1.51 tons per hectare and (ISCW) is given as marginal (30%). The grazing capacity is given as ranging from 11 to 17 hectares per large stock unit. Because of the climate limitations, lack of access to water for irrigation, and soils with limited depth and limited water holding capacity, the site is not suitable for cultivated crops, and viable agricultural land use is limited to grazing only.

Change in land use	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Low cumulative impacts (2). Overall loss of farmland could affect the livelihoods of the affected farmers, their families, and the workers on the farms and their families. However, disturbed areas can be rehabilitated.	
Significance	Negative low (13)	Negative low (13)
Can impacts be mitigated?	The proponent should investigate the option of establishing a Rehabilitation Fund to be used to rehabilitate the area once the proposed facility has been decommissioned. The fund should be funded by revenue generated during the operational phase of the project. The motivation for the establishment of a Rehabilitation Fund is based on the experience from the mining sector where many mines on closure have not set aside sufficient funds for closure and decommissioning.	

- Increase in storm water runoff – The development will potentially result in an increase in storm water run-off that needs to be managed to prevent soil erosion, especially where vegetation will be cleared. Storm water canals will be designed into which the water from the panels can be channeled. These canals should reduce the speed of the water and allow the water to drain slowly onto the land. Vegetation corridors should be maintained within the subject area.

Increase in storm water runoff	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Probable (3)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)

Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3) - Should these impacts occur, there will be a cumulative impact on the wider area.	
Significance	Negative medium (30)	Negative low (13)
Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in the EMPr are implemented to ensure that these impacts do not occur.	

- Increased consumption of water - Approximately 3,880,000 liters of water per annum will be required for the operation of the solar plant. Cleaning will take place once every quarter. The water will be sourced from groundwater sources.

Increased consumption of water	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Region (3)	Region (3)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	Marginal loss of resources (2)	Marginal loss of resources (2)
Cumulative impact	High cumulative impacts (4) - An additional demand on water sources could result in a significant cumulative impact with regards to the availability of water.	
Significance	Negative medium (40)	Negative medium (40)
Can impacts be mitigated?	Yes, management actions and mitigation measures related to the use of water are included in the EMPr.	

- Visual intrusion - The Visual Impact Assessment (Refer to Appendix H5) concluded that The main town of Vryburg is located within a basin like landform and 11km from the proposed development, thus limited visibility. Huhudi, one of Vryburg's low cost residential areas will be the most sensitive area of Vryburg. It is located approximately 7.5km from the proposed development with an amsl of approximately 1206m. Regarding service development, the N18 national road, the Cape to Cairo railway line, Tiger Kloof Educational Institution and the D1196 gravel road will be most sensitive to the proposed development due to close proximity to site. The majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period and

the lifespan of the development. The Visual Impact Assessment also stated that it is important to note that this facility has an advantage over other more conventional power generating plants (e.g. coal-fired power stations). The facility utilises a renewable source of energy (considered as an international priority) to generate power and is therefore generally perceived in a more favorable light.

Visual intrusion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Barely reversible (3)	Barely reversible (3)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	High cumulative impact (4). The operation of the plant may increase the cumulative visual impact together with dust from the nearby gravel roads, farming activities, existing Eskom power infrastructure and the 16 proposed solar power facilities in the area.	
Significance	Negative medium (34)	Negative low (34)
Can impacts be mitigated?	<p>Yes, mitigation measures are included in the visual impact assessment study and the EMP. The VIA recommends the following mitigation measures:</p> <ul style="list-style-type: none"> • Mitigation of lighting impacts includes the pro-active design, planning and specification lighting for the facility by a lighting engineer. Security lighting should make use of down-lights to minimise light spill, and motion detectors where possible so that lighting at night is minimised. • Good housekeeping should be implemented. • Risk assessments relating to fire hazards, “No Smoking” signs and the implementation of smoking areas. • Proper firefighting equipment should be available on site. Not only fire extinguishers but also equipment like a water truck which can store large amounts of water. 	

	<ul style="list-style-type: none"> Partial screening is possible by adding and maintaining indigenous flora.
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- Generation of waste - Security guards will be stationed at the solar facility 24 hours a day and 7 days a week. Sources of general waste will be waste food, packaging, paper, etc. General waste will be stored on the site and removed on a weekly basis. The proposed development will use the municipality for waste removal. The Local Municipality still has to confirm that the dumping site has the capacity to accommodate the additional waste generated by the employees working at the Solar Power Plant

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand for landfill space could result in significant cumulative impacts with regards to the availability of landfill space.	
Significance	Negative low (15)	Negative low (15)
Can impacts be mitigated?	Yes, management actions related to waste management are included in the EMPr.	

- Leakage of hazardous materials - The proposed development will comprise of a distribution substation and will include transformer bays which will contain transformer oils. Leakage of these oils can contaminate water supplies and must be prevented by constructing oil bunds to ensure that any oil spills are suitably attenuated and not released into the environment.

Leakage of hazardous materials	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Unlikely (1)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	Marginal loss of resource (2)	Marginal loss of resource (2)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	

Significance	Negative medium (36)	Negative low (22)
Can impacts be mitigated?	Yes. It is therefore important that all management actions and mitigation measures included in the EMPr are implemented to ensure that these impacts do not occur.	

- Permanent employment - Based on information from estimated global employment ratios per MW of solar PV installed (viz. 0.7 direct long term opportunities/ MW), the proposed development would create ~ 50 employment opportunities for over a 20-year period.

Permanent employment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2) – Creation of permanent employment and skills and development opportunities for members of the local community and creation of additional business and economic opportunities in the area.	
Significance	Negative Medium (30)	Negative Medium (30)
Can impacts be mitigated?	<p>The enhancement measures listed for the temporary employment opportunities during the construction phase to enhance local employment and business opportunities, also apply to the operational phase. In addition:</p> <ul style="list-style-type: none"> • Gamma Solar Power Plant should implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African's and locals employed during the operational phase of the project; • Gamma Solar Power Plant, in consultation with the NLM, should investigate the options for the establishment of a Community Development Trust. 	

- Generation of additional electricity - The photovoltaic effect of the panels will generate electricity that will be fed into the Mookodi-Magopela 132.0 [kV] line. The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).

Generation of additional electricity	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Medium (2)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Low cumulative impact (2) - The evacuation of generated electricity into the Eskom grid will strengthen and stabilize the grid (especially in the local area).	
Significance	Positive medium (30)	Positive medium (30)
Can impacts be mitigated?	No mitigation measure required.	

- Establishment of a Community Trust - In terms of the Request for Proposal document prepared by the Department of Energy all bidders for operating licences for renewable energy projects must demonstrate how the proposed development will benefit the local community. This can be achieved by establishing a Community Trust which is funded by revenue generated from the sale for energy. Community Trusts provide an opportunity to generate a steady revenue stream that is guaranteed for a 20-year period. This revenue can be used to fund development initiatives in the area and support the local community. The long term duration of the revenue stream also allows local municipalities and communities to undertake long term planning for the area. The revenue from the proposed plant can be used to support a number of social and economic initiatives in the area.

Establishment of a community trust	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	High (3)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) - promotion of social and economic development and	

	improvement in the overall well-being of the community.	
Significance	Positive medium (30)	Positive medium (48)
Can impacts be mitigated?	<p>In order to maximise the benefits and minimise the potential for corruption and misappropriation of funds the following measures should be implemented:</p> <ul style="list-style-type: none"> • The NLM should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the NLM that should be consulted include the Municipal Managers Office, IDP Manager and LED Manager. • Clear criteria for identifying and funding community projects and initiatives in the area should be identified. The criteria should be aimed at maximising the benefits for the community as a whole and not individuals within the community; • Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the plant. 	

Indirect impacts: The operational phase will have an indirect negative impact through the change in the sense of place and an indirect positive impact through the provision of additional electrical infrastructure.

- Change in the sense of place – The components associated with the proposed facility will have a visual impact and, in so doing, impact on the landscape and rural sense of the place of the area. The industrial development is likely to be sensitive to the proposed development. Eskom staff doing maintenance work on the power lines will be most sensitive to the development due to the close proximity of the lines to site. Vryburg’s industrial zone is 9km to the north west with a high level of existing screening between the zone and proposed development. The majority of the affected area falls within the agricultural development area. A small amount of nearby farmsteads will be affected for the duration of the construction period and the lifespan of the development.. The impact of the proposed SPP on the areas sense of place with mitigation is therefore likely to be low.

Change in sense of place	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)

Probability	Probable (3)	Probable (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (1)	Low (1)
Reversibility	Reversible (2)	Reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	High cumulative impact (4). The operation of the plant may increase the cumulative visual impact together with dust from the nearby gravel roads, farming activities, existing Eskom power infrastructure and the 16 proposed solar power facilities in the area.	
Significance	Negative low (16)	Negative low (16)
Can impacts be mitigated?	Yes, mitigation measures relating to visual impacts are included in the EMPr. The recommendations contained in the VIA should also be implemented – refer to previous discussions on visual impacts.	

- Potential impact on tourism – The tourism sector is regarded as an important economic sector in the NWP and NLM. The tourism potential of the area is linked to the areas natural resources, including the relatively undisturbed scenery and landscape. The proposed SPP on the areas sense of place with mitigation is likely to be low. In addition, the site will not be visible from or impact on the Treasure Corridor associated with the N12, 14 and 18. The impact of the proposed SPP on the tourism potential of the area and the NLM and NWP is therefore likely to be low. In some instances, the SPP may attract tourists to the area. However, the significance of this potential benefit is also rated as low positive.

Potential impacts on tourism	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)	Negative (Potential to distract from the tourist experience of the area) Positive (Potential to attract people to the area)
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Long term (4)	Long term (4)
Magnitude	Low (2) (Applies to both – and +)	Low (2) (Applies to both – and +)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	N/a	N/a

Cumulative impact	Cumulative impact (4) The proposed SPP is one of 16 SPPs proposed, located in the vicinity of Vryburg in the NLM.	
Significance	Negative & Positive medium (30)	Negative & Positive medium (30)
Can impacts be mitigated?	The recommendations contained in the VIA should be implemented – refer to previous discussions on visual impacts.	

- Development of infrastructure for the generation of clean, renewable energy - South Africa currently relies on coal-powered energy to meet more than 90% of its energy needs. Much of the coal used has high sulphur content. As a result, South Africa is the nineteenth largest per capita producer of carbon emissions in the world, and Eskom, as an energy utility, has been identified as the world's second largest producer carbon emissions. The overall contribution to South Africa's total energy requirements of the proposed facility is relatively small. However, the 115 MW produced will help to offset the total carbon emissions associated with energy generation in South Africa. Given South Africa's reliance on Eskom as a power utility, the benefits associated with an IPP based on renewable energy are regarded as an important contribution.

Development of infrastructure for the generation of clean, renewable energy	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	National (4)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Irreversible (4)	Irreversible (4)
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	Medium cumulative impact (3) Reduce carbon emissions via the use of renewable energy and associated benefits in terms of global warming and climate change.	
Significance	Positive low (18)	Positive low (18)
Can impacts be mitigated?	<p>The establishment of the proposed facility is a mitigation measure in itself. In order to maximise the benefits of the proposed project Gamma Solar Power Plant should:</p> <ul style="list-style-type: none"> • Use the project to promote and increase the contribution of renewable energy to the national energy supply; 	

	<ul style="list-style-type: none"> • Maximise the public’s exposure to the project via an extensive communication and advertising programme; • Implement a training and skills development programme for locals during the first 5 years of the operational phase. The aim of the programme should be to maximise the number of South African’s employed during the operational phase of the project.
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3. Impacts that may result from the decommissioning and closure phase

Direct impacts: Typically, the major social impacts associated with the decommissioning phase are linked to the loss of jobs and associated income. This has implications for the households who are directly affected, the communities within which they live, and the relevant local authorities. However, in the case of the proposed facility the decommissioning phase is likely to involve the disassembly and replacement of the existing components with more modern technology. This is likely to take place in the 20 - 25 years post commissioning. The decommissioning phase is therefore likely to create additional, construction type jobs, as opposed to the jobs losses typically associated with decommissioning. If infrastructures are removed after a 20/25-year period, the site will be returned to its natural state. Therefore, the physical environment will benefit from the closure of the solar facility.

- Rehabilitation of the physical environment – The physical environment will benefit from the closure of the solar facility since the site will be restored to its natural state.

Rehabilitation of the physical environment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Positive	Positive
Extent	Site (1)	Site (1)
Probability	Possible (2)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Medium (2)
Reversibility	N/A	N/A
Irreplaceable loss of resources	N/A	N/A
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative low (7)	Negative low (16)
Can impacts be mitigated?	No mitigation measures required.	

- Generation of waste - The panels contain material that may be hazardous in nature if released into the environment. If the panels are intact, there will be no risk of exposure. The removal of the supporting infrastructure such as the concrete foundations, cabling, fencing and control rooms, etc. will generate waste. Some of the waste will where possible be recycled, for example steel support structures can be re-used elsewhere or melted down to form new products. The amount of waste will be limited and is not expected to significantly reduce the capacity of the local landfill. However, the project is estimated to last for 20-25 years and the

current licensed landfill sites near Vryburg (such as Hoopstad, Vryburg, Wolmaranstad, Wesselsbron, Warrenton or Welkom), may at that stage (or sooner) reach its capacity. The applicant will need to assess the project lifespan and make suitable arrangements for waste disposal when the site is decommissioned.

Generation of waste	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Definite (4)	Definite (4)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Irreversible (4)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Medium cumulative impact (3) - An additional demand on municipal services could result in significant cumulative impacts with regards to the availability of landfill space.	
Significance	Negative medium (45)	Negative low (26)
Can impacts be mitigated?	Yes –there are mitigation measures in the EMPr.	

- Loss of employment - Given the relatively large number of people employed during the operational phase, the decommissioning of the facility has the potential to have a negative social impact on the local community. However, the potential impacts associated with the decommissioning phase can also be effectively managed with the implementation of a retrenchment and downscaling programme.

Loss of employment	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Possible (2)
Duration	Medium term (2)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	The impact would result in negligible to no cumulative effects (1)	
Significance	Negative medium (30)	Negative low (18)
Can impacts be mitigated?	<p>The following mitigation measures are recommended:</p> <ul style="list-style-type: none"> • Gamma Solar Power Plant should ensure that retrenchment packages are provided for all 	

	<p>staff retrenched when the facility is decommissioned.</p> <ul style="list-style-type: none"> • All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning; • Gamma Solar Power Plant should investigate the option of establishing an Environmental Rehabilitation Trust Fund to cover the costs of decommissioning and rehabilitation of disturbed areas. The Trust Fund should be funded by a percentage of the revenue generated from the sale of energy to the national grid over the 20-year operational life of the facility. The rationale for the establishment of a Rehabilitation Trust Fund is linked to the experiences with the mining sector in South Africa and failure of many mining companies to allocate sufficient funds during the operational phase to cover the costs of rehabilitation and closure.
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Indirect impacts: No indirect impacts are anticipated from the decommissioning phase of the proposed development.