

## APPENDIX F4 - 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 indicate 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, disturbance of soils and existing land use (soil compaction), physical and chemical degradation of the soils by construction vehicles, impacts of the geology on the proposed development, 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 grass fires. The construction phase will also have a direct positive impact through the provision of employment opportunities for its duration. The abovementioned impacts are discussed in more detail below:

- Loss or fragmentation of indigenous natural fauna and flora – The study site is located in the savanna vegetation biome which is represented by the Ghaap Plateau Vaalbosveld vegetation type (Mucina & Rutherford 2006). Ghaap Plateau Vaalbosveld is listed as a least threatened ecosystem (refer to Appendix D3 for the fauna and flora habitat survey). The ecological habitat survey confirmed that a moderate diversity of indigenous plant species and animal species appears to be present at the site proposed for development. The site does consist of natural areas which are considered of very high conservation importance. Any potential impact of the activity must thus be able to be mitigated or avoided completely. Local migrations of fauna in the area may be affected by linear infrastructure, fences and buildings, due to these areas forming a barrier to migrating animals. This impact is likely to be low due to the greatly reduced wildlife in the area due to previous disturbances in the area causing a greatly reduced species. There is a possibility of protected tree species occurring at the site due to the identification of such species within the surrounding areas.

Loss or fragmentation of indigenous natural fauna and flora	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Definite (4)	Possible (2)
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	There are a number of solar facilities planned in the vicinity of Vryburg as well as throughout the province. All these areas have been cleared and servitudes are maintained and vegetation clearing	

	conducted as fire breaks there will thus be a cumulative impact in the area (3).	
<b>Significance</b>	<b>Negative medium (30)</b>	<b>Negative (15)</b>
Can impacts be mitigated?	<p>If the development is approved, contractors must ensure that no animal species are disturbed, trapped, hunted or killed during the construction phase. The EMPr also provides numerous mitigation measures – refer to table 17 of the EMPr Appendix F.</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"> <li>• The site should be fenced off prior to commencement of construction activities;</li> <li>• 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;</li> <li>• An Environmental Control Officer (ECO) should be appointed to monitor the establishment phase of the construction phase;</li> <li>• 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;</li> <li>• 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 – refer to Appendix F.</li> <li>• The implementation of the Rehabilitation Programme should be monitored by the ECO.</li> </ul>	

- Loss or fragmentation of habitats – Of the seven fauna species of concern that may occur in the study area, 1 has low probability of occurrence, 5 have a medium probability of occurrence and one has a high probability of occurrence. Three of the species with a high probability of occurrence, the Black-necked spitting Cobra, Maccoa Duck and Lanner Falcon, were recorded during the study. A relatively large (depression) wetland is located in the south western eastern corner of the property. In order to maintain their integrity and ecological functions, sufficient buffer areas, approximately 200m around these wetland bodies should be maintained in natural or semi-natural condition. (refer to Appendix D3 for the fauna and flora ecological habitat survey).

<b>Loss or fragmentation of habitats</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
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 other projects are proposed in the area	
<b>Significance</b>	<b>Negative low (15)</b>	<b>Negative low (9)</b>
Can impacts be mitigated?	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. The EMPr also provides numerous mitigation measures related to flora– refer Appendix G.	

- **Destruction of Avifaunal Habitat:** It was determined that avifauna diversity in the area is high with approximately 332 avifauna species occurring in the region. Of these species 8 (6%) area listed as endemic and 26 (7%) are listed as being Red Data species. During the study, avifauna species diversity and abundance was low with only 39 species being during the site visit. Red Data species, which may occur in the study area, are discussed and listed in Appendix D2. Although there may be considerable impact due to the clearing of vegetation and the large footprint required for commercial-scale energy production, which would refer to the habitat loss and disturbance created during the construction phase of the facility, birds are the most mobile of vertebrate species and there is considerable amount of the same vegetation in adjacent areas to which avifauna will move.

<b>Loss of avifaunal habitat habitats</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
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)	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), The loss of habitat on-site has the potential to add to the cumulative impacts that habitat loss in the region is having on avifauna. However, in the context of the amount of similar habitat in the region the impact is a negligible amount.	
<b>Significance</b>	<b>Negative Medium (30)</b>	<b>Negative low (15)</b>
Can impacts be mitigated?	<ul style="list-style-type: none"> <li>• Where possible, avoid clearing vegetation in drainage channels or washes, where bird density and diversity has the potential to be higher (although this higher diversity was not recorded during the site visit).</li> <li>• If possible, the servitude of the power line exiting the site should follow existing roads and not cut across habitat.</li> <li>• All construction and maintenance activities must be undertaken in accordance with Eskom’s Environmental Best Practise</li> </ul>	

	<p>Standards.</p> <ul style="list-style-type: none"> <li>The construction footprint and access roads should be restricted to within the development footprint.</li> <li>All social weavers nests that may be affected by the development must be moved by a qualified contractor or with the assistance of the relevant qualified persons; other bird nests in trees/higher shrubs need to be monitored and only removed if not used for breeding.</li> </ul>
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- Disturbance of soils and existing land use (soil compaction) – Soil compaction due to unnatural load in the area will change the soil structure. Although there is already some soil compaction due to sections of the study site being used as a farm road, soil compaction will increase because of the increase in activity. The effect of this will largely be within the site boundary and will continue during the operational phase. If probable mitigating measures are not implemented the effect of the compaction will affect soil structure of soils on the site.

Soil compaction	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Probable (3)	Likely (2)
Duration	Long term (3)	Long term (3)
Magnitude	High (3)	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 impact (2). Should these impacts occur, there may be a cumulative impact on storm water runoff in the study area.	
<b>Significance</b>	<b>Negative Medium (39)</b>	<b>Negative low (11)</b>
Can impacts be mitigated?	Yes, the most effective mitigation will be the minimisation of the project footprint by using the existing roads in the area and not create new roads to prevent other areas also getting compacted. Refer to– Appendix G.	

- Physical and chemical degradation of the soils by construction vehicles (hydrocarbon spills) - The use of vehicles that can result in oil and fuel spills on site as well as waste generation by construction and construction workers can result in possible chemical soil pollution. Chemical soil pollution can also be caused by unlawful discarding of broken and old batteries.

Chemical soil pollution	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Low (1)
Probability	Probable (3)	Possible (2)

Duration	Long term (3)	Medium term (2)
Magnitude	High (3)	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).	
<b>Significance</b>	<b>Negative medium (42)</b>	<b>Negative low (12)</b>
Can impacts be mitigated?	<p>Yes, the following mitigation measures should be implemented:</p> <ul style="list-style-type: none"> <li>• All waste generated on site during construction should be stored in waste bins and removed from site on a regular basis.</li> <li>• Vehicles accessing the site should regularly be checked for fuel and oil spills. In case of spillage, the contaminated soil should be removed and transported to a designated waste site.</li> <li>• No broken or old batteries or components of the PV plant should be dumped on or around the site but should be removed immediately and taken to a special chemical waste facility.</li> </ul> <p>The EMPr also provides mitigation measures related to soil pollution – refer Appendix G.</p>	

- Impacts of the geology on the proposed development – The EIA and the geotechnical investigation conducted in 2012 found that the site is subject to the presence of dolomite. The geotechnical study, recommended that a dolomitic stability investigation be conducted prior to construction. Most of the area is covered by surface limestone of Tertiary to Recent age, and dolomite and chert of the Campbell Group (Griqualand West Supergroup, Vaalian Erathem) support shallow soils (0.1– 0.25 m) of Mispah and Hutton soil forms. Land types mainly Fc with some Ae and Ag. (Mucina & Rutherford, 2006)

<b>Geological impacts</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Probable (3)	Probable (3)
Duration	Short term (1)	Short term (1)
Magnitude	High (3)	Medium (2)
Reversibility	Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resource (1)	No loss of resource (1)
Cumulative impact	Low cumulative impact (2).	
<b>Significance</b>	<b>Negative low (16)</b>	<b>Negative low (16)</b>
Can impacts be mitigated?	<p>The Geotechnical report recommends that a detailed engineering geological investigation be conducted for the development of the PV plant.</p> <ul style="list-style-type: none"> <li>• It is recommended that a detailed slope analysis and flood line determination be conducted for the project area.</li> <li>• Where the use of ground water is considered for</li> </ul>	

	<p>the processes, a water use licence should be lodged.</p> <ul style="list-style-type: none"> <li>• It is expected that some of the material within the study area may be suitable for building construction purposes. It is recommended that the material be tested for this specific use, if required.</li> <li>• It is recommended that a suitably qualified engineering geologist or geotechnical engineer inspect all foundation trenches prior to construction in order to identify and evaluate any soil characteristics in variance with that found during the detailed geotechnical investigation.</li> <li>• The dolomite residuum consists of coarse gravelly material with a limited vertical extent. Any structure founded within it will be subject to limited settlement therefore it may require for foundation design.</li> </ul> <p>The EMPr also provides mitigation measures related to the geology of the site – refer Appendix G.</p>
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- 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	Possible (2)	Unlikely (1)
Duration	Short term (1)	Short term (1)
Magnitude	Medium (2)	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.	
<b>Significance</b>	<b>Negative low (22)</b>	<b>Negative low (10)</b>
Can impacts be mitigated?	The EMPr provides mitigation measures for the management of surface and groundwater – refer to Appendix G	

- 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 – 18:00).

Temporary noise disturbance	Pre-mitigation impact	Post mitigation impact
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	rating	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).	
<b>Significance</b>	<b>Negative low (20)</b>	<b>Negative low (9)</b>
Can impacts be mitigated?	Yes, management actions related to noise pollution are included in the EMPr – refer to Appendix G.	

- 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 registered 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.	
<b>Significance</b>	<b>Negative medium (13)</b>	<b>Negative low (13)</b>
Can impacts be mitigated?	Yes, it is therefore important that all management actions and mitigation measures included in the EMPr are implemented – refer to Appendix G.	

- Impacts on heritage objects – In accordance with Section 38 of the NHRA, an independent heritage consultant was 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 extend the photovoltaic power plant.

Impacts on heritage objects	Pre-mitigation impact	Post mitigation impact
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	rating	rating
Status (positive or negative)	Site (1)	Site (1)
Extent	Unlikely (1)	Unlikely (1)
Probability	Short term (1)	Short term (1)
Duration	Low (1)	Low (1)
Magnitude	Completely reversible (1)	Completely reversible (1)
Reversibility	No loss of resource (1)	No loss of resource (1)
Irreplaceable loss of resources	Site (1)	Site (1)
Cumulative impact	Negligible cumulative impact (1). Should these impacts occur, there may be a cumulative impact on the preservation of heritage objects in the area.	
<b>Significance</b>	<b>Negative low (6)</b>	<b>Negative low (6)</b>
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 – Appendix G.	

- Temporary employment and other economic benefits (business opportunities and skills development) – Approximately 300 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 estimated to take approximately 12 months. During this 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.	
<b>Significance</b>	<b>Positive Medium (30)</b>	<b>Positive Medium (45)</b>
Can impacts be mitigated?	In order to enhance local employment and business opportunities associated with the construction phase the following measures should be implemented: <u>Employment</u> <ul style="list-style-type: none"> <li>• Where reasonable and practical Waterloo Energy should appoint local contractors and</li> </ul>	



	<p>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;</p> <ul style="list-style-type: none"> <li>• Where feasible, efforts should be made to employ local contactors that are compliant with Broad Based Black Economic Empowerment (BBBEE) criteria;</li> <li>• Before the construction phase commences, it is suggested that Waterloo Energy should meet with representatives from the Naledi local municipality 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.</li> <li>• It is suggested that 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 Waterloo Energy intends following for the construction phase of the project.</li> <li>• Where feasible, a training and skills development programmes for local workers should be initiated prior to the initiation of the construction phase.</li> <li>• The recruitment selection process should seek to promote gender equality and the employment of women wherever possible.</li> </ul> <p><u>Business</u></p> <ul style="list-style-type: none"> <li>• It is suggested that Waterloo Energy should liaise with the Naledi local municipality with regards the establishment of a database of local companies, specifically BBBEE 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;</li> <li>• Where possible, Waterloo Energy should assist local BBBEE companies to complete and submit the required tender forms and associated information.</li> </ul>
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	<ul style="list-style-type: none"> <li>The Naledi local municipality, 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.</li> </ul> <p>Also refer to the EMPr in Appendix G for mitigation measures related to employment.</p>
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- Visual intrusion - The proposed development will have a limited visual impact on the visual environment within 2 km of the proposed facility, given that the number of sensitive receptors is very low, electrical infrastructure such as a substation and power lines are already located in close proximity to the site.

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)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	Medium cumulative impact (3). The construction of the solar plant and associated infrastructure will increase the cumulative visual impact of industrial type infrastructure in the region.	
<b>Significance</b>	<b>Negative low (26)</b>	<b>Negative low (13)</b>
Can impacts be mitigated?	<p>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 style="list-style-type: none"> <li>Dust suppression will play an important role to minimise the visibility of dust.</li> <li>Contractors must avoid using roads not relevant to the project.</li> <li>Contractors should try using public roads not used that often by the residents of Vryburg.</li> <li>Construction vehicles must limit traveling on surrounding roads and in Vryburg during peak hours when possible.</li> <li>New road construction must be avoided if possible.</li> </ul>	

	<ul style="list-style-type: none"> <li>• Good housekeeping should be implemented. ☑ Proper rehabilitation of disturbed areas after construction.</li> <li>• Risk assessments relating to fire hazards, “No Smoking” signs and the implementation of smoking areas.</li> <li>• Proper fire fighting 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> <li>• Partial screening is possible by adding indigenous flora.</li> </ul>
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**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.

- 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. The site is located ~ 7km north west of the Vryburg. Access to the site is via the R34, which is a gravel road. The findings of the SIA indicate that the R 34 is not heavily utilized. The potential safety for other road users associated with the movement of construction related traffic along these roads is therefore likely to be low. The movement of heavy vehicles along the R 34 is, however, 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/Regional (2)	Local/Regional (2)
Probability	Definite (4)	Definite (4)
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 low cumulative effects (2). 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.	
<b>Significance</b>	<b>Negative low (22)</b>	<b>Negative low (11)</b>
Can impacts be mitigated?	Yes, the management of traffic are dealt with in the following sections of the EMPr: <ul style="list-style-type: none"> <li>• 2.4.2. Construction traffic and access</li> </ul>	

	<ul style="list-style-type: none"> <li>• 2.4.12. Noise and Vibrations</li> <li>• 2.4.15. Occupational Health and Safety</li> </ul> <p>The EMPr includes specific mitigation measures to ensure that no hazards would result from the increased truck traffic and that traffic flow would not be adversely impacted. The EMPr also includes mitigation measures to minimize impacts on local commuters e.g. the movement of heavy construction vehicles through residential areas should be timed to avoid peak morning and evening traffic periods.</p> <p>The SIA propose the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• The contractor must ensure that damage caused by construction related traffic to the R 43 is repaired before the completion of the construction phase. The costs associated with the repair must be borne by the contractor;</li> <li>• 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;</li> <li>• 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.</li> </ul>
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- 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.

Increase of construction workers on local communities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (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	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.	
<b>Significance</b>	<b>Negative low (24)</b>	<b>Negative low (12)</b>
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"> <li>• Where reasonably and practicably possible Waterloo Energy should make it a requirement for contractors to implement a 'locals first' policy for construction jobs, specifically for semi and low-skilled job categories;</li> <li>• It is suggested that Waterloo Energy 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 Naledi local municipality, 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;</li> <li>• It is suggested that Waterloo Energy 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;</li> <li>• It is suggested that Waterloo Energy and the contractor should implement an HIV/AIDS awareness programme for all construction workers at the outset of the construction phase;</li> <li>• The construction area should be fenced off before construction commences and no workers should be permitted to leave the fenced off area;</li> <li>• 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;</li> <li>• Where necessary, the contractors should make</li> </ul>	

	<p>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;</p> <ul style="list-style-type: none"> <li>• It is recommended that no construction workers, with the exception of security personnel, should be permitted to stay over-night on the site.</li> </ul>
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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 Waterloo PV Solar Energy 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.

<b>Influx of job seekers</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (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.	
<b>Significance</b>	<b>Negative low (22)</b>	<b>Negative low (11)</b>
Can impacts be mitigated?	<p>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 Waterloo Energy facility and other projects is likely to be low. The following mitigation measures are proposed:</p> <ul style="list-style-type: none"> <li>• Where reasonably and practicably possible, Waterloo Energy should implement a “locals first” policy, specifically with regard to unskilled and low skilled opportunities;</li> <li>• Waterloo Energy should implement a policy that no employment will be available at the gate.</li> </ul>	

- 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. The local farmers in the area interviewed indicated that the presence of construction workers on the site increased the exposure of their farming operations and livestock to the outside world, which, in turn, increased the potential risk of stock theft and crime. The local farmers did, however, indicate that the potential risks (safety, livestock and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on the site workers during the construction phase.

<b>Risk to safety, livestock and farm infrastructure</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (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.	
<b>Significance</b>	<b>Negative low (22)</b>	<b>Negative low (11)</b>
Can impacts be mitigated?	Key mitigation measures include: <ul style="list-style-type: none"> <li>• Waterloo Energy 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;</li> <li>• 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;</li> <li>• Contractors appointed by Waterloo Energy 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;</li> <li>• Waterloo Energy 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;</li> </ul>	

	<ul style="list-style-type: none"> <li>• Waterloo Energy 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 be contained in the Code of Conduct to be signed between the proponent, the contractors and neighbouring landowners. The agreement should also cover losses and costs associated with fires caused by construction workers or construction related activities (see below);</li> <li>• 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;</li> <li>• Contractors appointed by Waterloo Energy 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.</li> <li>• Contractors appointed by Waterloo Energy 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;</li> <li>• The housing of construction workers on the site should be strictly limited to security personnel.</li> </ul>
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- Increased risk of grass fires - In the process, farm infrastructure may also be damaged or destroyed and human lives threatened. The local farmers interviewed, including the land owner, Mr van Zyl, all indicated that grass fires were common in the area and posed a significant threat to their livestock operations. They also indicated that the potential risk of grass fires was heightened by the windy conditions in the area, specifically during the dry, windy winter months from May to October. In terms of potential mitigation measures the local farmers indicated that a fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase. In addition, a fire fighting vehicle should be present at all times on the site during the construction phase.

Increased risk of grass fires	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 (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.	
<b>Significance</b>	<b>Negative low (16)</b>	<b>Negative low (8)</b>
Can impacts be mitigated?	<p>The mitigation measures include:</p> <ul style="list-style-type: none"> <li>• Waterloo Energy 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;</li> <li>• A fire-break should be constructed around the perimeter of the site prior to the commencement of the construction phase;</li> <li>• Contractor should ensure that open fires on the site for cooking or heating are not allowed except in designated areas;</li> <li>• 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;</li> <li>• Contractor to provide adequate fire fighting equipment on-site, including a fire fighting vehicle;</li> <li>• Contractor to provide fire-fighting training to selected construction staff;</li> <li>• No construction staff, with the exception of security staff, to be accommodated on site over night;</li> <li>• 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 fire fighting costs borne by farmers and local authorities.</li> </ul>	

### 5.1.1 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, the change of land use, 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.

<b>Avifaunal fatalities</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Regional (3)	Regional (3)
Probability	Probable (3)	Possible (2)
Duration	Long term (3)	Long term (3)
Magnitude	Medium (2)	Low (3)
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 (3), since there are a number of power lines in the vicinity as well as throughout the North West Province. Power lines that cross remote areas should be fitted with bird guards to reduce the incidence of perching on towers. With mitigation, it is considered unlikely that the addition of the proposed length of power line will significantly add to the cumulative impact of electrocution events in the region.	
<b>Significance</b>	<b>Negative medium (34)</b>	<b>Negative Low (16)</b>
Can impacts be mitigated?	<ul style="list-style-type: none"> <li>• Implement a bird monitoring program (BMP) for the entire Waterloo complex.</li> <li>• 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 selection criteria of the final design of the Waterloo complex PV arrays.</li> <li>• 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,</li> </ul>	

	<p>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. – refer Appendix G.</p> <ul style="list-style-type: none"> <li>• Mono pole bird friendly tower structures will be utilised in the development. This will significantly minimise the number of electrocutions.</li> <li>• The line should be kept as low as possible taking into account engineering and legal requirements.</li> <li>• The span lengths should be kept as short as is reasonable. Placement of bird flappers or deterrents as markers on the earth wire, which will increase the visibility of the power line.</li> </ul>
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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 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 if it cause.

Avifaunal fatalities	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Site (1)	Site (1)
Probability	Possible (2)	Unlikely (1)
Duration	Definite (4)	Definite (4)
Magnitude	Medium (2)	Low (1)
Reversibility	Partly reversible (2)	Completely reversible (1)
Irreplaceable loss of resources	Marginal loss of resource (2)	No loss (1)
Cumulative impact	Medium cumulative impact (3), since no other projects are proposed in the area	
<b>Significance</b>	<b>Positive low (28)</b>	<b>Negative low (11)</b>
Can impacts be mitigated?	<ul style="list-style-type: none"> <li>• Avoid the use of lattice-type structures in order to minimize perching and nesting opportunities;</li> <li>• 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.</li> <li>• Inspect each PV module at least once a month throughout the year for any nest-building activity. This can be accomplished by the staff</li> </ul>	

	<p>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</p> <ul style="list-style-type: none"> <li>Remove nesting material when it appears, but only if the nest belongs to one of the six species indicated in the text, and 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.– refer Appendix G.</li> </ul>
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- Soil erosion**– Soil erosion will not be a problem during the construction phase because the PV plant will be cemented into the soil and very little natural vegetation will be removed. 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.

Soil erosion	Pre-mitigation impact rating	Post mitigation impact rating
Status (positive or negative)	Negative	Negative
Extent	Local/Regional (2)	Local/Regional (2)
Probability	Definite (4)	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	Significant loss of resource (3)	Marginal loss of resource (2)
Cumulative impact	Medium cumulative impact (3). Should these impacts occur, there will be a cumulative impact on the air and water resources in the study area in terms of pollution.	
<b>Significance</b>	<b>Negative High (51)</b>	<b>Negative low (26)</b>
Can impacts be mitigated?	Yes, to avoid soil erosion it will be a good practice to design storm water canals 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. Another important measure is to avoid stripping land surfaces of existing vegetation by only allowing vehicles to travel on	

	existing roads and not create new roads.  Also refer to the EMPr – Appendix G.
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- Change in land-use – Land use was changed for the purpose of the initial Waterloo PV plant (which received Environmental Authorization) from agriculture and is currently zoned as agricultural land with “Special Consent” for electrical purpose (See Appendix J).

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.	
<b>Significance</b>	<b>Negative low (13)</b>	<b>Negative low (13)</b>
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 impacts on the wider area.	
<b>Significance</b>	<b>Negative medium (30)</b>	<b>Negative low (13)</b>
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 – refer to the EMPr. (Appendix G)	

- Increased consumption of water - Approximately 2,800,000 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.

<b>Increased consumption of water</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Region (3)	Region (3)
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	Marginal loss of resources (2)	Marginal loss of resources (2)
Cumulative impact	Medium cumulative impacts (3) - An additional demand on water sources could result in medium cumulative impacts with regards to the availability of water.	
<b>Significance</b>	<b>Negative medium (38)</b>	<b>Negative medium (38)</b>
Can impacts be mitigated?	Yes, management actions and mitigation measures related to the use of water are included in the EMPr. (Appendix G)	

- Visual intrusion - The Visual Impact Assessment that was conducted as part of the original Waterloo site concluded that the proposed development will have a limited visual impact on the visual environment within 2 km of the proposed facility, given that the number of sensitive receptors is very low, electrical infrastructure such as a substation and power lines are already located in close proximity to the site and the polycrystalline panels considered for this development are non-reflective. 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. It does not emit any harmful by-products or pollutants and is therefore not negatively associated with possible health risks to observers.

<b>Visual intrusion</b>	<b>Pre-mitigation impact</b>	<b>Post mitigation impact</b>
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	rating	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)	Low (1)
Reversibility	Completely reversible (1)	Completely reversible (1)
Irreplaceable loss of resources	No loss of resources (1)	No loss of resources (1)
Cumulative impact	High cumulative impact (4). The operation of the facility may increase the cumulative visual impact together with farming activities, existing Eskom power infrastructure and the 15 proposed solar power facilities in the area.	
<b>Significance</b>	<b>Negative low (30)</b>	<b>Negative low (15)</b>
Can impacts be mitigated?	<p>Yes, mitigation measures are included in the visual impact assessment study and table 36 of the EMPr. The VIA recommends the following mitigation measures:</p> <ul style="list-style-type: none"> <li>• 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. Care should be taken with the layout of the security lights to prevent motorists on the R 43 from being blinded by lights at the approach to Waterloo.</li> <li>• Screening should be implemented by means of vegetation in conjunction with security fencing. Water used for washing solar panels can be channelled to support growth of screening vegetation.</li> </ul>	

- 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 confirmed in a letter dated 16 November 2012 that they will be able to remove the household refuse from Solar Power Plant to the registered municipal dumping site and 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.	
<b>Significance</b>	<b>Negative low (15)</b>	<b>Negative low (15)</b>
Can impacts be mitigated?	<ul style="list-style-type: none"> <li>Waste has to be accommodated at a licensed landfill site.</li> <li>If possible and feasible, all waste generated on site during the operational phase must be separated into glass, plastic, paper, metal and wood to be recycled.</li> <li>Management actions related to waste management are included in the EMPr – refer to Appendix G.</li> </ul>	

- 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.

<b>Leakage of hazardous materials</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
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)	
<b>Significance</b>	<b>Negative medium (36)</b>	<b>Negative low (22)</b>
Can impacts be mitigated?	<ul style="list-style-type: none"> <li>An area for the storage of hazardous materials must be established that conforms to the relevant safety requirements and that provides for spillage prevention and containment.</li> <li>Environmental awareness training for staff, concerning the prevention of accidental spillage of hazardous chemicals and oil.</li> <li>Inventories should be made of all substances that are potentially hazardous to groundwater, which will be stored, used or transported over the sites. The risk of each substance to the groundwater should be considered.</li> <li>All areas in which substances potentially hazardous to groundwater are stored, loaded,</li> </ul>	



	worked with or disposed of should be securely banded (impermeable floor and sides) to prevent accidental discharge to groundwater.
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- Permanent employment - Security guards will be required for 24 hours every day of the week and general labourers will also be required for the cleaning of the panels.

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.	
<b>Significance</b>	<b>Negative Medium (30)</b>	<b>Negative Medium (30)</b>
Can impacts be mitigated?	<p>The enhancement measures listed in Section 4.4.1, i.e. to enhance local employment and business opportunities during the construction phase, also apply to the operational phase. In addition:</p> <ul style="list-style-type: none"> <li>• Waterloo Energy 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;</li> <li>• Waterloo Energy, in consultation with the Naledi Local Municipality, should investigate the options for the establishment of a Community Development Trust.</li> </ul>	

- Generation of additional electricity - The photovoltaic effect of the panels will generate electricity that will be fed into the National grid. 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).	
<b>Significance</b>	<b>Positive medium (30)</b>	<b>Positive medium (30)</b>
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.

<b>Establishment of a community trust</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
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	
<b>Significance</b>	<b>Positive medium (30)</b>	<b>Positive medium (45)</b>
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"> <li>• The option of establishing a single, municipal level Community Trust should be investigated by the Naledi Local Municipality in consultation with renewable energy companies that have identified sites in the Naledi Local Municipality.</li> <li>• The Naledi Local Municipality should be consulted as to the structure and identification of potential trustees to sit on the Trust. The key departments in the Naledi Local Municipality that should be consulted include the Municipal Managers Office, IDP</li> </ul>	

	<p>Manager and LED Manager.</p> <ul style="list-style-type: none"> <li>• 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;</li> <li>• Strict financial management controls, including annual audits, should be instituted to manage the funds generated for the Community Trust from the plant.</li> </ul>
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**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 findings of the Social Impact Assessment (SIA) conducted as part of the original Waterloo site indicated that the proposed site is screened from the R 34 and will not be visible to passing traffic. The site will be visible from the R 34. However, the volume of traffic along this road is low. In addition the visual integrity of the area has been impacted by the existing Eskom power lines in the area and the Harrisburg substation. The impact of the proposed facility 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 (3)	Long term (3)
Magnitude	Medium (2)	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	Low cumulative impact (2). The construction of the solar plant and associated infrastructure will increase the cumulative change in the sense of place due to industrial type infrastructure in the region. However this is not yet relevant in light of relatively low level occurrence of such infrastructure.	
<b>Significance</b>	<b>Negative low (26)</b>	<b>Negative low (13)</b>
Can impacts be mitigated?	Yes, mitigation measures relating to visual impacts are included in the EMPr.	

- Financial implications to tourism in the area – The tourism sector is regarded as an important economic sector in the NWP and Naledi Local Municipality. The tourism potential of the area is linked to the areas natural resources, including the relatively undisturbed scenery and landscape. As indicated above, the findings of the SIA conducted as part of the original Waterloo site indicated that the impact of the proposed facility on the areas sense of place with mitigation is likely to be low.

In some instances the facility may attract tourists to the area, since the plant is an unfamiliar but novel facility that invokes a curiosity factor. The advantage is that the facility can become an attraction or a landmark within the region that people would actually want to come and see. As it is impossible to completely hide the facility, the only option would be to promote it as an alternative and sustainable energy facility. Therefore the proposed development may enhance tourism in the area and may also have positive financial implications as a result.

<b>Financial implications to tourism</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Positive	Positive
Extent	Local (2)	Local (2)
Probability	Probable (3)	Probable (3)
Duration	Long term (3)	Long term (3)
Magnitude	Low (1)	Low (1)
Reversibility	Partly reversible (2)	Partly reversible (2)
Irreplaceable loss of resources	N/a	N/a
Cumulative impact	Low cumulative impact (2). The proposed facility is one of fifteen proposed located in the Vryburg area in the Naledi Local Municipality. Due to size and height of facilities the potential cumulative impact on the tourism potential of the area are not rated significant.	
<b>Significance</b>	<b>Negative low (12)</b>	<b>Negative low (12)</b>
Can impacts be mitigated?	The recommendations contained in the VIA should be implemented.	

- 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 a 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 75 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.

<b>Development of infrastructure for the generation of clean, renewable energy</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Positive	Positive
Extent	National (4)	Local (2)
Probability	Definite (4)	Probable (2)
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.	
<b>Significance</b>	<b>Positive low (18)</b>	<b>Positive low (18)</b>
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 Waterloo Energy should:</p> <ul style="list-style-type: none"> <li>• Use the project to promote and increase the contribution of renewable energy to the national energy supply;</li> <li>• Maximise the public's exposure to the project via an extensive communication and advertising programme;</li> <li>• 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.</li> </ul>	

### 5.1.2 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)	
<b>Significance</b>	<b>Negative low (7)</b>	<b>Negative low (16)</b>
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 landfill site near Vryburg 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.

<b>Generation of waste</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
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.	
<b>Significance</b>	<b>Negative medium (45)</b>	<b>Negative low (26)</b>
Can impacts be mitigated?	Yes – refer to the EMPr, Appendix G.	

- 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.

<b>Loss of employment</b>	<b>Pre-mitigation impact rating</b>	<b>Post mitigation impact rating</b>
Status (positive or negative)	Negative	Negative
Extent	Local (2)	Local (2)
Probability	Possible (2)	Possible (2)
Duration	Short term (1)	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)	
<b>Significance</b>	<b>Negative low (27)</b>	<b>Negative low (18)</b>
Can impacts be mitigated?	The following mitigation measures are recommended: <ul style="list-style-type: none"> <li>• Waterloo Energy should ensure that retrenchment packages are provided for all</li> </ul>	

	<p>staff retrenched when the facility is decommissioned.</p> <ul style="list-style-type: none"> <li>• All structures and infrastructure associated with the proposed facility should be dismantled and transported off-site on decommissioning;</li> <li>• Waterloo Energy 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.</li> </ul>
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**Indirect impacts:** No indirect impacts are anticipated from the decommissioning phase of the proposed development.