5 IDENTIFICATION OF POTENTIAL IMPACTS

5.1 Introduction

Scoping phase is widely recognised as a critical step in the Environmental Impact Assessment (EIA) process. The Scoping Study is in twofold as it identifies significant issues that require further investigation as well as identifying the preferred alternatives that will go through for further investigation. These issues and alternatives are carried forward into the EIA phase and subsequently the Environmental Management Plan (EMP). The site-specific issues in terms of nature, extent, duration, probability, magnitude and significance will be assessed in the EIA phase. Mitigation measures will then be identified and recommended for inclusion in the EMP.

The scoping of all environmental issues was assessed according to the following factors:

- The nature of the proposed activities and the receiving environment;
- The legal, policy and planning context of the proposed Solar Park and associated infrastructure; and
- The socio-economic and environmental issues.

The focus of an EIA ultimately narrows down to a judgement (decision based on the results from specialist studies) on whether the predicted impacts are significant. Significance is, however, relative and must always be set in a context, e.g. competition for resources, social sensitivity or the scale and rate of development.

The following section of the Scoping Report provides a discussion on the findings of the specialist studies, undertaken to date, with regards to identified issues and impacts associated with the Solar Park and associated infrastructure.

5.2 Identification of Impacts

Most of the environmental impacts are expected to occur during the construction phase of the Solar Park although a number of environmental impacts can be expected during the operational phase. Environmental impacts associated with *construction* and also decommissioning are similar in nature and include inter alia:

- Impact on Ecology (fauna and flora).
- Impact on soil and agricultural potential of the site.
- Impact on Heritage resources.
- Impact on Surface Water.
- Social impacts (positive and negative).
- Visual Impacts.

Environmental impacts specific to the *operational* phase of the Solar Park include inter alia:

- Long term loss of fauna and flora (endangered or protected species) and disruption of broad-scale ecological processes.
- Change of land use and potential loss of soil.

- Altered surface water run off
- Visual impacts (visibility of the Solar Park, potential loss of the rural sense of place)
- Social impacts (positive and negative).

5.2.1 Methodology for Impact Assessment during Scoping Phase

The methodology followed to determine the main issues and potential impacts of the proposed Solar Park include:

- Identification of sensitive environments that may be impacted on by the proposed Solar Park. The possible impacts can be direct, indirect or cumulative. Cumulative impacts (associated with the scale of the project and the existing impacts in the surrounding areas) will only be assessed when detailed layouts are known as part of the detailed specialist studies in the EIA phase.
- Determination of the nature and extent of the potential impacts during the construction and operational phase;
- No-Go areas were identified if applicable.
- Recommendations for further study.

5.3 Identification of Potential Biophysical Impacts

5.3.1 Geology

Potential geological issues that should to be taken into consideration are as follows:

- Impacts related to the construction-related earthworks (damage of soil and associated ecosystems due to excavations, wetting and compaction).
- Impacts related to the pollution in case of spillage/leakage of hydrocarbon and other hazardous material from storage facilities.

Potential groundwater issues that should to be taken into consideration are as follows:

- Contamination of ground water due to hydrocarbon spillage and seepage into groundwater reserves, affecting groundwater quality.
- Further construction of infrastructure and compaction of the area will further contribute to reduced water infiltration rates to replenish groundwater aquifers.

A desktop geohydrological study is also recommended for the EIA phase to describe existing hydrogeological data, with a brief groundwater conceptual description and summary of main issues including a map showing aquifer types and sample points if available.

5.3.2 Soil and agricultural potential

The major impact on the natural resources within the site would be the loss of arable land due to the construction of the various types of infrastructure. However, this impact would in all probability be of limited significance and would be local in extent. At the end of the project life, it is anticipated that removal of the structures would enable the land to be returned to more or

less a natural state following rehabilitation, with little impact, especially given the low prevailing agricultural potential. Amelioration is not considered after decommissioning.

The impact can be summarized as follows:

Nature of impact	Loss of agricultural land	Land that is no longer able to be utilized due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where infrastructure will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Moderate	
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that as little pollution or other non-physical disturbance occurs.	

Wind erosion hazard is another impact expected due to the sandy nature of the soils. Along with the dry climate it means that if the soil surface is denuded of vegetation, there will be an increased risk of topsoil removal by wind action. However, mitigation measures, such as restricting the infrastructure footprint as much as possible, as well as providing windbreaks if required, should keep this impact to a low level of significance. Due to the low vegetation growth pattern it might be investigated to keep as much as possible vegetation in situ. This will keep the dust down and will not impact the operation.

The impact can be summarized as follows:

Nature of impact	Increased susceptibility to wind erosion	Land that has lost topsoil to wind action due to construction of infrastructure
Extent of impact	Site only	Confined to areas within the site where infrastructure will be located
Duration of impact	Long-term	Will cease if operation of activity ceases
Probability of impact	Highly probable	
Severity of impact	Low	If mitigated
Significance of impact	Low	Mainly due to low potential of area, as well as nature of infrastructure
Mitigation factors	The main mitigation would be to ensure that as little removal of surface vegetation as possible occurs.	

Due mainly to the prevailing unfavourable climatic conditions for arable agriculture, as well as the prevalence of sandy soils with limited depth of the study area, it is not envisaged that any more detailed soil investigation will be required.

5.3.3 Flora

It is confirmed that several protected plant species occur within the site and under the current project description there is a certainty that many individuals of these would be affected by the development. Depending on the number and identity of the affected species, impacts on such species are likely to be of moderate significance. High significance on certain species such as *Acacia erioloba* in that they need to be removed (Permits required). There is little that can be done to mitigate this impact and it would be an inevitable consequence of the development.

The impacts were divided into generating and associated infrastructure (main solar park infrastructure) and grid connection for this section (flora).

Generating and associated infrastructure:

Impacts on vegetation and listed plant species:

*Nature***:** Site preparation and construction will result in a lot of disturbance which would impact indigenous vegetation and listed and protected species as well. For some species translocation may be a viable option, but this will not be a viable option for most of the protected woody species.

Extent: The total extent of the development is relatively high and the facility would result in a concentrated local impact of up to several thousand hectares.

Potential Significance: The significance of this impact would depend on the number and identity of protected species within the final development footprint, but as there is little scope for mitigation through avoidance, it is likely that a significant proportion of individuals on the site would be lost. While this would clearly generate a high local impact, the overall significance of this impact is likely to be moderate on account of the wide distribution and abundance of the protected species.

Soil erosion leading to ecological degradation

Nature: Disturbance at the site during construction would leave the site vulnerable to wind and water erosion. Large amounts of sand leaving the site through wind erosion could impact adjacent areas as the mobilised sand would smother vegetation and generate additional erosion problems. In addition, the area received occasional intense thunder storms during the summer and the large amount of hardened infrastructure associated with the development would generate large amounts of runoff that would need to be managed in order to limit erosion.

Extent: The extent of this impact would most likely be restricted to the site and the areas receiving the runoff or windblown sand.

Potential Significance: The site is fairly flat and so the risk of water erosion is likely to be fairly low and manageable with mitigation. The level of disturbance created during construction of the development is however likely to be high, especially in the areas with dunes and post-construction management will be required to manage dust and wind erosion. With mitigation the significance of this impact is likely to be low to moderate.

Grid connection:

Impacts on vegetation and listed plant species

Nature: Some listed plant species are likely to occur along the chosen power line route and may be impacted by disturbance during the construction of the power line.

Extent: The footprint of the power line is likely to be low and in addition it is likely that most listed species can be avoided through micrositing of the pylons.

Potential Significance: The significance of this impact is likely to be low as avoidance measures would be able to reduce the majority of negative impact associated with the power lines.

5.3.4 Conservation obligations and targets (Cumulative impact)

The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets. The receiving vegetation types in the study area are classified as Least Threatened and they are extensive vegetation types that are still more than 99% intact. The development of the site would result in the loss of up 5000ha of intact habitat which on its own is not considered highly significant, but as there is an array of other developments in the area, the possibility for significant cumulative impact on the affected vegetation types or on more localised plant communities is a potential concern.

Nature: The loss of unprotected vegetation types on a cumulative basis from the broad area may impact the countries' ability to meet its conservation targets.

Extent: The extent of this impact is likely to be restricted to the local region.

Potential Significance: The receiving vegetation types in the study area are classified as Least Threatened and they are extensive vegetation types that are still more than 99% intact. Therefore the loss of these vegetation types from the development area is not likely to be highly significant. However, at a more local level the habitats and plant communities present within the site may not be widely available in the area and the development would potentially have a more significant impact on such localised plant communities is a potential concern. There is little evidence to suggest at this point that the site is unique and this impact is likely to be relatively low significance.

5.3.5 Fauna

Direct Faunal Impacts

Nature: Increased levels of noise, pollution, disturbance and human presence will be detrimental to fauna. Sensitive and shy fauna are likely to move away from the area during the construction phase as a result of the noise and human activities present. Some mammals and reptiles such as tortoises would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Extent: The extent of the impact would be largely restricted to the local area.

Potential Significance: Disturbance during the construction is likely to be high as a result of disturbance, noise and human presence. However, during the operational phase impacts are likely to be of relatively low significance, given the low activity levels which will occur at this time.

Impacts on Broad-Scale Ecological Processes and Loss of Landscape Connectivity

As there are several other renewable energy developments in the area, the development of the site will contribute towards cumulative impacts, particularly the loss of landscape connectivity. The site is likely to be fenced and the cleared parts of the site are also likely to be hostile to many smaller fauna which will prevent or impede their movement across the landscape. The significance of this impact will need to be evaluated at the landscape level with consideration of the location and configuration of the other developments in the area. It is however recommended that the potential for the establishment of an ecological corridor across the site be investigated as a potential mitigation measure to reduce the impact on landscape connectivity. Any such corridors should be a minimum of 100m wide in order to be ecologically effective.

Nature: The development of the site will contribute towards the cumulative disruption of landscape connectivity as it will represent a hostile environment to many species which will be prevented from passing through the area.

Extent: The extent of the impact would be restricted to the local region.

Potential Significance: This impact is likely to be of moderate significance given the intact nature of the broader landscape and the lack of locally endemic fauna.

5.3.6 Avifauna

Potential issues in relation to avifauna include: Large raptors and many larger bird species such as cranes and bustards are vulnerable to collisions with or electrocution from power line infrastructure. This can be a particular problem if the power line lies or other associated infrastructure are located within the movement or migration pathway of the birds. As many of these species are long-lived slow-breeding species, collisions with power lines can be a major source of mortality for such species and may threaten the viability of local or regional

populations. Insulating electrical components and fitting bird flight diverters can provide some mitigation against such impacts and is recommended as standard practice for new power line infrastructure.

Nature: The power line and associated infrastructure is likely to generate collision or electrocution mortalities of susceptible avifauna. Although this impact may be low at any one time, this is a long term cumulative impact that may be a major source of mortality for some species.

Extent: The extent of this impact would be largely local in nature although it is important to recognise that the affected bird species move widely in response to the availability of food and nesting requirements.

Potential Significance: This impact would be of low significance, provided that suitable mitigation to reduce collisions and electrocution are implemented and given the likely low length of the required power line.

It is also important to note that CSP developments with a central receiver can also generate avifaunal impacts when birds fly through hotspots caused by the reflectors. Long-term preconstruction monitoring is usually a DEA requirement for CSP developments with a tower, but may not be required for parabolic trough systems.

5.3.7 Overall potential ecology impacts

Based on the results of the scoping study, four key potential impacts were identified that should receive consideration during the scoping phase public participation, authority consultation and detailed infrastructure layout planning for consideration in the EIA phase::

- The abundance of listed tree species within the site is likely to be relatively high and as there is little scope for avoidance, it is likely that a large proportion of the trees present would be impacted by the development. Depending on the exact number of trees that would be impacted, DAFF and provincial authorities may want to engage the developer through the EIA process with regards to the implementation of offset measures to compensate for the loss of the protected trees.
- The dunes at the site cannot be developed in their current state and it is likely that they would need to be levelled (depending on the viability and final layout) as part of the development. This is seen to constitute an irreversible impact as it is not likely that the dunes could be reformed when the facility is decommissioned. This will generate a large amount of loose sand at the site and it is likely that a long-term dust suppression and wind erosion management strategy would need to be developed to deal with this problem, should these areas be developed.
- There are a number of small rocks pans present at the site which are the main sensitive feature of the site (**Figure 5.1)**. These pans are scattered across the site, but comprise only a small overall proportion of the study area. Not all the pans are of equal significance and those pans identified as most ecologically significant should be targeted for incorporation into corridors or green areas within the development.

- While the concentration of development within the current site can be viewed in a positive light as it reduces the overall footprint that would be required if the same output was obtained from a number of separate sites, it does increase the likelihood and significance of some impacts. In particular, there is little space between the different elements of the development and this would increase the potential disruption of landscape connectivity for fauna. It is recommended that the potential for the development of at least one ecological corridor or 'green belt' be investigated as a possibility to reduce the potential impact of the development on the connectivity of the landscape.

Figure 5.1 below illustrates the draft ecological sensitivity map for the proposed Upington Solar Park site.

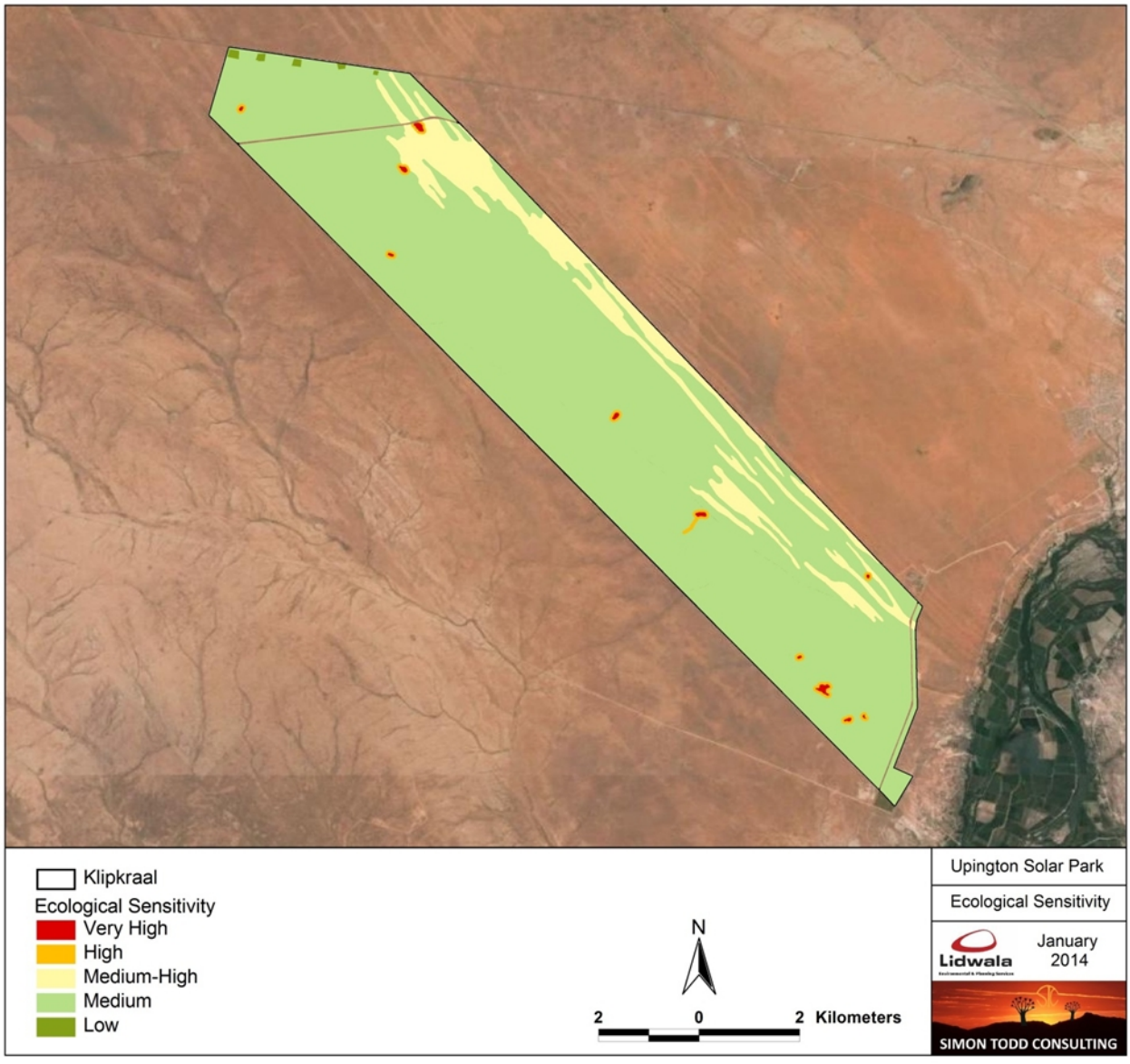

Figure 5.1 Draft ecological sensitivity map of the proposed Upington Solar Park site. The main sensitive feature of the site is the pans which are scattered across the site, but comprise a small overall proportion of the study area.

5.3.8 Surface Water

Large areas within the proposed Solar Park site will be cleared for construction activities and flat surfaces will be created for the storage and operation of heavy equipment. These construction activities, storing of material, might have the possibility to affect the storm water runoff characteristics within the proposed site. The flat surfaces will result in more point specific discharge points which in turn will concentrate the flow of water on site and increase the erosion potential. The absence of vegetation and the associated reduced infiltration will result in a higher runoff coefficient (higher percentage of water runoff from the site). Watercourses and man-made drainage structures will now carry more water which may result into flooding.

The following potentially negative impacts on the surface water associated with the **construction** phase were identified:

- Clearance of the site to prepare for construction;
- Storage of hazardous chemical substances;
- Storage of fuel, oil and other hazardous substances;
- Cement and concrete batching;
- Transportation of material to site and the storage of material on site; and
- Dust as a result of construction activities.

The abovementioned impacts associated with the construction phase are generic and can be adequately managed through the implementation of a Construction Environmental Management Plan. This might include the protection of an optimum vegetation cover.

If construction activities will be undertaken in any watercourse or any of the surrounding areas it would lead to direct or indirect loss or damage of these areas or possible changes to the catchment and also to a decline in ecosystem functionality that might even impact the lower lying Gariep River.

The potentially negative impacts on the surface water that is associated with the **operational** phase were identified and are the following:

- Blocked surface water management systems as result of build-up of dust and silt.
- Surface water run off to wetlands, pans and drainage lines can be cut off as a result of the diversion of site storm water.
- Impact on the riparian systems including the riverine and instream habitats of the catchment and the surrounding environment.
- The watercourses are mostly seasonal and taking their locality within the bigger landscape in consideration they may also pose a flood risk to the Solar Park development.

The mitigation of the above mentioned impacts can be achieved by developing a comprehensive operational plan that specifies the maintenance of civil infrastructure and the natural flow of surface water into the pans and drainage lines by confining plant areas from those areas which drain into the watercourses (operational stormwater management plan).

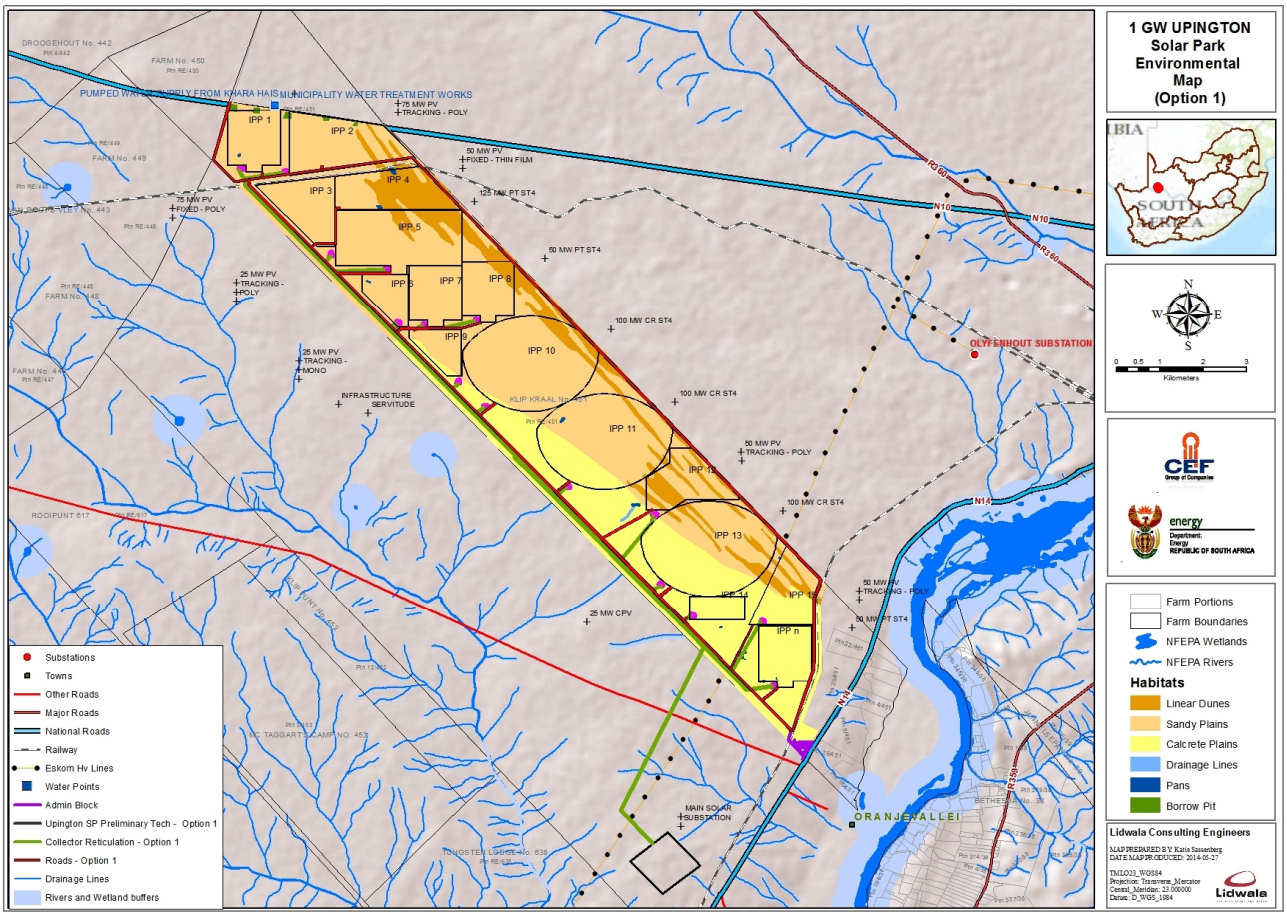

Figure 5.2 Illustrates the pans and the drainage lines including the hydrological features (Gariep River, Helbrandkloofspruit and its tributaries) in the study area (A3 map included in Appendix L)

5.4 Identification of Potential Social Impacts

5.4.1 Visual

The key visual issues identified that would need to be assessed during the EIA phase include:

- The receiving environment of the project has little capacity to absorb the proposed development, especially when considering the visual impact of the CSP system with its central tower structure.
- The potential impacts of glare and glint from the Solar Park components such as mirrors on especially the road users of the national N10 and N14 roads must be adequately investigated and mitigated as it poses a potential safety risk.
- The predominantly rural sense of place of Upington and surrounds may be impacted by this and other similar projects in the area (cumulative impact), especially where it concerns nature based tourism as an income stream.

5.4.2 Heritage

From a heritage point of view the proposed Solar Park and associated infrastructure will not impact on any sites, features or objects of cultural heritage significance that occur within the boundaries of the Klipkraal 451 farm.

Table 5.1 Summary of the identified heritage resources within the study area.

Identified heritage resources	
Category, according to NHRA	*Identification/Description*
Formal protections (NHRA)	
National heritage site (Section 27)	None
Provincial heritage site (Section 27)	None
Provisional protection (Section 29)	None
Place listed in heritage register (Section 30)	None
General protections (NHRA)	
structures older than 60 years (Section 34)	None
archaeological site or material (Section 35)	Low density of scattered surface material
palaeontological site or material (Section 35)	None
graves or burial grounds (Section 36)	None
public monuments or memorials (Section 37)	None
Other	
Any other heritage resources (describe)	None

5.4.3 Social impacts

Positive impacts

- Creation of employment- during construction and operation of Solar park;
- Increased tax base for local authority, stimulation of local economy and service industry- local Manufactures;
- Transfer of skills (Creation of employment and business opportunities during the operational phase will also create opportunities for skills development and training);
- Security of electricity supply;
- Reduced carbon footprint due to renewable energy(electricity generated by solar energy);
- Impact on tourism and the creation of potential tourist opportunities; and
- The establishment of infrastructure to generate renewable energy.

Potential negative impacts

- Influx of construction workers employed on the project;

- Increased risk of stock theft, poaching and damage to farm infrastructure associated with construction workers;
- Increased risk of veld fires associated with construction related activities;
- Impact of heavy vehicles, including damage to roads, safety, noise and dust;
- Increased pressure on infrastructure such as sewerage treatment works and transportation associated with construction;
- Noise from the construction and operation of the Solar Park; and
- Visual impact and possible mirror glare from the mirrors of the different technologies of solar energy generation.

Potential health impacts

The potential health risks associated with solar plants are linked to the hazardous materials used in the process of electricity generation including the materials and possible waste stored on site. These include liquids such as oils or molten salts that may be hazardous and present a possible spill risks. In addition, various fluids are commonly used in most industrial facilities, such as hydraulic fluids, coolants, and lubricants. These fluids may in some cases be hazardous, and present a spill-related risk. PV panels may also contain hazardous materials and although they are sealed under normal operating conditions there is the potential for environmental contamination if they were damaged or improperly disposed upon decommissioning.

Cumulative social impacts

The cumulative impacts associated with large (Solar Park developments), renewable energy facilities, are largely linked to the impact on sense of place and visual impacts. Due to other solar plants being proposed and some already being constructed in proximity to the proposed Solar Park site, significance of the potential cumulative social impacts, specifically the impact on the landscape, sense of place and visual impacts, associated with the proposed facility has to be assessed.