

This Chapter discusses the potential impacts on heritage resources resulting from the establishment of the Solar Farm at the Humansrus site including physical effects on sites and features of cultural heritage interest and broader landscape and visual effects on the site setting. The potential impacts are assessed and mitigation measures to reduce the impacts are outlined below.

The proposed Solar Farm is likely to have a negative effect on cultural heritage resources during the construction and operational phases of the development as summarised in *Table 11.1*. These potential impacts include direct and indirect effects. The direct effects would be physical effects on sites and features of cultural heritage interest within the site and would be associated with the construction phase. Indirect effects incorporate visual effects on the settings of sites in the broader landscape and would continue during the operational phase of the facility. Indirect effects will be removed after decommissioning of the facility but direct effects are not reversible, only avoidable.

**Table 11.1** *Impact characteristics: Impacts on Cultural Heritage*

| <b>Summary</b>              | <b>Construction</b>   | <b>Operation</b>   |
|-----------------------------|---|--|
| Project Aspect/<br>activity | (i) Disturbance of or damage to archaeological, cultural heritage sites or palaeontology resources associated with site preparation and construction activities.    | (iv) Visual or sense of place impact on cultural heritage features.                |
| Impact Type                 | Direct  | Indirect   |
| Receptors Affected          | (i) Archaeological and cultural heritage interests (buildings, ruins, graveyards etc.) within site clearance areas.<br><br>(ii) On-site fossils which may be found. | (iii) Homesteads and other historic structures or features and the heritage value. |

## 11.1 *DISTURBANCE OR DAMAGE TO ARCHAEOLOGY*

### 11.1.1 *Impact Description and Assessment*

#### *Construction Phase Impact*

Stone artefacts are distributed quite widely across the Study Area in proximity to water courses and pans. Early, Middle and perhaps Later Stone Age implements are found. None of the distributions observed during this survey appear to be in primary context and they do not appear to constitute “living sites”. They are not associated with bone or pottery which would increase their research potential. They are therefore assigned a low archaeological value.

There is a high degree of confidence that the construction of the solar facility will result in the destruction of some of these stone tool scatters, although the PV panels will clearly not be placed on the banks of streams or inside pans. The destruction of sites will be permanent.

#### **Box 11.1** *Summary Impact Assessment: Archaeology*

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**Nature:** The excavation activities associated with the Humansrus Solar PV facility will impact directly and negatively on the stone artefact scatters which have been identified in the Study Area.

**Impact Magnitude: Low**

- **Extent:** On-site
- **Duration:** Permanent
- **Intensity:** Medium

**Likelihood** – There is a **definite** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) MINOR (-VE)**

**Degree of Confidence:** The degree of confidence is **HIGH**.

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### 11.1.2 *Mitigating for Damage or Destruction of Archaeological Resources*

The objective of mitigation is to minimise impacts on archaeological resources.

#### *Construction Phase*

- No mitigation is proposed due to the low significance of the archaeological remains. However, if bones are discovered during excavations into the margins of the pans, then work must stop so that an archaeologist can examine the finds. If appropriate, they must immediately be reported to the South African Heritage Resources Agency (SAHRA). After assessment and if appropriate a permit must be obtained from the SAHRA or HNC to remove such remains.

### 11.1.3 *Residual Impact*

There will permanent loss of some stone tool scatters but this is considered to be a minor impact.

**Table 11.1** *Pre- and Post-Mitigation Significance: Damage or destruction to Archaeological Resources*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MINOR (-VE)                   | MINOR (-VE)                  |
| Operation    | N/A                           | N/A                          |

## 11.2 *CULTURAL LANDSCAPE IMPACT*

### 11.2.1 *Impact Description and Assessment*

#### *Operational Phase Impacts*

The cultural landscape comprises a mix of grassland which is used for grazing of livestock and horses, and natural environment to the south-east which is covered in wild olive trees. The north-west section of the Study Area has been transformed by the mining of red jasper. This cultural landscape is very common in large parts of the Northern Cape and it is not considered of high significance.

**Figure 11.1** *Summary Impact Assessment: Cultural Landscape*

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**Nature:** The excavation activities associated with the Humansrus Solar PV facility is unlikely to impact negatively on the Cultural Landscape of the Study Area.

**Impact Magnitude: Low**

- **Extent:** On-site
- **Duration:** Temporary
- **Intensity:** Low

**Likelihood:** Unlikely

**IMPACT SIGNIFICANCE (PRE-MITIGATION) MINOR (-VE)**

**Degree of confidence:** high

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### 11.2.2 *Mitigation of Cultural Landscape Impact*

No mitigation is required with respect to the Cultural Landscape.

### 11.2.3 *Residual Impact*

No residual impact is anticipated.

**Table 11.2 Pre- and Post- Mitigation Significance: Cultural Landscape**

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | N/A                           | N/A                          |
| Operation    | MINOR (-VE)                   | MINOR (-VE)                  |

**11.3 BUILT ENVIRONMENT AND GRAVES IMPACT**

**11.3.1 Impact Description and Assessment**

*Construction Phase Impacts*

The ruins of the old Humansrus farmstead are located within the Study Area. The ruined farmstead, shed and stone kraal/s are older than 60 years. However, they are in a bad condition and of very low significance. The outlines of workers’ cottages were also recorded although they too, are of low significance. No construction will occur within the old Humansrus farmstead.

There is also a family graveyard consisting of at least four graves although more may be present under adjoining vegetation. The graveyard is unfenced and in close proximity to the homestead and other farm buildings.

If the PV panels, offices or storage facilities are constructed in this area they will have a direct and negative impact on the graveyard. Human remains are accorded a high significance rating by the NHRA.

At least three stone cairns were discovered during the survey. They were found in the same vicinity as the three stone features (which may represent the foundations of workers’ cottages) and the stone kraals. It is possible that more cairns may occur in this particular area near the Humansrus farmstead (see mapped in constraints map – Figure 4.5).

It is not known whether these cairns represent burials or not. They do not have head or footstones, they are not clustered together, and they are not aligned to points of the compass. Elsewhere, archaeologists have found that cairns may be placed on top of burials, but they may merely represent geographical markers, or the result of agricultural activities.

If human remains are uncovered during the construction of the solar farm, this will delay the completion of the project due to the legal process which needs to be followed.

**Box 11.2 Summary Impact Assessment: Built Environment**

**Nature:** The excavation activities associated with the Humansrus Solar PV facility may impact directly and negatively on the Built Environment which has been identified in the Study Area.

**Impact Magnitude: Low**

- **Extent:** On-site
- **Duration:** Permanent
- **Intensity:** Low

**Likelihood:** Likely

**IMPACT SIGNIFICANCE (PRE-MITIGATION) MINOR (-VE)**

**Degree of confidence:** Medium

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**Box 11.3**

***Summary Impact Assessment: Graves***

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**Nature:** The excavation activities associated with the Humansrus Solar PV facility may impact directly and negatively on the family graveyard which has been identified in the Study Area, as well as on possible burial cairns scattered in the area.

**Impact Magnitude: High**

- **Extent:** On-site
- **Duration:** Permanent
- **Intensity:** Medium

**Likelihood:** Definite

**IMPACT SIGNIFICANCE (PRE MITIGATION) MAJOR(-VE)**

**Degree of confidence:** High for the graveyard Low for the stone cairns

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**11.3.2**

***Mitigation of Impact on Built Environment and Graves***

*Construction Phase*

- In view of the close proximity of the homestead to the family graveyard (which is of high significance), it is recommended that an area around the farmstead is fenced off and that no construction takes place within the fence.
- It is recommended that the farmstead is fenced off and that no development takes place within the established border.
- It is recommended that this area around the Humansrus homestead is avoided if possible. Alternatively, if development of the substation or access roads needs to be placed near the transmission lines, then it is recommended that an archaeologist should be asked to monitor construction in this particular area.
- Buffer zones (20 m) around built structures should be maintained during the construction phase to prevent damage to structures of cultural heritage interest.
- Should any human burials, archaeological or paleontological materials (fossils, bones, artefacts etc.) be uncovered or exposed during earthworks or excavations, they must immediately be reported to the NCH and/or South African Heritage Resources Agency (SAHRA). After assessment and

if appropriate a permit must be obtained from the SAHRA to remove such remains.

### 11.3.3 *Residual Impact*

Providing the above mitigation measures are implemented the impacts on built environment and graves will be reduced to moderate-minor (see *Table 11.3*).

**Table 11.3** *Pre- and Post-Mitigation Significance: Built Environment and Graves*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MAJOR-MODERATE (-VE)          | MODERATE-MINOR (-VE)         |
| Operation    | N/A                           | N/A                          |

## 11.4 *DISTURBANCE OR DAMAGE TO PALAEOLOGY*

### 11.4.1 *Impact Description and Assessment*

#### *Construction Phase Impact*

Impacts on palaeontological resources in the area will be confined to levelling and excavations for roads and foundations. If fossiliferous deposits are present, and if the recommended remediation is carried out, then this will represent a positive impact. Palaeontology benefits from excavation for roads and construction if this is carried out with the necessary collaboration and cooperation.

All planned development is southwest of the low hills to the northeast of the Study Area. These low hills appear as dark fingers of Daniëlskuil Formation ironstones on the aerial photograph. Any possible excavations into this formation in the Study Area, for foundations or road metal, will result a negligible impact on any potential palaeontology. This anyway would be restricted to the possible recovery of microfossils, which requires small samples collectable from numerous extant outcrops. The palaeontological potential and possible impact for the Daniëlskuil Formation are considered to be **negligible**.

The diamictites and conglomerates of the Makganyene Formation have more limited outcrop, but apart from possible stromatolites in dolomite and microfossils in chert layers, these predominantly glacial sediments are not expected to be fossiliferous. Any sampling for possible microfossils would be driven by external research interests and not rescue. The mapped outcrop of the Makganyene Formation falls outside the area with planned infrastructure, and hence the palaeontological impact is considered to be **negligible**.

The Ongeluk volcanics are exposed not only in the jasper mine, but also as flat carapaces and scree on the slopes around the abandoned southern Humansrus

farmstead. These volcanic rocks are not fossiliferous. The palaeontological potential is **negligible**.

The sandy valley fill of the Gordonia Formation of the Kalahari Group may contain Cenozoic terrestrial molluscan (snail) and mammalian fossils. It is not possible to predict if they are present, or if present, whether excavation will be deep enough to encounter them. A shallow seasonal watercourse crosses the central low-lying area of the farm. In various places subsurface gravel is exposed in a series of very shallow gullies and in one place in a dam excavation. Although these exposures contain scatters of stone artefacts, no fossil material was found in any of these exposures. The area around the water point was visited, as it was thought it may represent a former natural spring. There was no evidence of spring deposits, and the farmer indicated it was fed by a borehole. The palaeontological potential and possible impact for the valley fill sediments are considered to be **low to negligible**.

#### **Box 11.5** *Summary Impact Assessment: Palaeontology*

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**Nature:** The excavation activities associated with the construction of the Humansrus Solar PV Facility have the potential to have a direct negative impact on palaeontological finds if these occur in the affected areas. The discovery of palaeontological finds is positive in terms of increasing the body of knowledge related to palaeontology in the area if the recommended intervention is performed.

**Impact Magnitude: Low**

- **Extent:** On-site
- **Duration:** Permanent if fossils are encountered and destroyed.
- **Intensity:** Low

**Likelihood** Possible/unlikely

**IMPACT SIGNIFICANCE (PRE MITIGATION) MINOR (-VE)**

**Degree of confidence:** Medium (it is difficult to state confidently whether finds are likely or not)

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#### **11.4.2** *Mitigating for Damage or Destruction of Paleontological Resources*

The objective of mitigation is to minimise impacts on Paleontological Resources.

##### *Construction Phase*

- No intervention or remediation is recommended for excavations or levelling in the hard rock formations (as discussed above).
- If excavations in the sandy and gravelly valley fill sediments occurs, a qualified palaeontologist should be present. If the excavations reveal fossils, the find would need to be reported to the relevant heritage authorities (SAHRA in this case).

### 11.4.3 *Residual Impact*

No significant negative impacts are anticipated, the above mitigation measures will ensure any paleontological resources are protected if discovered on site.

**Table 11.5** *Pre- and Post-Mitigation Significance: Damage or destruction to Palaeontology*

| <b>Phase</b> | <b>Significance (Pre-mitigation)</b> | <b>Residual Impact Significance</b> |
|--------------|--------------------------------------|-------------------------------------|
| Construction | <b>MINOR (-VE)</b>                   | <b>NEGLIGIBLE</b>                   |
| Operation    | N/A                                  | N/A                                 |



## 12.1 BENEFITS FOR THE LOCAL ECONOMY

## 12.1.1 Impact Description and Assessment

The development of the proposed Solar Power Farm will result in spending in South Africa having a positive impact on the national, regional and local economy to varying degrees. Direct impacts such as employment and procurement associated with the project will have the most significant impact when compared to other indirect and induced economic impacts. The direct impacts will be most significant during the construction phase of the project, and are likely to have the largest influence on the local economy.

**Table 12.1** Impact Characteristics: Benefits for the Local Economy

| Summary                          | Construction   | Operation  |
|----------------------------------|--|--|
| Project Aspect/ activity         | Employment and Procurement of local contractors/workers.<br>Lease Agreements with directly affected farmers. | Employment and Procurement of local contractors/workers.<br>Lease Agreements with directly affected farmers. |
| Impact Type                      | Direct, indirect and induced positive impact.  | Direct, indirect and induced positive impact.  |
| Stakeholders/ Receptors Affected | Local community, Local Municipality, suppliers throughout South Africa and Directly Affected Landowners.     | Local community, Local Municipality, suppliers throughout South Africa and Directly Affected Landowners.     |

#### *Construction Phase Impacts*

##### Employment and training

The capital investment required for the 160MW Solar Power Farm is approximately R4.5 Billion. The construction phase will be approximately five to six months for every 30MW (totalling approximately 27 months for the full 160MW facility over a period of up to four years). It is estimated that for the construction phase activities, between 30 and 75 site construction jobs will be created for a 30MW facility (thus between 160 and 400 jobs will be created for a 160MW facility). Of these jobs, approximately five percent of the jobs will require highly skilled personnel; the remainder will comprise semi-skilled and unskilled workers. The types of skills that will be required for the construction phase include; road construction, site clearance, security, and general construction and assembly.

An estimated 33 percent of the population in the Local Municipality are employed. There is a high dependency on the employed population as approximately 23 percent are unemployed and 44 percent are economically inactive. It is intended that Intikon and its contractors will source the majority of the semi-skilled and unskilled workers from the local municipal area with the remainder being sourced regionally. The benefit to the local economy will be for the short-term i.e. for the duration of the construction phase. It is

unlikely that there are many people with the required skills available to fill highly-skilled and some of the semi-skilled opportunities at the local municipal level. There may be more suitably highly and semi-skilled people available at the provincial and national levels.

The construction work will create an opportunity for 'on-the-job' training thus increasing the general skills levels in the local area. The opportunities for skills development and training would extend through from skilled to unskilled personnel.

#### Procurement

During the construction phase the civil and other construction, specialised industrial machinery and building construction sectors will derive the greatest benefits. Local procurement will primarily benefit the civils and construction industry, hospitality and service industries (e.g. accommodation, catering, cleaning, transport, vehicle servicing and security services).

The highly specialised nature of the machinery required for the project will, however, require that the majority of the technical components be imported from specialist suppliers. The renewable energy sector is still developing in South Africa and as such the appropriate supplies and service providers are not available in the country; this may, however, change over time. The majority of the project spend will be on PV cells which will be imported, the balance of plant (buildings, substations etc) will be spent in South Africa.

#### Indirect spending

The project will lead to increased spending in the local economy via employment (increase in wages), and procurement of goods and services. This in turn will create further indirect spending and thus the generation of indirect and induced job opportunities.

### ***Construction Impact: Local Economy (including Procurement and Employment)***

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**Nature:** The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** via the spend in the local economy due to increase in wages etc.

**Impact Magnitude – Low**

- **Extent:** Employment and procurement of services will be created for South African's at a **local, provincial and national** level depending on skills and capacity availability.
- **Duration:** Employment and procurement will be generated during the construction phase and will therefore be **short-term**.
- **Intensity:** The intensity will be **low** as there will be a relatively small number of jobs created and procurement of goods and services in the local area during the construction phase.

**Likelihood** – There is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT) – LOW POSITIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that actual figures are not yet available due to the early stage of this project.

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#### *Operational Phase Impacts*

##### Direct employment

Operation of the Solar Power Farm will largely be automated with routine scheduled services and maintenance. The operations team will comprise of between six to 10 full time jobs for every 30MW (thus between 30 and 50 jobs for a 160MW facility). It is estimated that the majority of the operations team will be semi-skilled and unskilled labour and therefore potentially sourced locally. Approximately three to five percent of the staff will be highly skilled, the majority of jobs will include security, equipment and infrastructure maintenance, and cleaning.

Much of the knowledge regarding operations and maintenance will be acquired 'on-the-job'. It is envisaged that operations personnel will be increasingly trained up and qualified to high levels over the operational period, consistent with demonstrated capability and ambition.

##### Direct procurement

Similar to the construction phase, the majority of goods and services will be highly specialised and technical in nature with the majority of operational expenditure being imported. Locally procured services will include maintenance work for balance of plant facilities, 24 hour security and cleaning resulting in an ongoing investment injection. Over time, as businesses develop locally to meet the needs of the renewables sector, levels of procurement may increase.

##### Indirect and induced benefits

Apart from the direct benefits resulting from the operational spend and direct jobs created, the spending of those employed directly would result in a positive indirect impact on the local and regional economy.

The potential for the proposed project and other future projects to result in greater impacts on local economies and the South African economy as a whole is primarily dependent on economies of scale. Initially import content will be high. However, if the sector grows in size it should provide opportunities for growth of the local supply chain and the additional benefit that would flow from this. The introduction of a large-scale renewable energy programme could provide local economic opportunities for component manufacturers.

**Box 12.2**      ***Operational Impact: Local Economy (including Procurement and Employment)***

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**Nature:** The benefit to the local economy will be **direct** via employment and procurement of services and **indirect** and induced benefits via the spend in the local economy due to increase in wages; local supply chain etc.

**Impact Magnitude – Low**

- **Extent:** Employment and procurement of service will be created for South African’s at a **local, provincial and national** level depending on skills and capacity availability.
- **Duration:** Employment and procurement of services will be generated during the operational phase over a period of 25 years and will therefore be **long-term**.
- **Intensity:** The intensity will be **low** given the relatively small number of employees and procurement spend.

**Likelihood** – There is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT) – LOW POSITIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that actual figures are not yet available due to the early stage of this project.

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**12.1.2**      ***Mitigation and Enhancement***

The objective of enhancement is to optimise opportunities for employment and procurement of local labour and services, wherever possible, or alternatively that procurement at a regional or national level should take place.

Community Development:

- Intikon will develop a Corporate Social Investment Programme in collaboration with the local Municipality and community representatives to ensure alignment with the key needs identified through the Integrated Development Planning process.
- All projects will be aligned with Intikon’s policies.

Employment and procurement

It is important to recognise that the nature of the project dictates that the main PV infrastructure and the specialist skills (five percent of the highly skilled positions) will have to come from outside of South Africa (and/or outside the

province). However, the objective of enhancement is to optimise opportunities for employment/procurement of local people/suppliers or alternatively that employment and procurement opportunities are enhanced on a regional or national basis, where possible.

The following measures will be implemented to ensure that employment of local people is maximised and procurement of local, regional and national services is maximised:

- Intikon will establish a recruitment and procurement policy which sets reasonable targets for the employment of South African and local residents/suppliers (originating from the local municipality) and promote the employment of women as a means of ensuring that gender equality is attained. Criteria will be set for prioritising, where possible, local (Groenwater, Danielskuil and local municipal) residents/suppliers over regional or national people/suppliers. All contractors will be required to recruit and procure in terms of Intikon's recruitment and procurement policy.
- Intikon will work closely with relevant local authorities, community representatives and organisations to ensure that the use of local labour and procurement is maximised. This may include:
  - sourcing and using available databases on skills/employment-seekers that local authorities may have;
  - advertising job opportunities and criteria for skills and experience needed through local and national media (and community notice boards <sup>(1)</sup>); and
  - conducting an assessment of capacity within the Local Municipality and South Africa to supply goods and services over the operational lifetime of the project.
- Intikon will develop a local preferential procurement and supply policy to benefit local procurement of goods and services where it meets the required standards.
- Intikon to work closely with the suppliers to provide the required training to the workers. The training provided will focus of development of local skills.
- Ensure that the appointed project contractors and suppliers have access to Health, Safety, Environmental and Quality training as required by the Project. This will help to ensure that they have future opportunities to provide goods and services to the sector.

(1) As requested in the public meeting on 22 February 2011..

### 12.1.3 *Residual Impact*

The implementation of the above measures would ensure that the construction and operation impacts remain of low positive significance. The pre- and post- enhancement impacts are compared in *Table 12.2*.

**Table 12.2** *Pre- and Post- Enhancement Significance: Local Economy (including Procurement and Employment)*

| Phase        | Significance (Pre-enhancement) | Residual Impact Significance |
|--------------|--------------------------------|------------------------------|
| Construction | LOW (+VE)                      | LOW (+VE)                    |
| Operation    | LOW (+VE)                      | LOW (+VE)                    |

## 12.2 *INCREASED SOCIAL ILLS LINKED TO INFLUX OF WORKERS AND JOB-SEEKERS*

### 12.2.1 *Impact Description and Assessment*

**Table 12.3** *Impact Characteristics: Increased Social Ills*

| Summary                          | Construction   | Operation  |
|----------------------------------|--|--|
| Project Aspect/ activity         | Construction staff on site and potential influx of job-seekers.  | Operation staff on site.   |
| Impact Type                      | Direct (as related to workers) and indirect (as related to job-seekers), negative impact                     | Direct, negative impact  |
| Stakeholders/ Receptors Affected | Local residents of the area, most specifically landowners of directly affected farms and neighbouring farms. | Local residents of the area, most specifically landowners of directly affected farms and neighbouring farms. |

#### *Construction Phase Impacts*

The introduction of construction activity can sometimes bring about social change in an area. This change is typically due to an influx of workers and job-seekers into the area. As a worst-case scenario, these changes have been known to increase levels of crime, drug and alcohol abuse, increased incidence of sex workers, and domestic violence.

The project area is located outside town in an area predominantly characterised by agricultural and mining activity. The population density of the immediate area is relatively low, however the Groenwater settlement is located approximately five km from the site. The only people living on the proposed project site and on the neighbouring farms are the landowners and their farm workers. An influx of 'outsiders' could pose a risk to existing family structures and social networks however it is unlikely that there will be a significant influx of job-seekers given the size of the project and the existing alternate economic opportunities in the surrounding area.

Intikon has estimated that between 30 and 75 site construction jobs will be created for a 30MW facility (thus between 160 and 400 jobs will be created for a 160MW facility). If the construction period is phased there will be fewer workers on site at any one time and it is estimated that the construction time will be between five and 27 months. Due to the early phase of this project, specific arrangements have not yet been made regarding worker accommodation and the terms of employment. Postmasburg and Danielskuil are located approximately 30 km from the site; it is possible for workers to be accommodated in these areas and transported to the site on a daily basis. Groenwater is located only five km from the site, however, it would not be appropriate to locate outside workers in the area. It is possible that workers could be recruited from Groenwater, thus avoiding potential conflict and accommodation and transport requirements. If workers are employed from outside the area, they are likely to be male and potentially living away from their families.

The most likely social ills that may occur as a result of the increased number of workers and job-seekers are described below.

- **Theft of livestock** could potentially occur as the site is located on the R385 (Postmansburg to Lime Acres).
- **Petty crimes** (e.g. theft of tools, household items and farm materials) on the project affected farm and neighbouring farms could occur.

An increase in disposable income within the project area (among workers) could result in an **increase in alcohol and drug abuse, increased incidences of prostitution and casual sexual relations**. These sexual relations could result in increased incidents of HIV/AIDS and increased numbers of teenage and unwanted pregnancies.

Given the relatively small numbers of workers and job-seekers, it is likely that this impact will be limited. In addition, the skilled workers are more likely to be housed in formal accommodation facilities and are unlikely to exacerbate this impact and the low skilled workers are likely to be local residents and as such already part of the community social structures and family networks.

### Box 12.3

#### *Construction Impact: Increased Social Ills*

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**Nature:** The social ill likely to accompany the project would be regarded as an **indirect, negative** impact.

**Impact Magnitude – Low**

- **Extent:** It is anticipated that the potential social ill will have impacts at the **local** scale.
- **Duration:** The social ill likely to accompany the Project are expected to be **short-term**.
- **Intensity:** The intensity will be **low** as people should be able to adapt with relative ease.

**Likelihood –** There is a **medium** likelihood that this impact will occur during the construction phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – LOW NEGATIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that the extent of the influx of job-seekers is unknown.

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#### *Operation Phase Impacts*

During the operational phase, there are going to be a limited number of workers and/or contractors working on the project (10 full time jobs for every 30MW thus between 30 and 50 jobs for a 160MW facility). It is unlikely that there will be any social ill linked to the project activities, the majority of the unskilled workers should be hired from the local municipality and thus will already be part of existing social structures and networks.

The landowner raised concern regarding the relatively high levels of crime (in particular theft) currently in the area. He confirmed that security will be required at the site to secure the project infrastructure.

### Box 12.4

#### *Operational Impact: Increased Social Ills*

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**Nature:** The social ill likely to accompany the project would be regarded as an **indirect, negative** impact.

**Impact Magnitude –Low**

- **Extent:** It is anticipated that the potential social ill will have impacts at the **local** scale.
- **Duration:** The social ill likely to accompany the Project are expected to be **temporary**.
- **Intensity:** The intensity will be **low** as people should be able to adapt with relative ease.

**Likelihood –** There is a **medium** likelihood that this impact will occur during the construction phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – LOW NEGATIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that the extent of the influx of job-seekers is unknown.

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### 12.2.2

#### *Mitigation*

The objectives of mitigation are:



- to limit, where possible, social ills brought about by the construction and operation of the Solar Power Farm; and
- to ensure that Contractors manage their workers in such a way that the impacts on local communities are limited.

Specific measures include:

- Intikon and the appointed contractors to develop an induction programmes, including a Code of Conduct, for all workers (Intikon and contractors including their workers) directly related to the project. A copy of the Code of Conduct to be presented to all workers and signed by each person.
- The Code of Conduct must address the following aspects:
  - respect for local residents;
  - respect for farm infrastructure and agricultural activities;
  - no hunting or unauthorised taking of products or livestock;
  - zero tolerance of illegal activities by construction personnel including: unlicensed prostitution; illegal sale or purchase of alcohol; sale, purchase or consumption of drugs; illegal gambling or fighting;
  - compliance with the Traffic Management Plan and all road regulations; and
  - description of disciplinary measures for infringement of the Code and company rules.
- If workers are found to be in contravention of the Code of Conduct, which they signed at the commencement of their contract, they will face disciplinary procedures that could result in dismissal. Stock theft should be noted as a dismissible offence.
- All workers will reside in nearby towns or guest houses. No workers will be accommodated in formal or informal construction camps on nearby farms. This stipulation is to be reflected in all Subcontractors agreements.
- Intikon will implement a grievance procedure that is easily accessible to neighbouring farmers and other stakeholders, through which complaints related to contractor or employee behaviour can be lodged and responded to. Intikon will respond to all such complaints. Key steps of the grievance mechanism include:
  - circulation of contact details of ‘grievance officer’ or other key contact;
  - awareness raising among local communities (including all directly affected and neighbouring farmers) regarding the grievance procedure and how it works; and
  - establishment of a grievance register to be updated by Intikon, including all responses and response times.
- Intikon and its contractors will develop and implement an HIV/AIDS policy and information document for all workers directly related to the

project. The information document will address factual health issues as well as behaviour change issues around the transmission and infection of HIV/AIDS. Intikon will make condoms available to employees and all contractor workers.

- The construction workers (from outside the area) should be allowed to return home over the weekends or on a regular basis to visit their families; the contractor should make the necessary arrangement to facilitate these visits.

### 12.2.3 *Residual Impact*

The implementation of the above mitigation measures would reduce the construction and operation impacts from low to negligible significance. The pre- and post-mitigation impacts are compared in *Table 12.4*.

**Table 12.4** *Pre- and Post- Mitigation Significance: Increased Social Ills*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | LOW (-VE)                     | NEGLIGIBLE                   |
| Operation    | LOW (-VE)                     | NEGLIGIBLE                   |

## 12.3 *DISRUPTION TO AGRICULTURAL ACTIVITIES*

### 12.3.1 *Impact Description and Assessment*

**Table 12.5** *Impact Characteristics: Disruption to Agricultural Activities*

| Summary                          | Construction   | Operation  |
|----------------------------------|--|--|
| Project Aspect/ activity         | Construction activities.                             | Operation activities.                                |
| Impact Type                      | Direct, negative impact.                             | Direct, negative impact.                             |
| Stakeholders/ Receptors Affected | Directly affected farmers, and neighbouring farmers. | Directly affected farmers, and neighbouring farmers. |

#### *Construction Phase Impacts*

During the construction phase, there will be some disruption to agricultural activities. There will be site clearance, road construction, assembly and installation of PV cells, as well as the construction of associated infrastructure.

The livestock currently grazes over the full extent of the farms. During construction, the farmers will need to keep their livestock in an alternate area/camp to the construction area in order to ensure that the stock are not harmed or lost as a result of the construction activities.

The high numbers of light and heavy vehicles that will be passing through the farm might cause damage to farm roads, gates and fencing. Any damage to this infrastructure could also lead to stock losses or cause inconvenience to the land owners.

As indicated in Section 4 it is possible that the adjacent railway line will be used to transport the PV panels to site which would reduce this impact.

### **Box 12.5**      *Construction Impact: Disruption to Agricultural Activities*

---

**Nature:** The disruption to agricultural activities would be regarded as a **direct, negative** impact.

#### **Impact Magnitude – Low**

- **Extent:** It is anticipated that the disruption to agricultural activities will be experienced at the **local** level.
- **Duration:** The disruptions will be experienced during the construction phase and as such will be **short-term**.
- **Intensity:** The intensity will be **low** as the farmers will be able to adapt with relative ease to the disruption.

**Likelihood** – There is a **high** likelihood that this impact will occur during the construction phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – LOW NEGATIVE**

**Degree of Confidence:** The degree of confidence is **high**.

---

#### *Operation Phase Impacts*

The disruption of farm activities during the operational phase is going to be significantly less. There will be substantially fewer vehicles on site and the stock will be able to graze in all areas of the farm, with the exception of the project area.

### **Box 12.6**      *Operational Impact: Disruption to Agricultural Activities*

---

**Nature:** The disruption to agricultural activities would be regarded as a **direct, negative** impact.

#### **Impact Magnitude – Low**

- **Extent:** It is anticipated that the disruption to agricultural activities will be experienced at the **local** level.
- **Duration:** The disruptions will be experienced throughout the operation phase and as such will be **long-term**.
- **Intensity:** The intensity will be **low** as the farmers will be able to adapt with relative ease during the operational phase.

**Likelihood** – There is a **medium** likelihood that this impact will occur during the operational phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – LOW NEGATIVE**

**Degree of Confidence:** The degree of confidence is **high**.

---

### **12.3.2**      *Mitigation*

The objective of mitigation is to minimise the disruption to agricultural activities as related to the construction and operational phase activities.

Specific measures include:

- Intikon to fence/secure the project area prior to construction to ensure that the stock remains out of the area under construction and operation.
- All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal (as outlined in *Section 12.2*).
- All directly affected and neighbouring farmers will be able to lodge grievances with Intikon using the Grievance Procedure as outlined in *Section 12.2*.

### 12.3.3 *Residual Impact*

The implementation of the above mitigation measures would reduce the construction and operation impacts from low to negligible significance. The pre- and post-mitigation impacts are compared in *Table 12.6*.

**Table 12.6** *Pre- and Post- Mitigation Significance: Disruption to Agricultural Activities*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | LOW (-VE)                     | NEGLIGIBLE                   |
| Operation    | LOW (-VE)                     | NEGLIGIBLE                   |

## 12.4 *LOSS OF AGRICULTURAL LAND*

### 12.4.1 *Impact Description and Assessment*

**Table 12.7** *Impact Characteristics: Loss of Agricultural Land*

| Summary                          | Construction and Operation  |
|----------------------------------|---|
| Project Aspect/ activity         | Land take for the construction and operation of the Solar Power Farm.                                     |
| Impact Type                      | Direct, negative impact.  |
| Stakeholders/ Receptors Affected | Directly affected land owners, Local, Provincial and National Government (most specifically agriculture). |

#### *Construction and Operation Phase Impacts*

The land parcels are currently zoned for agricultural use and would require rezoning prior to construction of the proposed Solar Power Farm. The construction and operation of the proposed Solar Power Farm will require that approximately 20 percent of the affected farm will be taken for the construction and operation of the facility. The proposed area is currently used as grazing by livestock (predominantly cattle, sheep and goats).

The landowner has considered this land loss and may be required to down-scale the agricultural activities on the farm slightly. The landowner does not have any specific development plans for his farm.

---

**Nature:** The impact on agricultural land is going to be experienced as a **direct, negative** impact.

**Impact Magnitude – Medium**

- **Extent:** The impact on agricultural land resulting from the construction and operation activities will occur at the **local/regional** level.
- **Duration:** This impact will occur for the duration of the construction and operation phases and will therefore be **long-term**.
- **Intensity:** The intensity will be **medium** as some agricultural land will be lost however, there is unlikely to be a significant downscaling of agricultural activities.

**Likelihood** – There is a **high** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MEDIUM NEGATIVE \***

**Degree of Confidence:** The degree of confidence is **high**.

---

## 12.4.2

**Mitigation**

The objective of mitigation is to minimise the loss of agricultural land resulting from project related activities during construction and operational phases.

Specific measures include:

- Animals (specifically sheep) should be able to continue grazing on the land between the PV cells; the area should be treated as one of the camps.
- Intikon to minimise the damage caused by construction activities to the farmland by ensuring strict compliance with construction plans and worker ‘Code of Conduct’.
- Any damage to vegetation will be rehabilitated in accordance with mitigation proposed for the rehabilitation of natural vegetation in *Section 7*.

## 12.4.3

**Residual Impact**

The implementation of the above mitigation measures would ensure that the construction and operation impacts reduce from medium to low significance. The pre- and post-mitigation impacts are compared in *Table 12.8*.

Table 12.8

**Pre- and Post- Mitigation Significance: Loss of Agricultural Land**

| Phase                      | Significance (Pre-mitigation) | Residual Impact Significance |
|----------------------------|-------------------------------|------------------------------|
| Construction and Operation | <b>MEDIUM (-VE)</b>           | <b>LOW (-VE)</b>             |

## 12.5 TOURISM ACTIVITIES

### 12.5.1 Impact Description and Assessment

Table 12.9 Impact Characteristics: Tourism Activities

| Summary                          | Construction   | Operation |
|----------------------------------|--|-----------|
| Project Aspect/ activity         | Construction and operation of the Solar Power Farm.  |           |
| Impact Type                      | Direct, positive impact (for most receptors); and<br>Direct, negative impact (for some receptors).                       |           |
| Stakeholders/ Receptors Affected | Directly affected landowner, neighbouring landowners, road users (particularly passing tourists), and interested people. |           |

#### *Construction and Operation Phase Impacts*

There is currently no available research reflecting the specific impacts on tourism by Solar Power Farms (in particular PV facilities). There is, however, no known tourism activity surrounding the proposed project site. The area surrounding the proposed project site is already disturbed, it is surrounded by some mining activity, a railway line and a level-crossing over the railway line, the R385 (Postmasburg to Lime Acres), the D3381 to Lime Acres, and a 66 kV electricity transmission line.

The construction of the Solar Power Farm will result in some visual and traffic disturbances that may, in turn, impact on the general sense of place in the area (see Section 12.6). These factors are unlikely to have a significant impact on potential tourism activities due to the limited duration of the construction activities as well as the limited amount of tourism.

Operation of the Solar Power Farm is not predicted to have a generally negative impact on tourism-related activities in the broader region and those passing the site; this is, however, quite subjective and will be dependent on each individual's particular set of values.

On the contrary, given that this will be one of the first Solar Power Farms in South Africa, it is anticipated that people may be interested in viewing the facility – especially given the rise in the so-called “green tourist” market. The facility may attract interested “green tourists” to the area, in turn generating revenue and opportunity for the development of tourist accommodation as well as related activities, such as mountain biking routes, 4x4 trails, walks and viewing areas.

---

**Nature:** The impact on tourism activities is most likely going to be a **direct, positive** impact. It will, however, be experienced as a direct, negative impact by some receptors who will not value the change to the area (see Box 12.9).

**Impact Magnitude – Low**

- **Extent:** The impacts on tourism linked to the operational activities will occur at the **local** level.
- **Duration:** This impact will occur throughout the construction and operation phases, and will therefore be **long-term**.
- **Intensity:** The intensity will be **medium to low** for those who appreciate seeing the Solar Power Farm; however, it will not offer in-depth interaction and learning.

**Likelihood** – There is a **medium** likelihood that this impact will occur.

**IMPACT SIGNIFICANCE (PRE-ENHANCEMENT) – LOW POSITIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that there are no recorded experiences relating to similar developments in South Africa or other developing countries.

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**Nature:** The impact on tourism activities could be experienced as a **direct, negative** impact by some receptors who will not value the change to the area. It is, however, most likely going to be a direct, positive impact for most receptors (see Box 12.8).

**Impact Magnitude – low**

- **Extent:** The impacts on tourism linked to the construction and operation activities will occur at the **local** level.
- **Duration:** This impact will occur throughout the project life, and will therefore be **long-term**.
- **Intensity:** The intensity will be **negligible** given that there are no known tourism establishments in the area.

**Likelihood** – There is a **low** likelihood that this impact will occur during the operational phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – NEGLIGIBLE NEGATIVE**

**Degree of Confidence:** The degree of confidence is **medium** given that there are no recorded experiences relating to similar developments in South Africa or other developing countries.

---

**Mitigation**

The objective of mitigation is to enhance the positive impacts and minimise the negative impacts of the Solar Power Farm on tourism activities in the area.

Specific measures include:

- Apply all mitigation measures to reduce the visual impacts as presented in *Section 10.1.2*.

- Intikon will work with the Local Municipality and local tourism organisations to raise awareness about the Solar Power Farm.
- Intikon will establish an information kiosk/notice board on the site boundary/entrance and at the closest information centre to facilitate education of the public about the need and benefits of the project. This is aimed at instilling the concept of sustainability and creating awareness by engaging the community and local schools. Information posters and signage will be made available at the kiosk to provide more information about the Solar Power Farm. These should be presented in the appropriate languages to maximise the benefits.

### 12.5.3 *Residual Impact*

The implementation of the above mitigation measures should enhance the positive operational impacts from low to medium (positive) significance and ensure that the negative operation impacts remain of negligible (negative) significance. The pre- and post-mitigation impacts are compared in *Table 12.10*.

**Table 12.10** *Pre- and Post- Mitigation Significance: Tourism Activities*

| Phase              | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------------|-------------------------------|------------------------------|
| Operation POSITIVE | LOW (+VE)                     | MEDIUM (+VE)                 |
| Operation NEGATIVE | NEGLIGIBLE                    | NEGLIGIBLE                   |

## 12.6 *SENSE OF PLACE*

### 12.6.1 *Impact Description and Assessment*

**Table 12.11** *Impact Characteristics: Sense of Place*

| Summary                          | Construction   | Operation  |
|----------------------------------|--|--|
| Project Aspect/ activity         | Clearing and stripping of vegetation and topsoil for construction of project infrastructure.<br>Increased traffic.<br>Visual and other disturbances.<br>Influx of workers. | Operation of Solar Power Farm and associated infrastructure - visibility of built structures, lighting, operational traffic.<br>Traffic slowing resulting from people looking at the Solar Power Farm. |
| Impact Type                      | Direct, negative impact (as related to project activities).  | Direct, negative impact (as related to project activities).<br>Indirect, negative impact (as related to non-project activities e.g. traffic slowing)   |
| Stakeholders/ Receptors Affected | Directly affected landowners, neighbouring landowners, local communities, tourists, and drivers passing on the R385.   | Directly affected landowners, neighbouring landowners, local communities, tourists, and drivers passing on the R385.   |



### *Construction Phase Impacts*

The proposed project site is located in an area that is disturbed; primarily agriculture and mining activities. The site lies alongside the R385 (Postmansburg to Lime Acres) and the D3381 to Lime Acres. There is also a railway line that runs adjacent to the western boundary of the site with a level-crossing over the railway line in the southwest of the site and a 66 kV electricity transmission line running parallel to the railway. A limestone quarry and the Lime Acres Finsch Diamond Mine (operated by De Beers Consolidated Mines) are located approximately five km to the south-east of the site. The area is busy given the large amount of farming and mining activities and the passing traffic on the R385. During the construction phase, there will be an increase in the number of people (workers), visual disturbances, dust and traffic resulting directly from the construction activities.

These factors are going to further disturb the area. The construction period is limited in time; as such, these disturbances should not continue for longer than five to 27 months.

#### **Box 12.10**      *Construction Impact: Sense of Place*

---

**Nature:** The impact on sense of place is most likely going to be experienced as a **direct, negative** impact by the directly affected stakeholders.

##### **Impact Magnitude - Low**

- **Extent:** The impact on sense of place linked to the construction activities will occur at the **local** level.
- **Duration:** This impact will occur for the duration of the construction phase and will therefore be **short-term**.
- **Intensity:** The intensity will be **low** given the already disturbed environment; as such the receptors will be able to adapt with relative ease.

**Likelihood** - There is a **medium** likelihood that this impact will occur during the construction phase.

##### **IMPACT SIGNIFICANCE (PRE-MITIGATION) - LOW NEGATIVE**

**Degree of Confidence:** The degree of confidence is **high**.

---

### *Operation Phase Impacts*

Solar Power Farms and their associated infrastructure can change the visual character of the area by introducing industrial structures and machinery. The area is, however, already disturbed (as described above). The project infrastructure will include the PV cells themselves, as well as electrical transmission lines, sub-stations, maintenance staff, vehicles and maintenance equipment.

Given the already disturbed area in which the proposed project will be located, there were no concerns raised regarding the visual and other disturbance impacts related to the Solar Farm.

The directly affected landowners were not concerned about the transformed visual environment and did not think that the facility would have a significant impact on the sense of place. The majority of receptors are unlikely to experience further disruptions to the sense of place. Disruptions and disturbances will be intermittent in nature. Those receptors that are passing through the area are most likely going to value the experience of viewing the Solar Farm en route to other destinations.

**Box 12.11**      ***Operational Impact: Sense of Place***

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**Nature:** The impact on sense of place is most likely going to be experienced as a **direct, negative** impact by the affected stakeholders.

**Impact Magnitude – Low**

- **Extent:** The impact on sense of place linked to the operational phase will occur at the **local** level.
- **Duration:** This impact will occur for the duration of the operational phase and will therefore be **long term**.
- **Intensity:** The intensity will be **low** as the disturbances will be intermittent and the receptors will be able to adapt with relative ease.

**Likelihood** – There is a **low** likelihood that this impact will occur during the operation phase.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – NEGLIGIBLE NEGATIVE**

**Degree of Confidence:** The degree of confidence is **high**.

---

**12.6.2**      ***Mitigation***

The objective of mitigation is to minimise, wherever possible, the impacts on sense of place by ensuring that all visual impacts (amongst others) are addressed during construction and operation.

Specific measures include:

- Apply all mitigation measures to reduce the visual impacts as presented in *Section 10*.
- No recruitment will take place at the Humansrus farm to ensure that influx of jobseekers does not occur at the project site.
- The construction activities will be undertaken in accordance with a schedule that will be approved by the landowners.
- All workers will agree to the Code of Conduct and be aware that contravention of the Code could lead to dismissal (as outlined in *Section 12.2*).

- All directly affected and neighbouring farmers will be able to lodge grievances with Intikon using the Grievance Procedure as outlined in *Section 12.2*.
- No construction or operational employees are to be housed in formal or informal construction camps or informal (un-serviced) housing on neighbouring farms.

### 12.6.3 *Residual Impact*

The implementation of the above mitigation measures would reduce both the construction impacts from medium to low significance. The pre- and post-mitigation impacts are compared in *Table 12.12*.

**Table 12.12** *Pre- and Post- Mitigation Significance: Sense of Place*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | LOW (-VE)                     | NEGLIGIBLE                   |
| Operation    | NEGLIGIBLE                    | NEGLIGIBLE                   |

## 13.1 AIR QUALITY

## 13.1.1 Impact Description and Assessment

This section considers the impacts to air quality during the construction and operation of the Humansrus Solar Farm. The two primary areas of interest are:

- dust generated during clearing of vegetation and earthmoving activities and by vehicles on site travelling along unpaved roads; and
- emissions from the exhaust of vehicles during construction.

**Table 13.1** Impact Characteristics: Air Quality

| Summary                          | Construction   | Operation                         |
|----------------------------------|--|-----------------------------------|
| Project Aspect/ activity         | Vehicle movement on gravel roads.<br>Soil disturbance and excavating.<br>Emissions from construction vehicles and equipment. | Vehicle movement on gravel roads. |
| Impact Type                      | Direct negative  | Direct negative                   |
| Stakeholders/ Receptors Affected | Affected landowners.<br>Road users.<br>Construction personnel.   | Affected landowners.              |

#### *Construction Phase Impacts*

The presence of dust can be a nuisance to site users and nearby receptors. Dust is expected to be generated during the construction phase of the project by trucks driving on gravel roads and through construction activities that may disturb the soil. The levels of dust are expected to be highly variable and dependent on the time of year, the intensity of the activity and the prevailing winds at the time of construction.

Dust becomes airborne due to the action of winds on material stockpiles and other dusty surfaces, or when thrown up by mechanical action, for example the movement of tyres on a dusty road or activities such as excavating. The quantity of dust released during construction depends on a number of factors, including:

- the type of construction activities occurring (e.g. crushing and grinding);
- volume of material being moved;
- the area of exposed materials;
- the moisture and silt content of the materials;
- distances travelled on unpaved surfaces; and
- the mitigation measures employed.

Dust emissions are exacerbated by dry weather and high wind speeds. The impact of dust also depends on the wind direction and the relative locations of dust sources and receptors.

Construction vehicles and other construction equipment will generate exhaust emissions. It is not anticipated that large volumes of exhaust emissions will be generated.

Minimal dust generation is expected to occur during the operational phase of the project by maintenance vehicles along the gravel access roads, which will be infrequent. Therefore, impact of dust generated during the operation phase is not considered any further.

### **Box 13.1**      *Construction Impact: Dust*

---

**Nature:** Construction activities that generate dust would result in a **negative direct** impact on receptors in the area.

**Impact Magnitude – Low**

- **Extent:** The extent of the impact is **local**, limited to within 200m of construction activities.
- **Duration:** The duration would be **short-term** for the duration of construction.
- **Intensity:** The site is sparsely populated and on site activities will continue largely undisturbed, the dust is therefore unlikely to impact any sensitive receptors, the intensity can be considered **low**.

**Likelihood** – There is a **definite** likelihood of dust generation.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR**

**Degree of Confidence:** The degree of confidence is **high**.

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### **Box 13.2**      *Construction Impact: Emissions*

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**Nature:** Construction activities that generate emissions would result in a **negative direct** impact on people in the area.

**Impact Magnitude – Low**

- **Extent:** The extent of the impact is **local** limited to within 5 km of **site**.
- **Duration:** The duration would be **short-term** for the duration of construction.
- **Intensity:** The site is sparsely populated, emissions are likely to be low and there are no sensitive receptors close by, the intensity can be considered **low**.

**Likelihood** – There is a **definite** likelihood of emissions generation.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR -VE**

**Degree of Confidence:** The degree of confidence is **high**.

---

### **13.1.2**      *Mitigation Measures*

Due to the amount of truck traffic that is anticipated during construction and the potentially strong winds that move through the area, mitigation measures

are required. Given that the site is located in a water-scarce area, wetting of surfaces to minimise dust is not recommended.

*Construction phase*

- Vehicles travelling on gravel roads will not exceed a speed of 40 km/h.
- Stockpiles of dusty materials will be enclosed or covered by suitable shade cloth or netting to prevent escape of dust during loading and transfer from site.
- Vehicles are to be kept in good working order and serviced regularly to minimise emissions.
- All directly affected and neighbouring farmers and local residents will be able to lodge grievances with Intikon Energy using the Grievance Procedure (included in the EMP) regarding dust emissions that could be linked to the project.

*Operation phase*

- Vehicles travelling on gravel roads should not exceed a speed of 40 km/h.

**13.1.3 Residual Impacts**

If mitigation measures are implemented, the overall significance will be negligible.

**Table 13.2 Pre- and Post- Mitigation Significance: Dust and Emissions**

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MINOR (-VE)                   | NEGLIGABLE                   |
| Operation    | MINOR (-VE)                   | NEGLIGABLE                   |

**13.2 TRAFFIC IMPACT**

**13.2.1 Impact Description and Assessment**

This section considers the impacts to traffic and road users during the construction and operation of the Humansrus Solar Farm.

**Table 13.3 Impact Characteristics: Traffic**

| Summary                          | Construction   | Operation   |
|----------------------------------|--|---|
| Project Aspect/ activity         | Delivery of PV components and construction equipment.<br>Delivery of concrete.<br>Construction personnel commuting to and from site. | Operational personnel commuting to and from site.<br>Delivery of replacement PV components. |
| Impact Type                      | Direct negative  | Direct negative   |
| Stakeholders/ Receptors Affected | Road users.<br>Affect land owner.  | Road users.<br>Affect land owner.   |

### *Construction Phase Impacts*

During the construction phase of the Solar Farm, there will be an increase in vehicle movement to and from the site. This has the potential to impact on traffic along the final transport route and on the site.

The increase in traffic could create noise, dust and safety impacts for other road users and people living or working within close proximity to the roads selected transport route. In addition, the increased volume of traffic along the final transport route will increase the wear and tear on these roads and possibly lead to deterioration in road conditions.

The construction phase of the project will take between 5 - 6 months and 4 years and during this time the impact on traffic levels will be intermittent and temporary in nature. It is also envisaged that the nearby railway line will be utilised for transport. It is estimated that approximately 1067 containers (one container per semitrailer) will be required for the transport of the solar panels to the site for the full 160MW (the 30MW phases will require approximately 200 containers). This number would be reduced should it be possible to use the adjacent railway line.

#### **Box 13.3** *Construction Impact: Traffic*

---

**Nature:** Construction activities that increase traffic would result in a **negative direct** impact on people who use the roads along the final transport route.

**Impact Magnitude – Medium**

- **Extent:** The extent of the impact is **regional** as the potential impact will extend along the selected transport route.
- **Duration:** The duration would be **short-term** for the duration of construction.
- **Intensity:** The intensity is likely to be **medium** given that the increase in traffic will temporary, but may create a nuisance and impact on the safety of other road users.

**Likelihood** – There is a **high** likelihood of increased traffic.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MODERATE (-VE)**

**Degree of Confidence:** The degree of confidence is **medium**.

---

### *Operation Phase Impacts*

A limited number of people will be employed permanently at the site during the operation phase of the Solar Farm; these employees will have to commute to and from site on a daily basis. The Solar Farm will need to be accessed several times a month for general maintenance by one to two vehicles. Infrequent deliveries of replacement parts may be made during the lifespan of the Solar Farm. Traffic impacts associated with the operation of the facility will be largely limited to the site.

### Box 13.4 *Operation Impact: Traffic*

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**Nature:** Operation activities that increase traffic would result in a **negative direct** impact on people who use the site.

**Impact Magnitude – Low**

- **Extent:** The extent of the impact is **local** as impact would be restricted to the site.
- **Duration:** The duration would be **long-term** for the operation of the REF.
- **Intensity:** The intensity is likely to be **low** given that the increase in traffic minimal.

**Likelihood –** There is a **definite** likelihood of increased traffic.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR (-VE)**

**Degree of Confidence:** The degree of confidence is **high**.

---

### 13.2.2 *Mitigation Measures*

#### *Construction*

- During construction, arrangements and routes for abnormal loads (if required) must be agreed in advanced with the relevant authorities and the appropriate permit must be obtained for the use of public roads.
- A grievance procedure will be established whereby any complaints by neighbours are recorded and responded to.

#### *Operation*

- During operation, if abnormal loads are required for maintenance, the appropriate arrangements will be made to obtain the necessary transportation permits and the route agreed with the relevant authorities to minimise the impact of other road users.

### 13.2.3 *Residual Impacts*

If mitigation measures are implemented, the overall significance will be reduced to minor negative for construction and negligible for operational phase.

**Table 13.4** *Pre- and Post- Mitigation Significance: Traffic*

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MODERATE (-VE)                | MINOR (-VE)                  |
| Operation    | MINOR (-VE)                   | NEGLECTIBLE                  |

### 13.3 *WASTE AND EFFLUENT*

Waste and effluent will be generated during the construction and operational phases of the Solar Farm.



13.3.1 *Impact Description and Assessment*

Table 13.5 *Impact Characteristics: Waste and Effluent*

| Summary                          | Construction  | Operation   |
|----------------------------------|---|---|
| Project Aspect/ activity         | Construction activities including excavation, unpacking of turbine equipment, general eating facilities on site, general office facilities. | Maintenance activities and general office facilities. |
| Impact Type                      | Direct negative   | Direct negative                                       |
| Stakeholders/ Receptors Affected | Affect land owner. Surrounding habitat  | Affect land owner. Surrounding habitat                |

*Construction Phase Impacts*

The construction of the Solar Farm will produce a variety of waste products. The initial solid waste generated on site will be the cleared vegetation and soil overburden. Construction rubble will be produced throughout the construction phase from activities such as the construction of roads, the construction of buildings and concrete pouring. Packaging material will be accumulated from unpacking of turbine equipment and off cuts will be produced through various construction activities. General waste will be produced by site personnel including wrapping from food, bottles and cans. Effluent will be produced from toilet facilities (temporary chemical toilets).

It is anticipated that waste and effluent will be temporarily stored on site before it is removed by an appropriate contractor. There is potential for waste and effluent stored on site to leach into the soil and/ or groundwater, causing harm to the natural environment and potentially contaminating the soil and/ or groundwater. There is a risk that silt and wash water could enter water courses on site.

Box 13.5 *Construction Impact: Waste and Effluent*

**Nature:** Construction activities that produce waste would result in a **negative direct** impact on the site.

**Impact Magnitude - Low**

- **Extent:** The extent of the impact is **local** as impact would be restricted to the site.
- **Duration:** The duration would be **short-term** as impacts could persist after the construction of the Solar Farm.
- **Intensity:** The intensity is likely to be **low** as the construction phase is temporary and the site is sparsely populated.

**Likelihood** - It is **unlikely** that waste and effluent generated on site will impact on the soil and/ or groundwater and other site users.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) - MINOR (-VE)**

**Degree of Confidence:** The degree of confidence is **high**.

### *Operation Phase Impacts*

General waste, such as office waste, and effluent from onsite toilet facilities will be produced during the operation phase of the Solar Farm by onsite personnel. However, this will be limited as there is only likely to be a very small number permanent personnel on site and a small team of personnel expected during maintenance activities.

Waste produced during the operation phase will be minimal.

#### **Box 13.6**      *Operation Impact: Waste and Effluent*

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**Nature:** Operation activities that produce waste would result in a **negative direct** impact on the site.

**Impact Magnitude – Low**

- **Extent:** The extent of the impact is **local** as impact would be restricted to the site.
- **Duration:** The duration would be **long-term** during the operation of the Solar Farm.
- **Intensity:** The intensity is likely to be **low** owing to the small number of staff on site.

**Likelihood** – It is **unlikely** that oils and hydraulic fluid will be spilt or large quantities of general waste generated on site.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) – MINOR (-VE)**

**Degree of Confidence:** The degree of confidence is **high**.

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#### **13.3.2**      *Mitigation Measures*

The potential impacts associated with the generation of waste and effluent can be minimised through careful mitigation measure.

##### *Design*

- A suitable area for waste skips must be selected, away from water courses, and included in the site layout plan.

##### *Construction*

- All waste must be separated into skips for recycling, reuse and disposal. Recycled waste will be removed by an appropriate contractor, as per the EMP recommendations.
- Vegetative material will be kept on site and mulched after construction to be spread over the disturbed areas to enhance rehabilitation of the natural vegetation.
- Effluent from temporary staff facilities will be collected in storage tanks, which will be emptied by a sanitary contractor.

- Effluent from concrete washings etc will be contained within a bunded area.
- All hazardous and liquid waste materials, including any contaminated soils, will be stored in a bunded area and disposed of by a licensed contractor.
- Effluent and stormwater run-off will be discharged away from water courses (drainage channels, streams or dams).
- Steel off-cuts will be re-used or recycled, as far as possible.
- Materials that cannot be re-used or recycled will be placed in a skip and removed from site to a licensed municipal disposal site.

*Operation*

- Used oil stored on site must be stored in an impervious container, within a bunded area.
- General waste must be removed from site by a licensed contractor.

**13.3.3 Residual Impacts**

If mitigation measures given above and listed in the EMP are implemented, the overall significance will be negligible during the construction phase and operation phases of the Humansrus Solar Farm.

**Table 13.6 Pre- and Post- Mitigation Significance: Waste and Effluent**

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MINOR (-VE)                   | NEGLIGIBLE                   |
| Operation    | MINOR (-VE)                   | NEGLIGIBLE                   |

**13.4 HEALTH AND SAFETY LINKED TO CONSTRUCTION AND OPERATION ACTIVITIES**

**13.4.1 Impact Description and Assessment**

**Table 13.7 Impact Characteristics: Health and Safety**

| Summary                          | Construction             | Operation                                       |
|----------------------------------|--------------------------|---|
| Project Aspect/ activity         | Construction activities. | Operational activities                          |
| Impact Type                      | Direct, negative impact  | Direct, negative impact                         |
| Stakeholders/ Receptors Affected | Construction personnel.  | Landowner, other sites users, onsite personnel. |

### *Construction Phase Impacts*

Construction activities will involve working with heavy machinery and large turbine components. During the construction phase there will be open excavation pits on site, heavy vehicles will be moving on site and large. These construction activities are potentially dangerous if not managed appropriately.

#### **Box 13.7**      ***Construction Impact: Health and Safety***

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**Nature:** The impact on health and safety will be a **direct, negative** impact.

**Impact Magnitude - Low**

- **Extent:** The health and safety risks linked to the construction activities will occur at the **local** level.
- **Duration:** This impact will be for the construction phase, and will therefore be for the **short-term**.
- **Intensity:** The intensity will be **low** as those who are directly affected will (in most cases) be able to adapt.

**Likelihood** - It is **unlikely** that this impact will occur during the construction phase as potential accidents can be mitigated through a health and safety plan.

**IMPACT SIGNIFICANCE (PRE-MITIGATION) -MINOR (-VE)**

**Degree of Confidence:** The degree of confidence is **Medium**

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#### **13.4.2**      ***Mitigation***

The objective of mitigation is to manage construction and operation so that impacts on health and safety risks to local residents, contractors, employees and animals are reduced.

##### *Construction*

- A health and safety plan must be developed prior to the commencement of construction to identify and avoid work related accidents. This plan must be adhered to by the appointed construction contractors and meet Occupational Health and Safety Act (OHSAct), Act 85 of 1993, requirements.
- The healthy and safety plan referred to in the above section must be adhered to by the appointed construction contractors.
- Potentially hazardous areas must be clearly demarcated (i.e. unattended excavation foundations).
- Appropriate PPE must be worn by all construction personnel.

#### **13.4.3**      ***Residual Impact***

The implementation of the above mitigation measures would reduce the construction impacts from low to negligible. The pre- and post-mitigation impacts are compared in *Table 13.8*.

**Table 13.8 Pre- and Post- Mitigation Significance: Health and Safety**

| Phase        | Significance (Pre-mitigation) | Residual Impact Significance |
|--------------|-------------------------------|------------------------------|
| Construction | MINOR (-VE)                   | NEGLIGIBLE                   |

**13.5 ELECTROMAGNETIC INTERFERENCE**

**13.5.1 Impact Description and Assessment**

Electromagnetic Interference (EMI) is not a concern during the construction phase and can only occur during the operation of the Solar Farm.

Large PV plants can cause electromagnetic interference (EMI). The Solar Farm can be likened to a large antenna, converting energy into electricity, but at the same time producing EMI. This can potentially interfere with electronic systems at a local level (on site). Two potential impacts are electromagnetic perturbations (Daniel Iulian COSTIA, Mihai Octavian POPESCU, Claudia Laurența POPESCU Aurelian CRACIUNESCU, 2010) and electromagnetic noise ((*Northern Arizona Wind and Sun, 2011*). The negative EMI associated with the proposed Humansrus Solar Farm is likely to be low to negligible.

Appropriate mitigation measures for reducing noise in electronic systems include the shielding, cancellation, filtering and suppression (*Northern Arizona Wind and Sun, 2011*).

If problems do arise once the Solar Farm is operational suitable mitigation measures should be put into place, and residual impacts are not anticipated to be significant.

There has been a substantial increase in renewable energy developments (and wind farms in particular) recently as legislation in South Africa is evolving to facilitate the introduction of Independent Power Producers (IPPs) and renewable energy into the electricity generation mix. The focus of the renewable energy developments have largely been in the Northern, Western and Easter Cape.

The preceding impact assessment chapters have assessed the impacts associated with the Solar Farm at Humansrus largely in isolation. It is important to, and there is a legislated requirement to, assess cumulative impacts associated with a proposed development. The scale at which the cumulative impacts are assessed is important. For example the significance of the cumulative impact on the regional or national economy will be influence by solar farm developments throughout South Africa, while the significance of the cumulative impact on visual amenity may only be influence by solar farm developments that are in closer proximity to each other (30km to 60km apart). At this stage it is not feasible to look at the solar farm developments at a national scale and for practical purposes a sub-regional scale has been selected. There are no other known other solar farm developments in the within a 60km radius of the site.

In the absence of any known proposed Solar Farm developments within a 60km radius of the site, to assess cumulative impacts it is necessary to speculate on the possible cumulative effects of other types of developments in the vicinity which could have similar impacts e.g. loss of agricultural.

In the context of the proposed Greonwater Solar Farm, the loss of agricultural land, habitat loss, visual impact and cultural heritage is not a significantly high negative impact when viewed in isolation. However, should other developments in the area (such residential, industrial or other REFs) lead to similar impacts, the respective cumulative effects may become significant.

In contrast, the cumulative socio-economic impacts are likely to be positive as a result of the benefits to the local, regional and national economy through employment and procurement of services.

Cumulative impacts and benefits on various environmental and social receptors will occur to varying degrees with the development of several renewable energy facilities in South Africa. The degree of significance of these cumulative impacts is difficult to predict without detailed studies based on more comprehensive data/information on each of the receptors and the site specific developments.

The alignment of renewable energy developments with South Africa's National Energy Response Plan and the global drive to move away from the

use of non-renewable energy resources and to reduce greenhouse gas emissions is undoubtedly positive. The economic benefits of renewable energy developments at a local, regional and national level have the potential to be significant. However, there is a lack of understanding of the cumulative impacts on other environmental and social receptors such as birds, visual amenity and landscape character of the affected areas.

There is a need for strategic planning and cooperation to better understand the cumulative impacts that may result from promoting renewable energy.

The impact assessment focussed on impacts associated with the construction and operational phase of the Humansrus Solar Farm. A detailed decommissioning and rehabilitation plan should be developed prior to decommissioning the facility and associated infrastructure. This plan should include, but not be limited to, management of socio-economic aspects such as employment creation, removal, re-use and recycling of materials and vegetative rehabilitation to prevent erosion. The decommissioning activities will be similar to construction activities and therefore recommendations outlined to manage construction phase impacts should be adhered to during decommissioning. Management actions should focus on the rehabilitation of disturbed areas and the removal of infrastructure.

It should be noted that should the applicant decide to decommission the Solar Farm at some future date, the act of decommissioning would likely trigger a requirement to undertake an environmental assessment, as would presently be the case in terms of Activity 27 of GN R544 of 2010. This environmental assessment would assess the impacts and opportunities of decommissioning in far greater detail than is possible at this time.



### 16.1 OVERVIEW

The aim of the EIA for the proposed Humansrus Solar Farm is to provide information to facility decision-making that will contribute to environmentally sound and sustainable development.

The EIA has identified and assessed a number of issues relating to Intikon's proposed PV Solar Farm at Humansrus. This chapter provides an overview of the EIA findings.

The Site Layout Alternative 2 is based on the sensitivity of the site as established in the EIA.

This draft EIA report provides a description of the EIA process followed to date including the public participation process that has been undertaken and which will continue through to the submission of the Final Impact Assessment Report to the Department of Environmental Affairs for decision-making.

The potential impacts associated with the development are summarised below and should be considered both in the context of the project rationale, the recommended mitigations measures in the preceding chapters and the discussion of cumulative impacts in the previous chapter.

### 16.2 SUMMARY OF IMPACTS IDENTIFIED AND ASSESSED FOR CONSTRUCTION PHASE

**Table 16.1** *Summary of pre-mitigation and residual impacts of the bio-physical and socio-economic environment during construction*

|                          | Section | Impact   | Pre-mitigation Significance | Residual Impact Significance |
|--------------------------|---------|--|-----------------------------|------------------------------|
| Flora                    | 7.1     | Loss of vegetation                                       | MODERATE-MINOR (-VE)        | MINOR (-VE)                  |
| Habitat loss             | 7.2     | Destruction, disturbance                                 | MINOR (-VE)                 | MINOR (-VE)                  |
| Fauna                    | 7.3     | Habitat loss - Destruction, disturbance & displacement   | MODERATE (-VE)              | MINOR (-VE)                  |
| Topsoil                  | 8.1     | Compaction and removal                                   | MODERATE (-VE)              | MINOR (-VE)                  |
| Surface and ground water | 8.2     | Soil compaction, leaks and spills and increased sediment | MINOR (-VE)                 | MINOR (-VE)                  |
| Noise                    | 9.1     | Construction noise                                       | MODERATE (-VE)              | MINOR-MODERATE (-VE)         |
| Archaeology              | 11.1    | Loss of stone tool scatters                              | MINOR (-VE)                 | MINOR (-VE)                  |

|                              | Section | Impact  | Pre-mitigation Significance | Residual Impact Significance |
|------------------------------|---------|---|-----------------------------|------------------------------|
| Built Environment and Graves | 11.3    | Impact on old farmstead, shed and kraal, loss or damage to graves | MAJOR-MODERATE (-VE)        | MODERATE-MINOR (-VE)         |
| Palaeontology                | 11.4    | Loss of paleontological resources                                 | MINOR (-VE)                 | NEGLIGIBLE                   |
| Socio-economic               | 12.1    | Benefits to the local economy                                     | MINOR (+VE)                 | MINOR (+VE)                  |
|                              | 12.2    | Increased social ills   | MINOR (-VE)                 | NEGLIGIBLE                   |
|                              | 12.3    | Disruption to agricultural activities                             | MINOR (-VE)                 | NEGLIGIBLE                   |
|                              | 12.4    | Loss of agricultural land   | MODERATE (-VE)              | MINOR (-VE)                  |
|                              | 12.6    | Sense of place  | MINOR(-VE)                  | NEGLIGIBLE                   |
| Other Impacts                | 13.1    | Dust and emissions  | MINOR (-VE)                 | MINOR (-VE)                  |
|                              | 13.2    | Traffic   | MODERATE (-VE)              | MINOR (-VE)                  |
|                              | 13.3    | Waste and effluent  | MINOR (-VE)                 | NEGLIGIBLE                   |
|                              | 13.4    | Health and safety   | MINOR (-VE)                 | NEGLIGIBLE                   |

### 16.2.1 *Bio-physical and Socio-economic Construction Phase Impacts*

#### *Impact on Flora*

During the construction phase it is definite that the impact magnitude on flora will be medium to low negative. The extent of this impact will be contained to the site itself. Although this is a long term impact on the flora it expected that the intensity will be medium to low. The impact significance will be moderate, however with the implementation of the proposed mitigation measures outlined within *Section 7.1.2*, the magnitude and significance would be reduced to low and minor negative respectively.

#### *Impact on Habitat*

Construction activities will have a low - medium direct negative impact on habitat. The extent of the impact will be restricted to the site. The duration of the impact is likely to be medium term as ecology will be altered beyond the completion of construction; however the vegetation will recover over time. Small areas of original habitat will be lost, but this is not significant in the broader context, since the Humansrus site does not contain any unique and highly sensitive habitat. The impact significance will be minor-moderate, however with the implementation of the proposed mitigation measures outlined within *Section 7.2.2*, the magnitude and significance would be reduced to low and minor negative respectively.

#### *Impact on Fauna*

During the construction phase it is definite that construction activities would have a medium magnitude, direct negative impact on fauna. The extent of this impact will be contained to the site itself. Although this is a long term impact on the fauna it expected that the intensity will be medium, since although certain red listed species are known to occur in the region, the

likelihood of their occurrence on the site itself is considered to be low. It is also probable that other species that do occur on the site (amphibians, reptiles, birds and mammals) would tend to move away from the noise and disturbance caused by construction activities. The impact significance will be moderate, however with the implementation of the proposed mitigation measures outlined within *Section 7.3.2*, the magnitude and significance would be reduced to low and minor negative respectively.

#### *Impact on topsoil*

It is likely that a medium direct negative impact on topsoil will occur during the construction phase. This impact largely relates to removal of topsoil and compaction as a result of building the Solar Farm and associated infrastructure such as roads. The significance is considered to be moderate, but with the implementation of the proposed mitigation measures in *Section 8.1.2*, this significance would drop to minor negative.

#### *Impact on surface and ground water*

Ground and surface water has the potential to be impacted by soil compaction, increased sediment load or through leaks and spills during construction. The extent of this impact will be local and short term unless there is a significant spill that has long term implications. With the completion of the construction phase, the impact should largely be non-existent. The expected magnitude and significance of this impact is considered to be low and minor respectively and with the mitigation measures listed in *Section 8.2.2*, it would remain low and minor negative.

#### *Noise Impact*

The impact of noise primarily pertains to the construction phase of the project and is a direct negative impact as a result of construction activities. It will be at a local level and of short term duration. It will definitely occur and is considered to be of moderate impact significance. Implementing the mitigation measures in *Section 9.1.2* will reduce the magnitude of this impact and consequently lower the significance to minor-moderate.

#### *Impact on Archaeology*

Stone artefact scatters will be impacted directly and negatively by the construction of the Humansrus Solar Farm. Although this impact is highly likely to be permanent it is considered to be of a low magnitude and minor significance. No mitigation measures are proposed as a result of the low magnitude and minor significance of this impact.

#### *Impact on Built Environment and Graves*

It is highly likely that the construction of the Humansrus Solar Farm will have a direct negative effect on the built environment and graves on the site. The damage or loss would be permanent. With respect to the built environment

this is not a major significance however, it is of major significance and high magnitude with respect to the family graves. The implementation of the construction mitigation measures will reduce this potential impact to moderate-minor and medium negative respectively.

#### *Palaeontology Impacts*

The excavation activities associated with the construction of the Humansrus Solar Farm have the potential to have a direct negative impact on palaeontological finds if these occur in the affected areas. It is possible that fossils may be found and thus permanently destroyed, however, this is considered to be of a low and minor negative magnitude and significance respectively. The discovery of palaeontological finds is positive in terms of increasing the body of knowledge related to palaeontology in the area if the recommended intervention in *Section 11.4.2* is performed.

#### *Socio-economic Benefits*

The benefit to the local economy will be direct via employment and procurement of services and indirect via the money spent in the local economy due to increase in wages etc. The expected likely magnitude of this impact is low. The extent of the employment and procurement of services that will be created for South African's at a local, provincial and national level will depend on skills and capacity availability. The intensity will be low as there will be a relatively small number of jobs created and procurement of goods and services in the local area during the construction phase. The expected significance will be minor positive even with the proposed enhancement measures regarding community development, employment and procurement.

#### *Increased Social Ills*

The social ills that are likely to accompany the project can be regarded as indirect and negative with an expected low magnitude. The social ills primarily relate to an expected influx of workers and job seekers during the construction phase, with associated potential social problems such as alcoholism. The extent of the impact would be local and for a short term. It is likely that it would occur and therefore the impact significance is considered to be minor negative dropping to negligible if the proposed mitigation measures in *Section 12.2.2* are implemented.

#### *Disruption of Agricultural Activities*

The disruption of agricultural activities during the construction phase would be regarded as a direct, negative impact with a magnitude of low. This disruption would occur at a local level, specifically on site with the loss of agricultural land to the Solar Farm, although it is possible that some form of agriculture may be possible around the Solar Farm after construction. Livestock grazing in the area would also have to cease during construction. The disruption is therefore considered to be short term and of a low intensity.

The overall significance is considered to be minor negative dropping to negligible with the proposed mitigation measures in *Section 12.3.2*.

#### *Loss of Agricultural land*

The impact on agricultural land resulting from the construction phase will be direct, negative and of a medium magnitude. Agricultural land will be lost for the construction of the Solar Farm. The impact will at a local level and will be permanent. However the intensity is considered to be medium and that it is unlikely to result in a significant down scaling of agricultural activity. The significance can be considered to be moderate negative, but this is reduced to minor negative with the proposed mitigation measures in *Section 12.4.2*.

#### *Impact on Sense of Place*

The impact on sense of place is most likely going to be experienced as a direct, negative impact by the directly affected stakeholders at a local level for the duration of the construction phase. During the construction phase, there will be an increase in the number of people (workers), visual disturbances, dust and traffic resulting directly from the construction activities. Given the already disturbed environment the intensity of the impact is considered to be low and as is the magnitude and significance (minor) of the impact. With the mitigation measures in *Section 12.6.2*, this significance level drops to negligible.

#### *Dust and Emissions*

Construction activities that generate dust would result in a direct negative impact on receptors in the area. The extent of this would be local and probably limited to within 200 m of the construction activities. The impact would also be short term being limited to the construction phase. The site is sparsely populated and on site activities will continue largely undisturbed, the dust is therefore unlikely to impact any sensitive receptors, the intensity can be considered low, as is the magnitude and significance (minor).

Similarly, construction activities that generate emissions would result in a negative direct impact on people in the area. The extent of this impact is also local limited to within 5km and of short term duration. As the site is sparsely populated, emissions are likely to be low and there is no sensitive receptors close by, the intensity can be considered low, along with the significance (minor) and magnitude.

With the proposed mitigation measures in *Section 13.1.2*, the impact significant can be regarded as negligible.

#### *Traffic Impact*

Construction activities that increase traffic would result in a negative direct impact on people who use the roads along the final transport route. The extent of the impact is regional as the potential impact will extend along the

selected transport route. The intensity is likely to be medium given that the increase in traffic will short term, but may create a nuisance and impact on the safety of other road users. Therefore the magnitude and impact significance is considered to be medium and moderate negative respectively. The implementation of the proposed mitigation measures in *Section 13.2.2* would reduce this significance to minor negative.

#### *Waste and Effluent*

It is highly likely that construction activities that produce waste would result in a negative direct impact on the site. The extent of the impact is local as impact would be restricted to the site and short term for the duration of the construction phase. There is a low likelihood that waste and effluent generated on site will impact on the soil and/ or groundwater and other site users. And the intensity is likely to be low as the construction phase is temporary and the site is sparsely populated. Therefore the magnitude and impact significance can be considered to be low and minor negative respectively, and will remain low with mitigation measures proposed in *Section 13.3.2*.

#### *Health and Safety*

The impact on health and safety will be a direct negative impact relating to risks linked to the construction activities at a local level. The duration will be short term and of a low intensity. Therefore the magnitude and significance can be considered to be low and minor negative respectively. With the appropriate mitigation measures recommended in *Section 13.4.2*, this significance can be reduced to negligible.

### 16.3 SUMMARY OF IMPACTS IDENTIFIED AND ASSESSED FOR OPERATIONAL PHASE

**Table 16.2** *Summary of residual bio-physical and social residual impacts during the operational phase of the project*

|                         | Section | Impact   | Pre-mitigation Significance | Residual Impact Significance |
|-------------------------|---------|--|-----------------------------|------------------------------|
| Flora                   | 7.1     | Loss of vegetation                                       | MINOR (-VE)                 | MINOR (-VE)                  |
| Habitat loss            | 7.2     | Destruction, disturbance                                 | MODERATE-MINOR (-VE)        | MINOR (-VE)                  |
| Fauna                   | 7.3     | Habitat loss - Destruction, disturbance & displacement   | MODERATE (-VE)              | MINOR (-VE)                  |
| Avifauna                | 7.4     | Disturbance, collisions and electrocutions               | MODERATE (-VE)              | MINOR (-VE)                  |
| Topsoil                 | 8.1     | Compaction and erosion                                   | MINOR (-VE)                 | MINOR (-VE)                  |
| Surface and groundwater | 8.2     | Soil compaction, leaks and spills and increased sediment | MINOR (-VE)                 | MINOR (-VE)                  |
| Visual Impact           | 10.1    | Visual impact rural landscape                            | MAJOR (-VE)                 | MODERATE (-VE)               |

|                    | Section        | Impact                                     | Pre-mitigation Significance | Residual Impact Significance |
|--------------------|----------------|--|-----------------------------|------------------------------|
| Cultural Landscape | 11.2           | Cultural heritage visual or sense of place | MINOR (-VE)                 | MINOR (-VE)                  |
| Socio-economic     | 12.1           | Benefits to the local economy              | MINOR (+VE)                 | MINOR (+VE)                  |
|                    | 12.2           | Increased social ills                      | MINOR (-VE)                 | NEGLIGIBLE                   |
|                    | 12.3           | Disruption to agricultural activities      | MINOR (-VE)                 | NEGLIGIBLE                   |
|                    | 12.4           | Loss of agricultural land                  | MODERATE (-VE)              | MINOR (-VE)                  |
|                    | 12.5           | Tourism activities                         | MINOR (+VE)                 | MODERATE(+VE)                |
|                    |                |  | NEGLIGIBLE                  | NEGLIGIBLE                   |
| 12.6               | Sense of Place | NEGLIGIBLE                                 | NEGLIGIBLE                  |                              |
| Other Impacts      | 13.1           | Dust and emissions                         | MINOR (-VE)                 | NEGLIGIBLE                   |
|                    | 13.2           | Traffic                                    | MINOR (-VE)                 | NEGLIGIBLE                   |
|                    | 13.3           | Waste and effluent                         | MINOR (-VE)                 | NEGLIGIBLE                   |
|                    | 13.5           | Electromagnetic interference               | MINOR (-VE)                 | NEGLIGIBLE                   |

### 16.3.1 *Bio-physical and Socio-economic Construction Phase Impacts*

#### *Impact on Flora*

It is likely that the routine operational and maintenance activities of the Humansrus Solar Farm may result in negative direct impacts on the natural vegetation. Most disturbances would have occurred during the construction phase; therefore the expected impact magnitude and significance is low and minor negative respectively and would remain so with the proposed mitigation measures in *Section 7.1.2*, as some vegetation may grow back. The intensity of the impact is low; the extent is on the site and of long term duration.

#### *Impact on Habitat*

Operational activities would result in a negative direct impact of habitat loss on the Solar Farm site. The extent of the impact is local, not affecting habitat outside the development footprint. The duration would be long-term as the ecology of the area would be affected until the project stops operating (i.e. over 25 years). The habitat is likely to change and be altered as a result of the Solar Farm. While some species may move away as a result of this, others may come. It is unlikely the habitat loss will have a significant impact on sensitive species and therefore the intensity is considered to be low. The overall magnitude and significance is considered to be low and minor negative respectively and would remain so with the proposed mitigation measures in *Section 7.2.2*.

#### *Impact on Fauna*

As with flora on the site there is a medium probability that the routine operational and maintenance activities of the Humansrus Solar Farm may result in negative direct impacts on the fauna. The intensity of the impact is

again considered to be low as the extent is on the site, although of a long term duration. It is likely that the fauna will adapt over time to the Solar Farm, with some animals moving away and others coming in. The impact magnitude and significance is therefore low and minor negative respectively. Providing the mitigation measures in *Section 7.3.2* are implemented, the significance should remain low negative.

#### *Impact on Avifauna*

During the operational phase of the Solar Farm, the disruptive and destructive activities with regards to habitat loss associated with the construction phase will have ceased. No additional habitat destruction is anticipated during routine operation and maintenance of the facility. However, avifauna may be impacted by disturbance associated with human activity, maintenance vehicles around Solar Farm infrastructure and the additional pylons and power lines that may lead to collisions and electrocutions.

It is likely that the avifauna will be directly negatively impacted by the operation phase of the Solar Farm. The extent would be local, not directly affecting birds outside the foot print of the site. The duration is likely to be long term with low-medium intensity. The overall magnitude and significance of the impact is considered to be Medium-Low and moderate- minor negative respectively. With the proposed mitigation measures in *Section 7.4.2*, less will be reduced to Low negative.

#### *Impact on Topsoil*

It is likely that routine operational and maintenance activities may result in a negative direct impact on the soils of the site whereas PV panels acting as wind breaks result in a positive direct impact on soils of the site, reducing the possibility of wind erosion. The extent of this impact would be local with long term duration. The intensity is low and the magnitude and significance is considered to be low and minor negative respectively. The mitigation measures in *Section 8.1.2* would ensure the significance remains minor negative.

#### *Impact on Surface and Groundwater*

Increased sediment loads in drainage channels, spills and leaks during routine operational and maintenance activities and reduced groundwater recharge may result in a negative direct impact on surface- and groundwater. The extent of the impact is local since the impacts are limited predominantly to the boundaries of the site or in the vicinity of the site. The duration for contamination would be short to long-term depending on the size and nature of the spill. The duration for increased sediment loads and reduced groundwater recharge would be long-term. The intensity is low since the size of a spill is likely to be small given the limited volume of product to be stored onsite. Intensity for increased sediment load will be medium and for reduced groundwater recharge low since the natural groundwater recharge from rainfall in the area is low. The overall magnitude and significance is



considered to be low and minor negative respectively, and would remain so with the implementation of the proposed mitigation measures in *Section 8.2.2*.

#### *Visual Impact*

The construction of the Solar Farm at Humansrus may alter the visual character of the landscape, as these features are in contrast to the rural surrounding landscape. Given that the area is not a pristine landscape, with mining activities in the general area, that there are no important scenic or tourist resources, that the area is sparsely populated and that there are already Eskom power lines and a railway line across the site, it is not believed that the proposed solar energy facility would constitute a fatal flaw in terms of visual and landscape considerations, provided that the mitigation measures are adopted. The operational activities would result in a negative direct impact on the visual landscape in the area surrounding the site. The extent of the impact is local, as the facility will be hardly visible beyond 15km from the site. The duration would be long-term since it will persist for as long as the facility remains operational. The intensity will be high, as the Solar Farm will be highly visible from the main road on site but it will not be visible from surrounding dwellings. The magnitude and significance is considered to be medium-high negative and moderate-major negative respectively. The implementation of the mitigation measures proposed in *Section 10.1.2* will reduce this impact to moderate negative.

#### *Cultural Landscape Impact*

The cultural landscape comprises a mix of grassland which is used for grazing of livestock and horses, and natural environment to the south-east which is covered in wild olive trees. The north-west section of the Study Area has been transformed by the mining of red jasper. This cultural landscape is very common in large parts of the Northern Cape and it is not considered of high significance. The excavation activities associated with the Humansrus Solar Farm is unlikely to impact negatively on the Cultural Landscape of the Study Area. The impact is restricted to the site and although the facility is there for a long term, the intensity of the impact is considered to be low. The overall magnitude is low negative and significance is minor negative and will remain so as no mitigation measures are proposed.

#### *Socio-economic Benefits*

The benefit to the local economy will be direct via employment and procurement of services and indirect via the money spent in the local economy due to increase in wages etc. The expected likely magnitude of this impact is low. The extent of the employment and procurement of services that will be created for South African's at a local, provincial and national level will depend on skills and capacity availability. The intensity will be low as there will be a relatively small number of jobs created and procurement of goods and services in the local area during the operational phase. The expected significance will be minor positive even with the proposed enhancement measures regarding community development, employment and procurement.

### *Increased Social Ills*

During the operational phase, there are going to be a limited number of workers and/or contractors working on the project (10 full time jobs for every 30MW thus between 30 and 50 jobs for a 160MW facility). It is unlikely that there will be any social ill's linked to the project activities, the majority of the unskilled workers should be hired from the local municipality and thus will already be part of existing social structures and networks. The social ill's likely to accompany the project would be regarded as an indirect, negative impact. It is anticipated that the potential social ill's will have impacts at the local scale. The social ill's likely to accompany the project are expected to be temporary. The intensity will be low as people should be able to adapt with relative ease. The impact magnitude and significance is considered to be minor negative and negligible with the mitigation measures in *Section 12.2.2*.

### *Disruption of Agricultural Activities*

The disruption to agricultural activities would be regarded as a direct, negative impact. It is anticipated that the disruption to agricultural activities will be experienced at the local level. The disruptions will be experienced throughout the operation phase and as such will be long-term. The intensity will be low as the farmers will be able to adapt with relative ease during the operational phase. It is likely that this impact will occur during the operational phase. The magnitude of significance is considered to be minor negative and negligible with the mitigation measures in *Section 12.3.2*.

### *Loss of Agricultural land*

The impact on agricultural land resulting from the operational phase will be direct, negative and of a medium magnitude. Agricultural land will be lost for the operational phase of the Solar Farm. The impact will be at a local level and will be permanent. However the intensity is considered to be medium and that it is unlikely to result in a significant down scaling of agricultural activity. The significance can be considered to be moderate negative, but this is reduced to minor negative with the proposed mitigation measures in *Section 12.4.2*.

### *Tourism Activities*

Tourism activities have the potential for both positive and negative impacts.

The impact on tourism activities is most likely going to be a direct, positive impact. It will, however, be experienced as a direct, negative impact by some receptors who will not value the change to the area. The impacts on tourism linked to the operational activities will occur at the local level. This impact will occur throughout the construction and operation phases, and will therefore be long-term. The intensity will be medium to low for those who appreciate seeing the Solar Farm; however, it will not offer in-depth interaction and learning. It is likely that this impact will occur. The

magnitude and significance of this impact is low positive. The implementation of the *Section 12.5.2* mitigation measures should enhance the positive operational impacts from minor to moderate (positive) significance.

The impact on tourism activities could be experienced as a direct, negative impact by some receptors who will not value the change to the area. It is, however, most likely going to be a direct, positive impact for most receptors. The impacts on tourism linked to the construction and operation activities will occur at the local level. This impact will occur throughout the project life, and will therefore be long-term. The intensity will be negligible given that there are no known tourism establishments in the area. It is unlikely that this impact will occur during the operational phase and as such the magnitude and significance is considered to be low negative and negligible respectively. The implementation of *Section 12.5.2* mitigation measures should ensure that the negative operation impacts remain of negligible (negative) significance.

#### *Impact on Sense of Place*

Solar Power Farms and their associated infrastructure can change the visual character of the area by introducing industrial structures and machinery. The impact on sense of place is most likely going to be experienced as a direct, negative impact by the affected stakeholders. The impact on sense of place linked to the operational phase will occur at the local level. This impact will occur for the duration of the operational phase and will therefore be long term. The intensity will be low as the disturbances will be intermittent and the receptors will be able to adapt with relative ease. It is unlikely that this impact will occur during the operation phase. The magnitude is considered to be low negative with negligible significance. This would remain so post the implementation of *Section 12.6.2* mitigation measures.

#### *Dust and Emissions*

Dust and emissions would primarily be an impact of the construction phase. However, some increased vehicle traffic will occur with the potential for direct, local low negative impact. This can be considered a low negative magnitude and a minor negative significance being reduced to negligible with the mitigation measures in *Section 13.1.2*.

#### *Traffic Impact*

Operation activities that increase traffic would result in a negative direct impact on people who use the site. The extent of the impact is local as impact would be restricted to the site. The duration would be long-term for the operation of the Solar Farm. Although there is a definite likelihood of the increase in traffic, the intensity is likely to be low given that the increase in traffic minimal. The magnitude and the significance of the impacts are considered to be low and minor respectively negative and negligible with the mitigation measures of *Section 13.2.2*.

### *Waste and Effluent*

General waste, such as office waste, and effluent from onsite toilet facilities will be produced during the operation phase of the Solar Farm by onsite personnel. Operation activities that produce waste would result in a negative direct impact on the site, although it is unlikely to occur. The extent of the impact is local as impact would be restricted to the site. The duration would be long-term during the operation of the Solar Farm. The intensity is likely to be low owing to the small number of staff on site. This significance can be reduced to negligible with the mitigation measures in *Section 13.3.2*.

## **16.4**

### **RECOMMENDATIONS**

The implementation of the mitigation measures outlined above and included in the Environmental Management Plan (EMP), including additional pre-construction monitoring will provide a basis for ensuring that the potential positive and negative impacts associated with the establishment of the Humansrus Solar Farm are enhanced and mitigated.

Based on the findings of this assessment, there is no reason why the proposed Solar Farm at Humansrus should not be authorised contingent that the mitigations and monitoring for potential environmental and social impacts are implemented.

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- Annex A:* Photographs
- Annex B:* DEA acceptance of Scoping
- Annex C:* Public Participation documentation
- Annex D:* Comments and Responses Report
- Annex E:* Ecological Specialist Report
- Annex F:* Visual Specialist Report
- Annex G:* Heritage Specialist Report
- Annex H:* Palaeontology Specialist Report
- Annex I:* Environmental Management Programme
- Annex J:* Deeds
- Annex K:* Specialist Declarations

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