

**Figure 3-25: Maize cultivation south-west of the Vhuvhili SEF project area (Source: Schwartz, 2022).**

High levels of human influence are however visible in the northern and north-western sector of the study area. Much of the town of Secunda (Figure 3-25) and the adjacent small town of Trichardt encroach into the study area and the peri-urban areas are dominated by industrial / mining activity (Figure 3-27). In addition, the Sasol Secunda synthetic fuel plant (Figure 3-28) is located on the western boundary of the study area, and this facility together with the associated infrastructure related to the supply and storage of coal as well as electrical infrastructure (Figure 3-29) has resulted in significant transformation in the landscape. Associated with the Sasol plant is the nearby Riaan Rademan Training Academy (Figure 3-30) and adjacent electrical substation (Figure 3-31), contributing further to the overall transformation of the landscape in this area.

Other evidence of significant human influence in the area includes mining activity in the south-western sector of the study area (Bosjesspruit Mine) with some associated service industry as well as road, rail, telecommunications, and electricity infrastructure.

The physical and land use-related characteristics of the study area as described above contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural, undisturbed landscape. Visual character is also influenced by the presence of built infrastructure including buildings, roads, and other objects such as telephone or electrical infrastructure. The visual character of an area largely determines the sense of place relevant to the area. This is the unique quality or character of a place, whether natural, rural, or urban which results in a uniqueness, distinctiveness, or strong identity.

The predominant land use in the area (maize cultivation) has significantly transformed the natural landscape across much of the study area. In addition, the landscape becomes progressively more transformed towards the northern and north-western boundary of the study area where the towns of Secunda and Trichardt, the Sasol Secunda fuel plant and mining activities have resulted in a high degree of visual degradation. The more industrial character of the landscape is an important factor in this context, as the introduction of the proposed SEF would result in less visual contrast where other anthropogenic elements are already present, especially where the scale of those elements is similar to that of the proposed Vhuvhili SEF development.

The scenic quality of the landscape is also an important factor that contributes to the visual character or inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in form. As such, the pastoral landscape and rolling hills in parts of the study area are important features that could increase the visual appeal and visual interest in the area.

Cultural landscapes are becoming increasingly important concepts in terms of the preservation and management of rural and urban settings across the world. The concept of 'cultural landscape' is a way of looking at a place that focuses on the relationship between human activity and the biophysical environment (Breedlove, 2002). In this instance, the rural / pastoral landscape represents how the environment has shaped the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction.

In light of this, it is important to assess whether the introduction of a solar PV facility into the study area would be a degrading factor in the context of the prevailing character of the cultural landscape. Broadly speaking, visual impacts on the cultural landscape in the area around the proposed development would be reduced by the fact that the visual character in much of the area has been significantly transformed and degraded by urban/industrial, mining, and infrastructural development.



**Figure 3-26: View southwards from Secunda towards the Sasol Fuel Plant.**

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**Figure 3-27: Mining /Quarrying Activity on the periphery of Secunda.**

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**Figure 3-28: Sasol synthetic fuel plant located on the western boundary of the Vhuvhili SEF study area.**

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**Figure 3-29:** Infrastructure associated with the Sasol Plant.

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**Figure 3-30:** Riaan Rademan Training Academy located close to the Sasol Fuel Plant.

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**Figure 3-31: Substation and coal conveyor adjacent to the Riaan Rademan Training Academy (Source: Google Earth 2022).**

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#### **3.2.9.2 Visual Implications**

The predominance of cultivated land in conjunction with the remaining natural grassland cover across much of the study area would give the viewer the general impression of a largely rural / pastoral setting. Thus, the proposed Vhuvhili SEF development would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across the development site and across much of the study area.

High levels of human transformation and visual degradation are however evident in the north and north-west where urban/industrial, peri-urban development and mining activity dominate the landscape. In addition, roads, railways, coal conveyors and power lines have further degraded the visual character of the study area to some degree. This transformation has already altered the visual character across much of the north and north-western sector of the study area, thus reducing the level of contrast of the proposed Vhuvhili SEF development.

#### **3.2.9.3 Visual Absorption Capacity**

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

Although the undulating topography and the areas of cultivation and grassland would reduce the visual absorption capacity, this would be offset considerably by the presence of urban/industrial, mining, and infrastructural development in the vicinity of the proposed Vhuvhili SEF.

Visual absorption capacity in the study area is therefore rated as **MODERATE**.

#### **3.2.9.4 Sensitive Visual Receptor Locations**

A sensitive visual receptor location is defined as a location from where receptors would potentially be impacted by a proposed development. Adverse impacts often arise where a new development is seen as an intrusion that alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to another, depending on the viewer's perception.

A distinction must be made between a receptor location and a sensitive receptor location. A receptor location is a site from where the proposed development may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Less sensitive receptor locations include locations of commercial activities and certain movement corridors, such as roads that are not tourism routes. More sensitive receptor locations typically include sites that are likely to be adversely affected by the visual intrusion of the proposed development. They include tourism facilities, scenic sites, and residential dwellings in natural settings.

The identification of sensitive receptors is typically based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity;
- the presence of leisure-based (especially nature-based) tourism in an area;
- the presence of sites / routes that are valued for their scenic quality and sense of place;
- the presence of homesteads / farmsteads in a largely natural setting where the development may influence the typical character of their views; and
- feedback from I&APs, as raised during the public participation process conducted as part of the Environmental Assessment study.

As the visibility of the development would diminish exponentially over distance, receptors that are closer to the SEF would experience greater adverse visual impacts than those located further away. Zones of visual impact were therefore delineated based on distance bands measured from the proposed boundaries of the Vhuvhili PV development area. Based on the height and scale of the project, the distance intervals chosen for these zones of visual impact are as follow:

- 0 – 500 m (high impact zone);
- 500 m – 2 km (moderate impact zone); and
- 2 km – 5 km (low impact zone).

The degree of visual impact experienced will vary from one receptor location to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

- Value placed by the viewer on the natural scenic characteristics of the area;



- The viewer's sentiments toward the proposed development. These may be positive (a symbol of progression toward a less polluted future) or negative (foreign objects degrading the natural landscape); and
- Degree to which the viewer will accept a change in the typical character of the surrounding area.

A preliminary desktop assessment did not identify any formal protected areas or leisure-based tourism activities in the study area for the proposed Vhuvhili SEF. The desktop assessment did however identify multiple farmsteads and residences within the study area. While these homesteads and residences could be considered to be receptors, not all of them would be sensitive to the proposed development and given the number of farmsteads, it was not possible to confirm the presence of receptors at all the identified locations. Notwithstanding these limitations, all the identified receptor locations were assessed as part of the VIA as they are still regarded as being potentially sensitive to the visual impacts associated with the proposed development. None of these receptor locations was found to be sensitive.

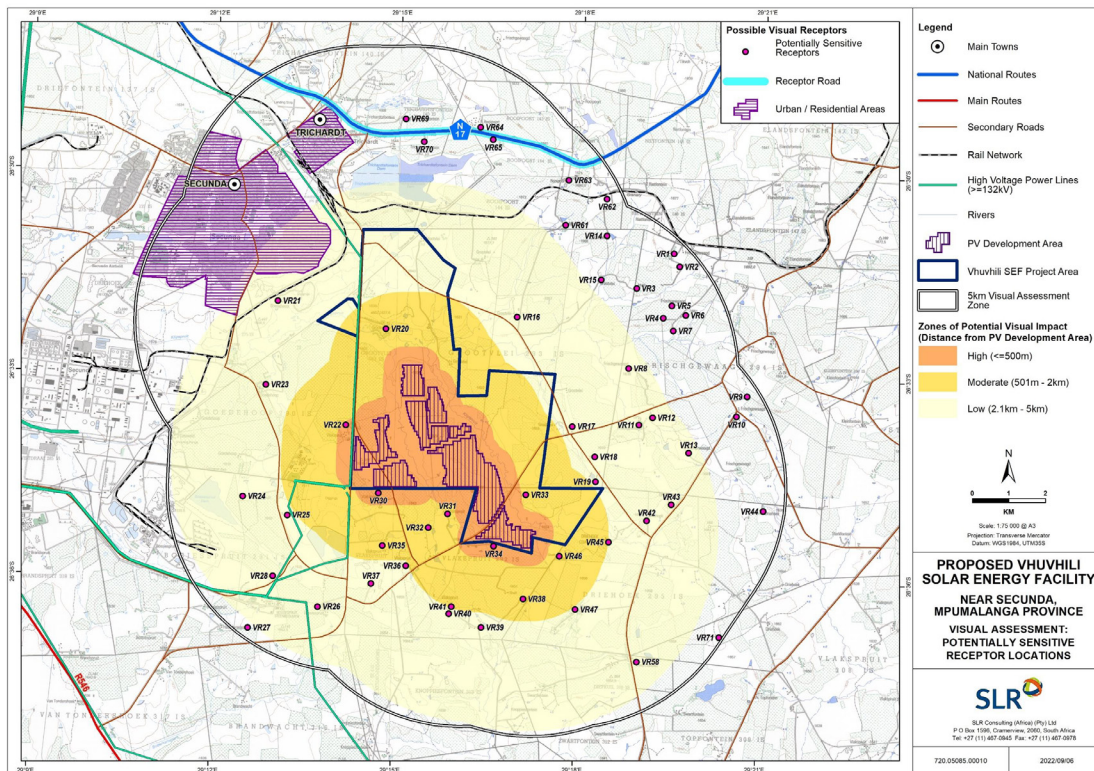
Although most of the receptor locations are believed to be farmsteads, they are regarded as potentially sensitive visual receptors as the proposed development could potentially alter natural or semi-natural vistas experienced from these locations. At this stage however, local sentiments towards the proposed development are not known.

It was noted that residential areas within the towns of Secunda and Trichardt are located within the Vhuvhili SEF study area. While these could be considered as receptors, they are not considered to be sensitive due to their location within built-up, heavily transformed areas.

In many cases, roads along which people travel, are regarded as sensitive receptors. The primary thoroughfare in the study area is the N17 National Route, which provides a major link between Johannesburg in the West with Ermelo, and the Eswatini Border in the east. The section of this road traversing the study area is not however considered part of a designated scenic route, although the route is an important link and is likely to be utilised, to some extent, by tourists en route to other parts of Mpumalanga Province. As a result, it is considered to be a potentially sensitive receptor road – i.e., a road being used by motorists who may object to the potential visual intrusion of the proposed SEF.

The other thoroughfares in the study area are primarily used as local access roads and do not form part of any scenic tourist routes. These roads are not specifically valued or utilised for their scenic or tourism potential and are therefore not regarded as visually sensitive.

The potentially sensitive visual receptor locations identified within the study area for the proposed Vhuvhili SEF are indicated in Figure 3-32.



**Figure 3-32: Potentially sensitive receptor locations of the proposed Vhuvhili SEF (Source: Schwartz, 2022).**

### 3.2.9.5 Receptor Impact Rating

The methodology to determine the receptor impact rating is included in Section 4.1.8 of the Visual Assessment Report which is included in Chapter 10 of this draft EIA Report. The full receptor impact rating for the proposed Vhuvhili SEF is provided in Appendix E of the said report. However, Table 3-9 below presents a summary of the overall visual impact of the proposed SEF on each of the potentially sensitive visual receptor locations identified within 5 kms of the proposed PV development area.

**Table 3-8: Summary receptor impact rating for the proposed Vhuvhili SEF.**

OVERALL IMPACT RATING	NUMBER OF SENSITIVE RECEPTORS	NUMBER OF POTENTIALLY SENSITIVE RECEPTORS
HIGH	0	1
MODERATE	0	18
LOW	0	5
<b>TOTAL INCLUDED IN ASSESSMENT</b>	<b>0</b>	<b>24</b>
>5 KMS FROM NEAREST PV ARRAY	0	13
OUTSIDE VIEWSHED	0	18
<b>TOTAL EXCLUDED FROM ASSESSMENT</b>	<b>0</b>	<b>31</b>

Table 3-9 above shows that although there are a total of 55 receptors within the study area, 18 of these receptors are found to be outside the viewshed for the proposed SEF. A total of 13 receptors were identified within 5 kms of the proposed Vhuvhili SEF development area, i.e., within 5 kms of the nearest PV array in the EIA Phase layout. None of the remaining receptors are considered sensitive. As previously mentioned, most of the locations identified are assumed to be farmsteads and although these residences could be considered to be receptors, given the degree of transformation in the landscape, not all of them would be sensitive to the proposed development.

Of the remaining twenty-four (24) potentially sensitive receptor locations, two (2) are located within the Vhuvhili SEF project area (VR20 and VR33) and it has been assumed that the relevant landowners are involved in the project. As such these landowners are not expected to perceive the proposed development in a negative light.

Only one potentially sensitive receptor (VR22) is expected to experience high levels of visual impact while twenty-three (23) receptor locations are expected to experience moderate levels of impact as a result of the Vhuvhili SEF development. The remaining five (5) would only experience low levels of visual impact.

As stated above, the N17 national route could be considered a potentially sensitive receptor road. This road is however more than 6 km from the nearest PV Array and is outside the viewshed of the proposed SEF and as such motorists utilising this route will not experience any visual impacts as a result of the SEF development.

### ***3.2.10 Heritage: Archaeology and Cultural Landscape***

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A detailed description of the archaeological features and cultural landscape within the proposed Vhuvhili projects site is provided in the Heritage Impact Assessment (Archaeology and Cultural Landscape), which is included in Chapter 11 of this draft EIA Report.

The project area is characterised by grazing lands and ploughed fields. The various farms are subdivided into large grazing camps with multiple gravel roads running through the area. Existing infrastructure occurring across the project area includes farmsteads, powerlines, pipelines, and farm dams.

The site is mostly characterised by thick grass cover. There is a general lack of trees, but clusters do occur at farmhouses. Some fields were planted with crops at the time of inspection. Figures 3-33 to 3-41 show the nature of the study area and its vegetation covering.





**Figure 3-339: Grass cover.**

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**Figure 3-34: Grass cover and loose rocks.**

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**Figure 3-35: Grass cover.**

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**Figure 3-36:** Grass cover and powerlines.



**Figure 3-37:** Grass cover and a pipeline manhole.



**Figure 3-3810:** Gravel road with a dam in the background.



**Figure 3-39:** Arable land planted with crops.



**Figure 3-40:** Dense grass with a dam in the background.



**Figure 3-41:** Dense grass with a dry stream bed in the background.

### 3.2.10.1 Findings of the Heritage Study

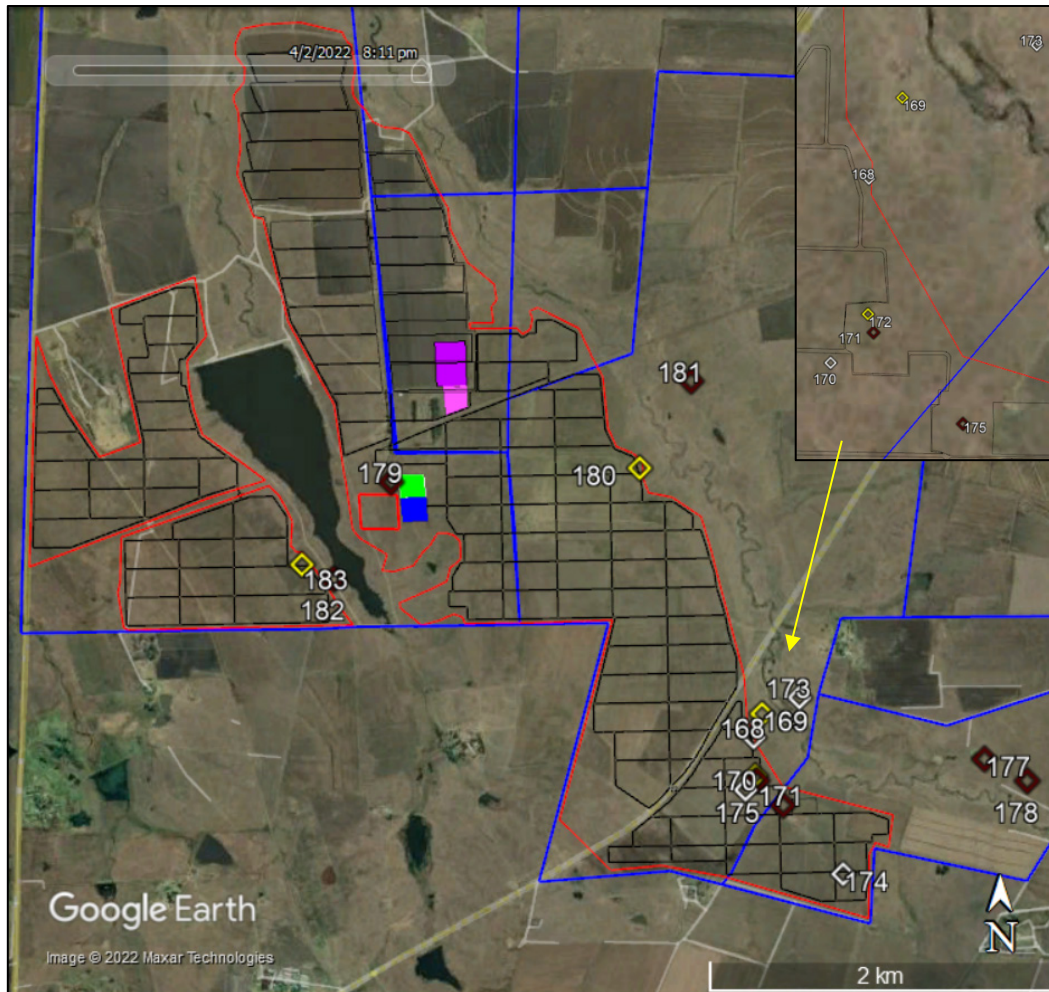
#### 3.2.10.1.1 Archaeology

This section describes the heritage resources recorded in the study area during the course of the assessment. Their locations are listed in Table 3-10, mapped in Figure 3-42, and then described in full further below.

**Table 3-10:** List of heritage finds recorded during the field survey.

Waypoint	Location	Nature	Grade
168	26° 35' 00.91" S 29° 16' 51.59" E	Archaeological – stone feature	GPC
169	26° 34' 56.49" S 29° 16' 53.38" E	Archaeological – stone feature	GPB
170	26° 35' 10.78" S 29° 16' 49.80" E	Archaeological – stone feature	GPC
171	26° 35' 09.09" S 29° 16' 52.27" E	Possible graves	IIIA
172	26° 35' 08.13" S 29° 16' 51.89" E	Archaeological – stone feature	GPB
173	26° 34' 53.38" S 29° 17' 01.27" E	Archaeological – stone feature	GPC
174	26° 35' 26.69" S 29° 17' 10.42" E	Archaeological – stone feature	GPC
175	26° 35' 13.73" S 29° 16' 57.80" E	Possible grave	IIIA
176	26° 35' 05.02" S 29° 17' 28.87" E	Not heritage	---
177	26° 35' 04.95" S 29° 17' 40.35" E	Grave	IIIA
178	26° 35' 09.11" S 29° 17' 49.44" E	Graves	IIIA
179	26° 34' 12.57" S 29° 15' 34.82" E	Graves	IIIA
180	26° 34' 09.92" S 29° 16' 27.47" E	Archaeological – stone feature	GPB
181	26° 33' 53.42" S 29° 16' 38.41" E	Graves	IIIA
182	26° 34' 30.94" S 29° 15' 22.54" E	Graves	IIIA
183	26° 34' 28.24" S 29° 15' 15.88" E	Archaeological – stone feature	GPB





**Figure 3-42:** Aerial view of the study area showing the locations of the recorded heritage resources.

#### *3.2.10.1.2 Site visit*

Despite the grass cover, the field survey revealed a number of archaeological remnants of old stone-built features. The age and functions of these features is not easily determined and, for precautionary reasons and in the absence of evidence to the contrary, they are generally treated as having been greater than 100 years of age and hence included within the legal definition of archaeological heritage. It seems likely that the above ground stones have largely been removed from these features for reuse elsewhere on the farms, leaving only the ground-level archaeological remnants. No Stone Age or Iron Age archaeological materials such as stone artefacts or pottery were seen in the study area, perhaps largely due to the thick grass cover. Detailed descriptions of the various sites are provided in Section 5.2.2 of the Heritage Impact Assessment which is included in Chapter 11 of this draft EIA Report.

#### *3.2.10.2 Graves*

Graves, including a number of features identified as possible graves, were seen in several places in the study area and it is always possible that further unmarked or poorly marked graves will be present in

unsurveyed areas or beneath the grass cover. Notables are two sets of graves that represent reburials. Both are noted on the grave markers to have been buried in 2020 but no dates of birth and death are known. The landowners noted that the graves were moved from the footprint of the enlarged farm dam, but aerial photography reveals that this dam was completed in 2017. This suggests that the remains were stored and only reburied later, perhaps after the full supply level of the dam had been reached. Detailed descriptions of the various sites are provided in Section 5.3 of the Heritage Impact Assessment which is included in Chapter 11 of this draft EIA Report.

#### ***3.2.10.3 Historical aspects and the Built Environment***

Aside from the archaeological remains found on site, no historical sites were present anywhere within the study area. A few farmsteads occur nearby but historical aerial photography indicates that most of the structures and many entire farmsteads are modern. None of them occur within the area proposed for the Vhuvhili Solar PV development. Most are more than 0.5 km from the proposed development area, but two occur close to the southern margin of the proposed development footprint. Both are on separate properties not forming part of the development proposal and thus could not be accessed.

#### ***3.2.10.4 Cultural Landscapes and Scenic Routes***

The landscape is an agricultural one characterised by grazing lands (grass) and arable lands (planted with crops). The landscape is extensive and is punctuated by towns and coal mines. It is not a particularly sensitive cultural landscape with most of its development having taken place during the 20<sup>th</sup> century. It is compromised by the very large Sasol oil refinery located 6 km northwest of the study area, and several coal mines in the surrounding landscape.

There are no scenic routes in the area, although the N17 runs west to east about 3 km north of the broader study area and some 8 km north of the proposed footprint area. Due to distance and topography, the proposed Vhuvhili SEF should only be minimally visible from the N17, and then only in certain places. Given the Sasol facility and coal mines of the area, this is of no further concern.

#### ***3.2.11 Palaeontology***

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A detailed description of the palaeontological features of the proposed Vhuvhili project site is provided in the Heritage Impact Assessment Report, which is included in Chapter 12 of this draft EIA Report.

The rocks present within the study area are of the Jurassic dolerite dykes and the Vryheid Formation shales. Fossils are typically preserved in sedimentary rocks, and do not occur in Jurassic dolerite as it is of volcanic origin, while Vryheid Formation shales might preserve fossils of the Glossopteris flora. Fossils of the Glossopteris flora, associated with coal seams, have been recorded from the carbonaceous shales and mudstones from some sites in the Vryheid Formation; however, these are by no means ubiquitous. Much of the study area has been cultivated for agriculture for decades, resulting in the rocks being covered by much younger soils. Since soils are the product of weathering and breakdown of rocks and organic matter, they do not preserve fossils either. Therefore, fossils may only be found in the underlying rocks of the Vryheid Formation and in surface outcrops. Furthermore, wetlands generally do not preserve fossils as the moisture and drying out destroys the delicate impressions of plants in the shales. In summary, fossils are very unlikely to occur on the ground surface in the north-western part of the project footprint i.e., the Vhuvhili on-site substation hub. Fossils might occur below ground in the mostly dry and un-weathered

shales of the Vryheid Formation; however, this will only be determined when excavations for foundations commence.

### 3.3 Socio-Economic Environment

A Socio-Economic report has been compiled and is included in Chapter 13 of this draft EIA Report. The available data used to compile the socio-economic baseline for the Secunda area within the Gert Sibande District Municipality, although not exhaustive, is interpreted in terms of professional opinion and is indicative of generally accepted trends within the Mpumalanga Province and the broader South Africa.

#### 3.3.1 Regional Context – Gert Sibande District Municipality (GSDM)

The Govan Mbeki Municipality (GMM) is located in the south-eastern part of Mpumalanga Province and is one of seven local municipalities that make up the Gert Sibande District Municipality (GSDM) (Figure 3-43). The GMM is made up of eight towns and 32 electoral wards. The project site is located within Ward 5 to the east and southeast of Secunda.



Figure 3-43: Location of Govan Mbeki Municipality within the Gert Sibande District Municipality.

#### 3.3.2 Local Context –Govan Mbeki Local Municipality

The information described below is based on the information provided by the Socio-Economic Specialist, which is included in Chapter 13 of this draft EIA Report.



The study area is located approximately 5-8 km east and south-east of the town of Secunda in the GMM. The town of Secunda has its origins in the 1973/74 international oil crisis when the then South African Government took the decision to establish a second coal liquefaction plant following the establishment of the first at Sasolburg in the 1950s. After the site for the Sasol complex had been identified, it had to be decided whether or not to combine the existing towns of Evander and Trichardt. The huge burden that extensions of this nature would have had on the financial and administrative resources of the established communities as well as the tempo at which such development should proceed was decisive and resulted in the decision to develop Trichardt and Secunda to be one town, named Secunda. Evander, located ~ 8km to the west of the current day Secunda, remained a separate town. Trichardt borders onto the northern part of Secunda.

The first town area was proclaimed in June 1976. The name Secunda is derived from the Latin, *secundi* meaning second/following, and was given to the town as it was the second extraction refinery producing oil from coal, after Sasolburg, which is located approximately 140km west of Secunda. The town was located adjacent to the large coalfields in the area, including the Evander and Winkelhaak coal mines located to the northwest of the town. The Secunda facility consists of Sasol Two (1980) and Sasol Three (1982) is the largest coal liquefaction plant in the world, and produces synthetic fuel, diesel, and related fuels and petrochemicals from coal gasification. The Secunda facility is located to the south of the town, approximately 5.6 km from the western boundary of the PV site (Figure 3-44).



**Figure 3-44:** The Secunda Sasol Facility located approximately 5.6 km from the western boundary of the Vhuvhili SEF site.

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The town of Secunda is located approximately 90 km west of Benoni in Gauteng, and 23 km west of Bethal. The N17 which runs to the north of the town and the site connects the towns of Benoni and Bethal (Figure 3-45).

The other land uses in the study area include coal mining and commercial agriculture. Commercial agriculture in the study area located to the south of the N17 and east of Secunda includes livestock and grain farming. Based on the Google Earth information there appear to be a limited number of farmsteads in the study area. The number of occupied farmsteads will be confirmed during the site visit undertaken during the EIA phase. The social environment can therefore be described as a working agricultural / industrial environment. There do not appear to be any tourist related activities located in the study area. Therefore, from a social perspective there appear to be a limited number of sensitive social receptors. This will be confirmed during the site visit undertaken during the EIA phase of the SIA.



**Figure 3-4511: The N17 which runs to the north of the town of Secunda and the site connects the towns of Benoni and Bethal.**

### **3.3.2.1 Vision of the Govan Mbeki Local Municipality**

The vision of the GMM as set out in the 2020/2021 Integrated Development Plan (IDP) review is “To be a Model City and Centre of Excellence” The associated Mission Statement is to serve our community by:

- Providing sustainable, quality services;
- Enabling diversified local economic development and job creation;
- Ensuring the financial sustainability of the Municipality;
- Working together with our stakeholders;
- Empowering our workforce; and
- Ensuring sound corporate governance.

The Vision, Mission and Values are informed by six (6) Key Strategic objectives of which Strategic Objective 3, To facilitate and create an enabling environment for diversified local economic development, social cohesion, and job creation and Strategic Objective 5, To develop spatially integrated, safe communities and a protected environment, are relevant to the proposed development.

A SWOT analysis undertaken as part of the IDP process identified key strengths, weaknesses, opportunities, and threats. The key findings relevant to the project include:

***Strengths***

- Petro-Chemical and synthetic fuels plant;
- Good tourism potential;
- Good infrastructure;
- Rail Network;
- Mining Area; and
- University /satellite campus.

***Opportunities***

- Economic development opportunities;
- SMME Development; and
- Industrial Park West of Secunda.

***Weaknesses***

- Ageing electricity infrastructure;
- Pressure on energy sources;
- Eskom Price increases;
- Unemployment and poverty;
- Climate change;
- Air pollution;
- Water shortages;
- Limited lifespan of mines;
- Increasing population (informal settlements, pressure on housing, unemployment, infrastructure, and municipal services); and
- Closure of mining and petrochemical industry.

The IDP provides a summary of the key socio-economic challenges facing the GMM, of which the following are relevant to the project.

- High and rising in unemployment.
- Youth unemployment.
- Creating of local economic development opportunities.
- Closure of mines.
- Increasing dependency rates.
- Low education levels and declining matric pass rate.
- Social development concerns such as clinics, police stations and schools.

The IDP notes that the key economic sectors that contribute to the local economy within in Govan Mbeki community are:

- Trade (including tourism);
- Mining;
- Manufacturing;



- Finance; and
- Agriculture.

The IDP lists the Local Economic Development (LED) Strategic Objectives as per the LED Strategy. Of relevance these include:

- Industrialisation of the Govan Mbeki economy using current and future comparative and competitive advantages; and newly targeted industries.
- Diversification of the local economy to reduce overreliance on the two complimentary sectors of coal mining and fuel from coal SASOL production.
- Improvement of living standards of the local citizenry through business and employment opportunities across economic sectors and industries

### **3.3.2.2 Demographics and Economic Profile**

#### **3.3.2.2.1 Population**

The population of the GMM in 2016 was 340 091 (Community Household Survey 2016). Of this total, 32.5% were under the age of 18, 63.3% were between 18 and 64, and the remaining 4.2% were 65 and older. The GMM therefore had a high percentage of the population that fall within the economically active group of 18-65. The population of Ward 5 in 2011 was 9 219 (Census 2011). Of this total, 21.5% were under the age of 18, 72.1% were between 18 and 64, and the remaining 6.4% were 65 and older. Ward 5 like the GMM also had a high percentage of the population that fall within the economically active group of 18-65. The figures are higher than the figures for the GSDM and Mpumalanga (57.7% and 56.6% respectively). This is due to the employment opportunities associated with the industrial, mining and manufacturing activities in the MM.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates to reduced revenue for local authorities to meet the growing demand for services. The traditional approach is based people younger than 15 or older than 64. The information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e., they are likely to be at school).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratios for the GMM, the GSDM and Mpumalanga in 2016 were 58%, 73.5% and 77% respectively. The dependency ratio for Ward 5 in 2011 was 38.6%. The lower dependency ratios in the GMM and Ward 5 reflect the employment and economic opportunities in and around Secunda linked to the towns petrochemical and industrial sector.

In terms of race groups, Black Africans made up 85.8% of the population on the GMM, followed by Whites, 12.1% and Coloureds (1.2%). The figures for Ward 5 in 2011 were Whites (72.6%), Black Africans (22.2%), Indian or Asian (2.7%) and Coloureds (2.3%). The main first language spoken in the GMM was isizulu, 60.5%, followed by Siswati, 7.3% and Afrikaans, 6.2%. In Ward 5 Afrikaans (64.6%) followed by English (11.1%) were the main languages spoken.

#### *3.3.2.2.2 Households and house types*

The total number of households in the GMM in 2016 was 108 892, which constituted approximately 33% of the total number of households in the GSDM. Of these 63% were formal houses, 20.4% were shacks, and 10.6% were flats in backyards. The figures for the GSDM were 67.2%, 13.4%, 6.7% and 8.3% respectively. While most of dwellings in the GMM are formal structures there are a high percentage of informal structures which reflects the migration of jobseekers to the area and the pressure this in turn places on housing. In Ward 5 82.5% of the dwellings were formal houses. There were no reported shacks.

In terms of ownership, 46% of the dwellings in the GMM were owned and fully paid off, while 10.6% were in the process of being paid off. 17.9% of the dwellings were rented from private individuals. In Ward 5, 15.2% were owned and fully paid off, 34.2% were in the process of being paid off, and 35% were rented. A relatively large percentage of the properties in the GMM (56.6%) were owned and or in the process of being paid off. This reflects a relatively stable and established community.

In terms of household heads, approximately 30.8% of the households in the GMM and 39.1% of the households in the GSDM were headed by women. These figures similar to the provincial figure of 39.71%. The figure for Ward 5 in 2011 was substantially lower at 15.5%. The high percentage of households headed by women in the GMM reflects the likelihood that the men have left the area in search of employment opportunities in Gauteng. This is despite the well-developed industrial sector in and around Secunda. Women headed households tend to be more vulnerable.

#### *3.3.2.2.3 Education*

In terms of education levels, the percentage of the population over 20 years of age in the GMM and GSDM with no schooling was 6.5% in 2016, compared to 10.8% and 11.3% for the GSDM and Mpumalanga Province respectively. The figure for Ward 5 in 2011 was 1.8%. The percentage of the population over the age of 20 with matric in the GMM (2016) and Ward 5 (2011) was 39.4% and 39.2% respectively, compared to 34.3% and 36.1% for the GSDM and Mpumalanga. The education levels in the GMM and Ward 5 are therefore marginally higher than the DM and Provincial figures.

#### *3.3.2.2.4 Employment*

The official unemployment rate in the GMM in 2016 was 17.2%, while 48.5% were employed, and 31% were regarded as not economically active. The figures for Ward 5 in 2011 were 3.6%, 63.6% and 32.4% respectively. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in both the GMM and Ward 5. Recent figures released by Stats South Africa also indicate that South Africa's unemployment rate is in the region of 36%, the highest formal unemployment rate in the world.

#### *3.3.2.2.5 Household income*

Based on the data from the 2011 Census, 16.6% of the population of the GMM had no formal income, 3.6% earned less than R 4 800, 5.5% earned between R 5 000 and R 10 000 per annum, 12.6% between R 10 000 and R 20 000 per annum and 16.4% between R 20 000 and 40 000 per annum (2016). The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based

on this measure, in the region of 54.7% of the households in the GMM and 65.2% in the GSDM live close to or below the poverty line. The figure for Ward 5 in 2011 was 16.9%.

The low-income levels in the GMM and GSDM reflect the limited formal employment opportunities outside in the urban areas. This is also reflected in the high unemployment rates. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the GMM. This in turn impacts on the ability of the GMM to maintain and provide services.

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the GMM and GSDM that live close to or below the poverty line is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area.

### **3.3.2.3 Municipal services**

#### **3.3.2.3.1 Electricity**

Based on 2016 survey, 95.1% of households in the GMM had access to electricity, compared to 90% for the GSDM and 93% for Mpumalanga.

#### **3.3.2.3.2 Access to water**

Based on the 2016 survey information, 96.9% of households in the GMM were supplied by a service provider. This compares to 86.7% and 80.5% for the GSDM and Mpumalanga respectively. The figure for Ward 5 in 2011 was 91.4%.

#### **3.3.2.3.3 Sanitation**

94.9% of the households in the GMM had access to flush toilets (2016), while 3.4% relied on pit toilets. This compares to 65.3% and 42.1% for the GSDM and Mpumalanga respectively. The figure for Ward 5 in 2011 was 94.5%. Only 0.5% of the households in the GMM reported that they had no access to formal sanitation, compared to 2.6% and 2.8% for the GSDM and Mpumalanga respectively.

#### **3.3.2.3.4 Refuse collection**

72.5% of the households in the GMM had access to regular refuse removal service, while for 13.9% the service was provided, but not on a regular basis. This compares to 52.2% for the GSDM (regular) and 5.2% (irregular). 89% of households in Ward 5 had their waste collected on a regular basis by a service provided.

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## **3.4 Civil Aviation**

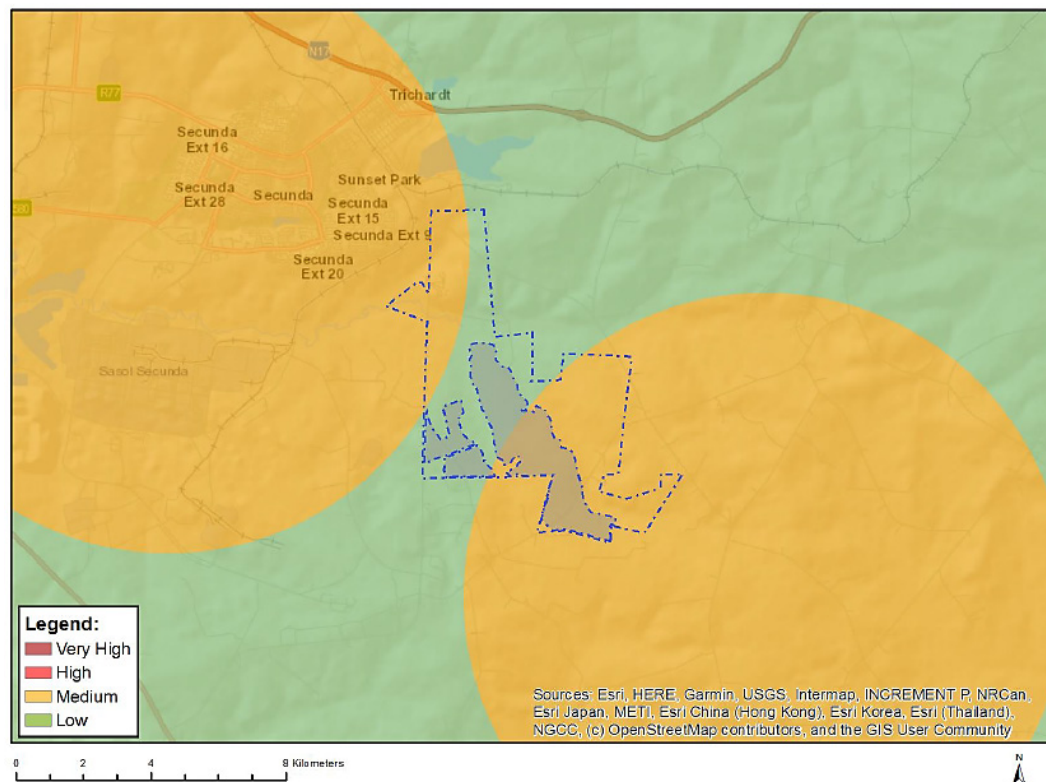
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As required by GN 320, a Civil Aviation Site Sensitivity Verification was undertaken as for this proposed SEF project. The Screening Tool has indicated that some of the south-eastern and north-western parts of the proposed Vhuvhili SEF project site is of potential 'medium' sensitivity with the classification of "within 8 km of another civil aviation aerodrome" whereas the rest of the site is of 'low' sensitivity (Figure 3-46). A site visit confirmed that the medium sensitivity in the south-eastern part of the proposed project site is in fact of low sensitivity, whereas the medium sensitivity in the north-western part of the proposed project



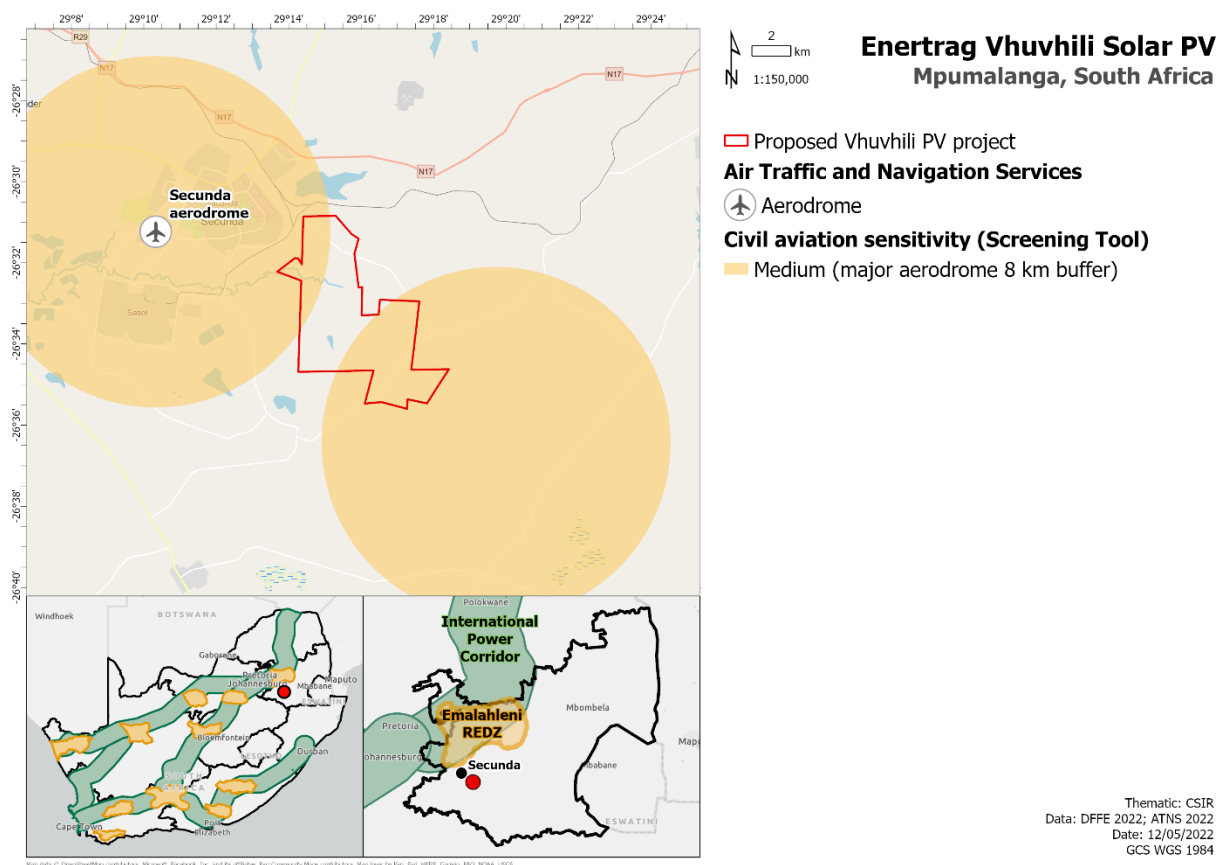
site does not intersect with the development footprint. As a result, it was concluded that the entire development footprint is of low sensitivity. Therefore, in line with GN R320, no further requirements are applicable i.e., a Civil Aviation Compliance Statement is not required.

The Civil Aviation Site Sensitivity Verification Report is included in Chapter 18 of this EIA Report.



**Figure 3-46: Map showing the proposed Vhuvhili SEF project site relating to Civil Aviation sensitivity (Source: DFFE Screening Tool, 2022).**

The Secunda aerodrome has been identified within 8 km of the proposed Vhuvhili SEF site (Figure 3-47).

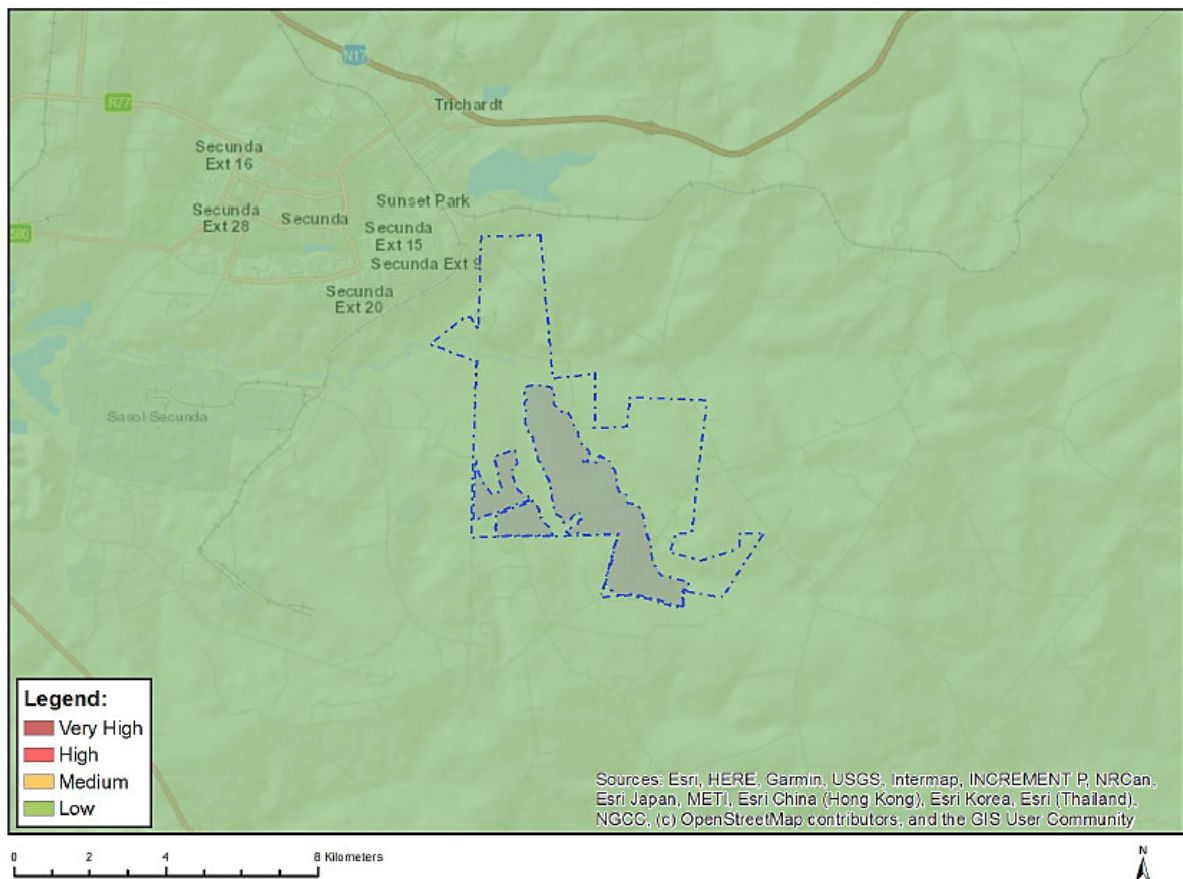


**Figure 3-47:** Map showing the Secunda aerodrome has been identified within 8 km of the proposed Vhuvhili SEF site.

### 3.5 Defence

As required by GN 320, a Defence Site Sensitivity Verification was undertaken for the proposed Vhuvhili SEF project. The Screening Tool has indicated the proposed Vhuvhili SEF project site to be of low sensitivity relating to Defence (Figure 3-48). This low sensitivity was verified and confirmed by the EAP during the EIA Process. Therefore, in line with GN R320, no further requirements are applicable i.e., a Defence Compliance Statement is not required.

The Defence Site Sensitivity Verification Report is included in Chapter 17 of this EIA Report.



**Figure 3-4812: Map showing the proposed Vhuvhili SEF project site relating to Defence sensitivity (Source: DFFE Screening Tool, 2022).**

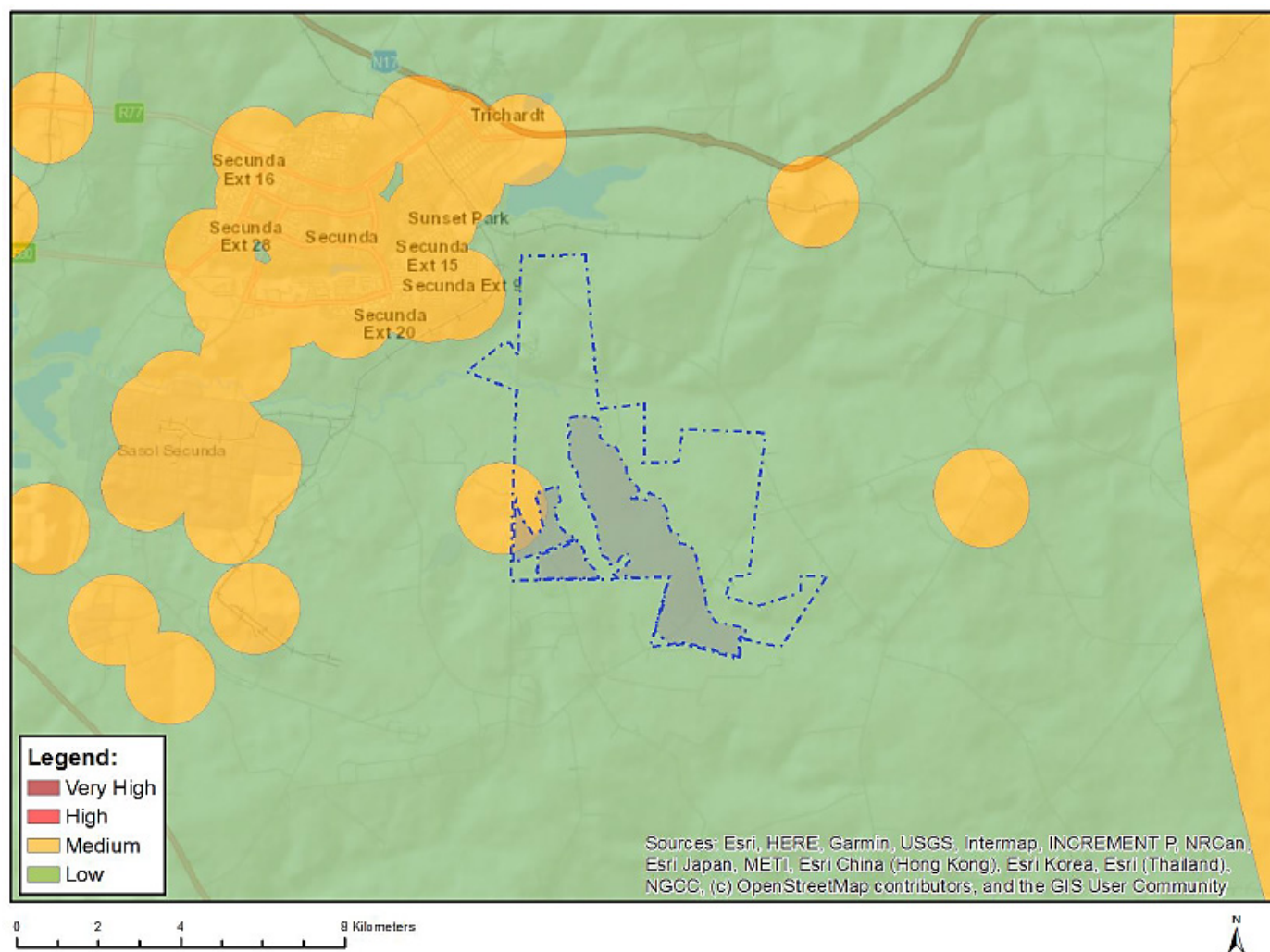
### 3.6 Radio Frequency Interference (RFI)

The DFFE Screening Tool results for Radio Frequency Interference (RFI) for the proposed Vhuvhili SEF indicated “medium” sensitivity. This result arose because some of the south-western part of the proposed Vhuvhili project site “lies within 1 km of a telecommunication facility”, as per Figure 3-49 below.

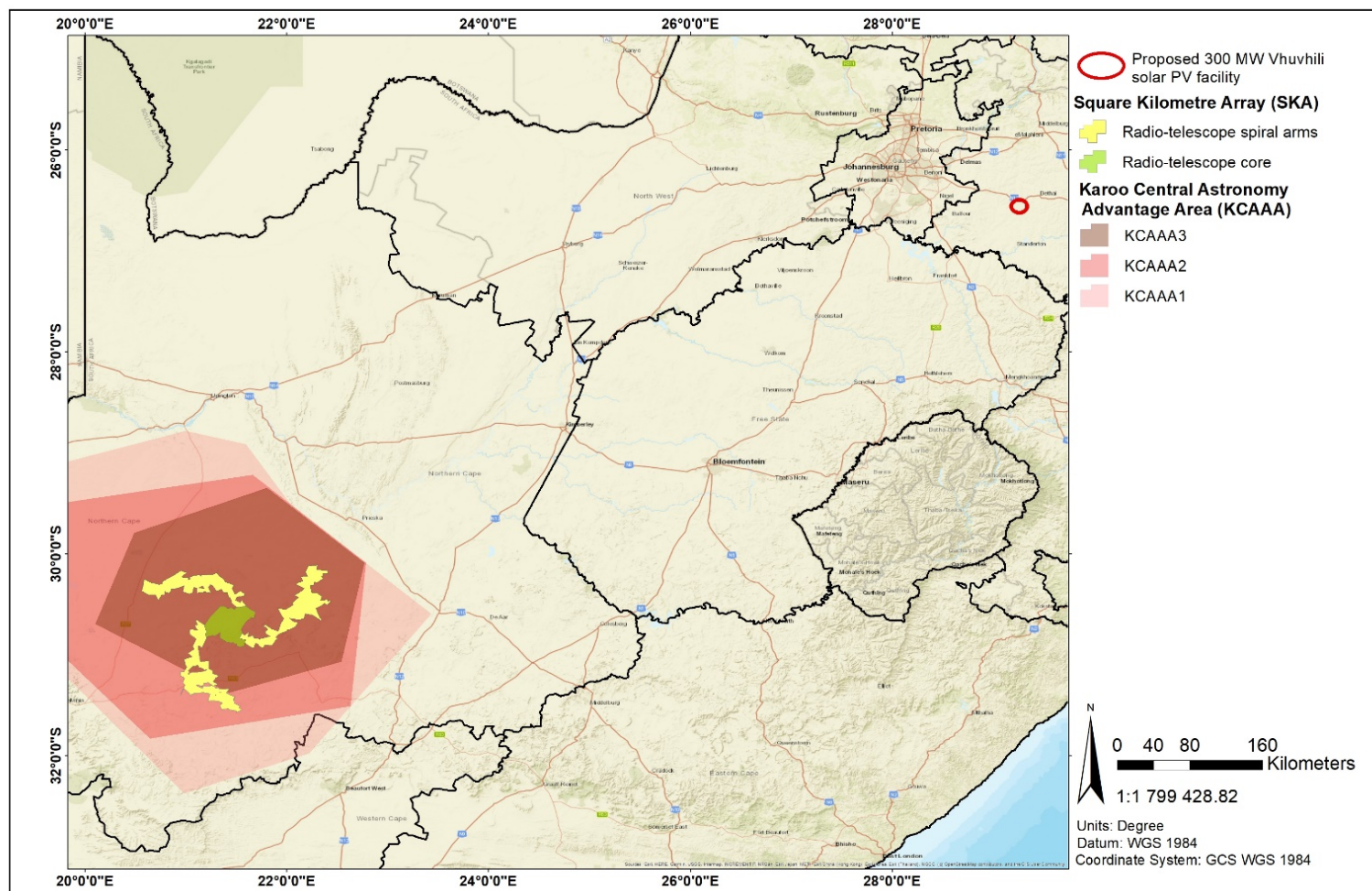
Therefore, it is important to note that the “medium” sensitivity assigned to the south-western portion of the site, is therefore not related to the Square Kilometre Array (SKA) or the Karoo Central Astronomy Advantage Area (KCAAA).

The location of the proposed project does not pose an Electro Magnetic Interference (EMI) or RFI risk to the SKA, as the proposed project is located outside of the Northern Cape and outside of the SKA and KCAAA. The proposed Vhuvhili SEF site is located approximately 743 km from the KCAAA. The distance from site to the SKA spiral arm (spiral arm 2) and to the SKA core are 780 km and 864 km respectively. Please refer to Figure 3-50 which confirms this.





**Figure 3-4913: Map showing the proposed Vhuvhili project site relating to RFI sensitivity (Source: DFFE Screening Tool, 2022).**



**Figure 3-5014:** Map showing the proposed Vhuvhili project site relating to RFI sensitivity in relation to SKA and KCAA.



# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed  
development of the Vhuvhili Solar  
Photovoltaic (PV) Facility near Secunda in  
the Mpumalanga Province

## CHAPTER 4:

# Approach to EIA Process and Public Participation



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## **4. APPROACH TO THE EIA PROCESS AND PUBLIC PARTICIPATION**

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This chapter presents the EIA process that is being conducted for the proposed development of the Vhuvhili SEF and gives particular attention to the legal context and guidelines that apply to this EIA, the steps in the Scoping and Public Participation component of the EIA (in accordance with Regulations 41, 42, 43 and 44 of GN R326 of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA) EIA Regulations, 2014, as amended, and the schedule for the EIA Process.

### **4.1 Legislation, Policies and Guidelines Pertinent to this EIA**

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The scope and content of this EIA Report has been informed by the main legislation, policies, guidelines and information series documents described in this section. Additional information on applicable legislation is provided in the specialist studies/assessments that were undertaken which are included in Chapter 6 to Chapter 18 of this EIA Report.

#### **4.1.1 National Legislation**

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##### **4.1.1.1 The Constitution of the Republic of South Africa (Act 108 of 1996)**

The Constitution, which is the supreme law of the Republic of South Africa, provides the legal framework for legislation regulating environmental management in general, against the backdrop of fundamental human rights. Section 24 of the Constitution states that:

- *“Everyone has the right:*
  - *to an environment that is not harmful to their health or well-being; and*
  - *to have the environment protected, for the benefit of present and future generations through reasonable legislative and other measures that –*
    - *prevent pollution and ecological degradation;*
    - *promote conservation; and*
    - *secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.”*

Section 24 of the Bill of Rights therefore guarantees the people of South Africa the right to an environment that is not detrimental to human health or well-being, and specifically imposes a duty on the State to promulgate legislation and take other steps that ensure that the right is upheld and that, among other things, ecological degradation and pollution are prevented.

In support of the above rights, the environmental management objectives of the proposed project are to protect ecologically sensitive areas and support sustainable development and the use of natural resources, whilst promoting justifiable socio-economic development in the towns nearest to the study area.

#### **4.1.1.2 NEMA and EIA Regulations published on 8 December 2014 (as amended on 7 April 2017 and 11 June 2021; GN 327, GN 326, GN 325 and GN 324)**

Chapter 1, Section 2 of the NEMA sets out several principles to give guidance to developers, private landowners, members of the public and authorities. The proclamation of the NEMA gives expression to an overarching environmental law. Various mechanisms, such as cooperative environmental governance, compliance and non-compliance, enforcement, and regulating government and business impacts on the environment, underpin NEMA. NEMA, as the primary environmental legislation, is complemented by several sectoral laws governing marine living resources, mining, forestry, biodiversity, protected areas, pollution, air quality, waste and integrated coastal management. Principle number 3 determines that a development must be socially, environmentally and economically sustainable. Principle Number 4(a) states that all relevant factors must be considered, *inter alia* i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied; ii) that pollution and degradation of the environment are avoided, or, where they cannot be altogether avoided, are minimised and remedied; vi) that the development, use and exploitation of renewable resources and the ecosystems of which they are part do not exceed the level beyond which their integrity is jeopardised; and viii) that negative impacts on the environment and on peoples' environmental rights be anticipated and prevented, and where they cannot be altogether prevented, are minimised and remedied.

Section 24 (1) of the NEMA, as amended states that *"In order to give effect to the general objectives of integrated environmental management laid down in this Chapter, the potential impact on the environment of listed activities must be considered, investigated, assessed and reported to the Competent Authority charged by this Act with granting the relevant EA"*. The reference to "listed activities" in Section 24 (1) of NEMA relates to the regulations promulgated in Government Notice (GN) R982, R983, R984 and R985 in Government Gazette 38282, dated 4 December 2014, which came into effect on 8 December 2014. These were amended in April 2017, specifically promulgated in GN R326, R327, R325 and R324 in Government Gazette 40772, dated 7 April 2017. GN R326 contains the regulations for the Environmental Assessment Process. GN R327 and GN R324 include listed activities that trigger the need for a Basic Assessment (BA) Process, whereas GN R325 includes listed activities that trigger the need for a full Scoping and EIA (S&EIA) Process.

In terms of the NEMA and the NEMA EIA Regulations, 2014, as amended, a S&EIA Process is required for the proposed development of the Vhuvhili SEF and associated infrastructure. Refer to Section 4.2 of this chapter for additional information on the NEMA EIA Regulations, 2014, as amended.

#### **4.1.1.3 Government Notice (GN) 960 (published 5 July 2019)**

GN 960 was published on 5 July 2019 and came into effect for compulsory use of the National Web Based Environmental Screening Tool (hereafter referred to as the Screening Tool) from 4 October 2019. The notice outlines the requirement to submit a report generated by the Screening Tool, in terms of Section 24(5)(h) of the NEMA and Regulation 16(1)(b)(v) of the NEMA EIA Regulations, 2014, as amended, when submitting an Application for EA in terms of Regulations 19 and 21 of the 2014 NEMA EIA Regulations, as amended. As such, the Application for EA for the proposed Vhuvhili SEF has been run through the Screening Tool, and the associated report generated and attached to the Application for EA, which was submitted to the Mpumalanga DARDLEA with the Draft Scoping Report.

#### **4.1.1.4 Government Notice (GN) 320 (20 March 2020)**

GN 320 prescribes the general requirements for undertaking site sensitivity verification and protocols for the assessment and minimum report content requirements for identified environmental impacts for environmental themes in terms of sections 24(5)(a) and (h) and 44 of NEMA, when applying for EA.

The Specialist Assessments undertaken as part of this S&EIA Process comply with GN 320, where applicable, specifically Agriculture, Terrestrial Biodiversity and Species, Aquatic Biodiversity. Some of the remaining specialist assessments comply with Appendix 6 of the NEMA EIA Regulations, 2014, as amended, and where relevant, Part A of GN 320 which contains site sensitivity verification requirements where a Specialist Assessment is required but no specific assessment protocol has been prescribed. This specifically applies to the Visual; Heritage (Archaeology and Cultural Heritage); Palaeontology; Socio-Economic and Traffic Impact Assessments. The Avifauna Assessment complies with the Assessment Protocol published in GN R1150 on 30 October 2020 (as described below). The Battery Energy Storage System (BESS) High Level Safety, Health and Environment Risk Assessment serves as a technical report, and the aforementioned legislation will thus not be applicable.

The Site Sensitivity Verifications undertaken for Civil Aviation and Defence, comply with GN 320. The protocols were enforced within a period of 50 days of publication of the notice i.e., on 9 May 2020.

#### **4.1.1.5 Government Notice (GN) 1150 (30 October 2020)**

GN 1150 prescribes procedures and protocols in respect of specific environmental themes for the assessment of, as well as the minimum criteria for reporting on identified environmental themes in terms of sections 24(5)(a) and (h) and 44 of the NEMA, when applying for EA. GN 1150 includes a protocol for the specialist assessment and minimum report content requirements for environmental impacts on a) terrestrial animal species and b) terrestrial plant species. The requirements of these protocols apply from the date of publication (i.e., from 30 October 2020), except where the Project Applicant provides proof to the Competent Authority that the specialist assessment affected by these protocols had been commissioned prior to the date of publication of these protocols in the Government Gazette, in which case Appendix 6 of the NEMA EIA Regulations, 2014, as amended, will apply to such applications.

*Note from the CSIR: The Terrestrial Biodiversity and Species Assessment undertaken as part of this S&EIA Process for the proposed Vhuvhili SEF project was commissioned prior to the publication date of the Species Protocols i.e., 30 October 2020, and therefore the terrestrial animal and plant species components form part of the Terrestrial Biodiversity Specialist Assessment that was undertaken in adherence to the protocol specified in GN 320. Contractual proof showing an appointment of the specialist prior to 30 October 2020 (included in Appendix G of Chapter 7 of this EIA Report) has been provided to the Competent Authority with submission of the Final Scoping Report and Application Form for EA, which were accepted and approved by DARDLEA on 29 August 2022.*

As confirmed with the Mpumalanga DARDLEA, one combined report was provided to address the Terrestrial Biodiversity and Species and the Terrestrial Plant Species Protocols (please refer to Chapter 7 of this EIA Report). This report also addressed faunal species and includes a Site Sensitivity Verification report for the Terrestrial Animal Species Themes.



However, the Avifauna specialists on the specialist team conducted a Terrestrial Animal Species Assessment based on the Terrestrial Animal Species Protocols (please refer to Chapter 9 of this EIA Report).

#### **4.1.1.6 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)**

The National Environmental Management: Biodiversity Act (Act 10 of 2004, as amended) (NEMBA) provides for “the management and conservation of South Africa’s biodiversity within the framework of the NEMA, the protection of species and ecosystems that warrant national protection, and the use of indigenous biological resources in a sustainable manner, amongst other provisions”. The Act states that the state is the custodian of South Africa’s biological diversity and is committed to respect, protect, promote and fulfil the constitutional rights of its citizens.

Overall, the NEMBA focuses on the protection of national biodiversity through the regulation of activities that may affect biodiversity including habitat disturbance, culture of and trade in organisms, both exotic and indigenous. Lists of threatened ecosystems (Sections 52 (1) (a)), threatened and protected species (Sections 56 (1)), and alien invasive organisms (Section 97 (1)) have been published and maintained in terms of NEMBA.

Chapter 1 sets out the objectives of the Act, and they are aligned with the objectives of the Convention on Biological Diversity, which are the conservation of biodiversity, the sustainable use of its components, and the fair and equitable sharing of the benefits of the use of genetic resources. The Act also gives effect to CITES, the Ramsar Convention, and the Bonn Convention on Migratory Species of Wild Animals. The State is endowed with the trusteeship of biodiversity and has the responsibility to manage, conserve and sustain the biodiversity of South Africa.

This Act therefore serves to control the disturbance and land utilisation within certain habitats, as well as the planting and control of certain exotic species. Effective disturbance and removal of threatened or protected species encountered on or around the sites, will require specific permission from the applicable authorities.

Furthermore, NEMBA states that the loss of biodiversity through habitat loss, degradation or fragmentation must be avoided, minimised or remedied. The loss of biodiversity includes *inter alia* the loss of endangered, threatened or protected plant and animal species.

Chapter 5 of NEMBA (Sections 73 to 75) regulates activities involving invasive species, and lists duty of care as follows:

- the landowner/land user must take steps to control and eradicate the invasive species and prevent their spread, which includes targeting offspring, propagating material and regrowth, in order to prevent the production of offspring, formation of seed, regeneration or re-establishment;
- take all required steps to prevent or minimise harm to biodiversity; and
- ensure that actions taken to control/eradicate invasive species must be executed with caution and in a manner that may cause the least possible harm to biodiversity and damage to the environment.

#### 4.1.1.6.1 Threatened Ecosystems

Government Gazette 34809, GN 1002, published on 9 December 2011 in terms of Section 52 (1) (a) of the NEMBA, provides a list of threatened terrestrial ecosystems categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) and Protected. The 2018 National Biodiversity Assessment (NBA) (SANBI, 2018) includes the updated extent and status of threatened ecosystems, although not yet formally adopted under the NEMBA.

The list of threatened ecosystems includes 225 threatened ecosystems based on vegetation types present within these ecosystems. Should a project fall within a listed vegetation type or ecosystem that is listed, actions in terms of NEMBA are triggered. In addition, Listing Notice 3 (GN R324) of the NEMA EIA Regulations, 2014, as amended, includes Listed Activity 12, for the clearance of an area of 300 m<sup>2</sup> or more of indigenous vegetation in Mpumalanga, specifically within any CR or EN ecosystem listed in terms of Section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as CR in the National Spatial Biodiversity Assessment 2004.

As indicated in the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report), the vegetation within the study area is located within the Soweto Highveld Grassland (Gm8) vegetation type (SANBI 2006-2018). This vegetation type covers 14 513 km<sup>2</sup> of Mpumalanga and Gauteng (and to a very small extent also in the neighbouring Free State and North-West provinces) (Mucina & Rutherford 2006). The ecosystem / vegetation type is classified as having a **Vulnerable conservation status because almost half of it has been transformed mostly by cultivation, plantations, mining and urbanisation**. Therefore, GN 1002 applies.

#### 4.1.1.6.2 Threatened and Protected Species (ToPS)

The 2007 Threatened or Protected Species (ToPS) Regulations of the NEMBA declares species of high conservation value, national importance or that are considered threatened and in need of protection. Furthermore, the regulations provide for the prohibition of specific restricted activities involving specific listed threatened or protected species.

The list of CR, EN, VU or Protected species was published in Government Gazette 29657, GN R151 on 23 February 2007 in terms of Section 56 (1) of the NEMBA. The list was further amended in Government Gazette 30568, GN R1187 on 14 December 2007, as well as in Government Gazette 43386, GN R627 of 3 June 2020. Should a project include threatened and protected species that are listed, actions in terms of NEMBA are triggered.

Based on the Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report) undertaken for the proposed development (van Rooyen, 2022), no threatened or protected plant species (ToPS; NEMA 2007c)) were recorded during the Vhuvhili site survey. None of the ToPS listed plant species are expected to be negatively affected by the development.

#### **4.1.1.7 The National Heritage Resources Act (Act 25 of 1999)**

The National Heritage Resources Act (Act 25 of 1999) (NHRA) introduces an integrated and interactive system for the management of national heritage, archaeological and palaeontological resources (which include landscapes and natural features of cultural significance).

Parts of sections 35(4), 36(3) (a) and 38(1) of the NHRA apply to the proposed project:

##### **Archaeology, palaeontology and meteorites:**

Section 35 (4) – No person may, without a permit issued by the responsible heritage resources authority:

- a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- c) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites.

##### **Burial grounds and graves:**

Section 36 (3) (a) - No person may, without a permit issued by South African Heritage Resources Agency (SAHRA) or a provincial heritage resources authority:

- a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority; or
- c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) any excavation equipment, or any equipment which assists in the detection or recovery of metals.

##### **Heritage resources management:**

38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorized as:

- a) the construction of a road, wall, power line, pipeline, canal or other similar form of linear development or barrier exceeding 300 m in length;
- b) the construction of a bridge or similar structure exceeding 50 m in length;
- c) any development or other activity which will change the character of the site –
  - (i) exceeding 5 000 m<sup>2</sup> in extent, or
  - (ii) involving three or more erven or subdivisions thereof; or
  - (iii) involving three or more erven or divisions thereof which have been consolidated within the past five years; or
  - (iv) the costs of which will exceed a sum set in terms of regulations by SAHRA, or a provincial resources authority;
- d) the re-zoning of a site exceeding 10 000 m<sup>2</sup> in extent; or



- e) any other category of development provided for in regulations by SAHRA or a provincial heritage resources authority, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development.

While landscapes with cultural significance do not have a dedicated Section in the NHRA, they are protected under the definition of the National Estate (Section 3). Section 3(2)(c) and (d) list “historical settlements and townscapes” and “landscapes and natural features of cultural significance” as part of the National Estate. Furthermore, Section 3(3) describes the reasons a place or object may have cultural heritage value. Section 38 (2a) of the NHRA states that if there is reason to believe that heritage resources will be affected then an impact assessment report must be submitted.

In terms of Archaeology and Cultural Landscape, a Site Sensitivity Verification (in terms of Part A of GN 320) was compiled and a HIA was undertaken in terms of Appendix 6 of the NEMA EIA Regulations, 2014, as amended (Chapter 11 of this EIA Report).

The HIA will be included in the Draft EIA Report that will be released to Interested and Affected Parties (I&APs) for a 30-day commenting period.

In terms of Palaeontology, a Site Sensitivity Verification (in terms of Part A of GN 320) was compiled and a Palaeontology Impact Assessment (PIA) was undertaken in terms of Appendix 6 of the NEMA EIA Regulations, 2014, as amended (Chapter 12 of this EIA Report). During a recent palaeontological site visit undertaken by the Palaeontologist, Professor Marion Bamford, in October 2021, the adjacent farm Goedenog 290 was surveyed for the proposed Becrux SEF project. The palaeontologist notes that no fossils of any kind were seen during this site visit. The recently ploughed agricultural land has deep, dark soils, more or less flat topography, and no rocky outcrops.

Since the site visit by the archaeologist for the proposed Vhuvhili SEF project confirmed that the land has been ploughed and planted in the last few decades, the palaeontologist confirmed it is unlikely that any fossils will be seen before excavations commence. Therefore, she strongly recommends a desktop study with a Fossil Chance Find Protocol that should be added to the EMPr, for the Vhuvhili SEF project.

Mpumalanga Provincial Heritage Resource Authority (MPHRA; for built environment and cultural landscapes) and the South African Heritage Resources Agency (SAHRA; for archaeology and palaeontology) are required to provide comment on the Draft EIA Report. The Draft EIA Report will be uploaded onto SAHRIS during the 30-day review period which extended from 13 June 2022 to 14 July 2022. All comments submitted by SAHRA and/or MPHRA will be captured and addressed in the Comments and Responses Report and will be included in Appendix D of the Final EIA Report which will be submitted to DARDLEA for decision-making. Comments that were received from SAHRA following the release of the Draft Scoping Report for comment are included in Appendix 3 of the PIA and also in Appendix D of this EIA Report.

Once a final comment has been issued by the heritage authority (i.e., SAHRA), the recommendations should be included in the conditions of the EA (should such authorisation be granted). This will essentially give ‘permission’ from the heritage authorities to proceed.

The proposed project may require a permit in terms of the NHRA prior to any fossils or artefacts being removed by professional palaeontologists and archaeologists. If archaeological mitigation is needed, then the appointed archaeologist will need to contact SAHRA and/or the MPHRA in order to confirm requirements to conduct the work. The permit application must be carried out well in advance of construction to ensure that there is enough time for the authorities to approve the mitigation work before construction commences.

Should professional palaeontological mitigation be necessary during the construction phase, the palaeontologist concerned will need to apply for a Fossil Collection Permit. Palaeontological collection should comply with international best practice. All fossil material collected must be deposited, together with key collection data, in an approved depository (museum / university). Palaeontological mitigation work including the ensuing Fossil Collection reports should comply with the minimum standards specified by SAHRA (2013).

#### **4.1.1.8 National Forests Act (Act 84 of 1998)**

The National Forests Act (Act 84 of 1998, as amended) (NFA) allows for the protection of certain tree species. The Minister has the power to declare a particular tree to be a protected tree. The most recent list of protected tree species was published in 2019. According to Section 12 (1) d (read with Sections (5) 1 and 62 (2) (c)) of the NFA, a licence is required to remove, cut, disturb, damage or destroy any of the listed protected trees. The DFFE is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. The Department of Agriculture, Land Reform and Rural Development (DALRRD) is authorised to issue licences for any removal, cutting, disturbance, damage to or destruction of any protected trees. Therefore, the removal of any protected tree species listed within the NFA will require a tree removal permit, which can be obtained from the DALRRD.

The Terrestrial Biodiversity and Species Assessment (Chapter 7 of this EIA Report) notes that no protected trees, according to the protected tree list (NFA 2021), were observed on site and it is unlikely that any such species occur within the Vhuvhili SEF development footprint.

#### **4.1.1.9 Conservation of Agricultural Resources Act (Act 43 of 1983)**

The objectives of the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) are to provide for the conservation of the natural agricultural resources of South Africa by the:

- maintenance of the production potential of land;
- combating and prevention of erosion and weakening or destruction of the water sources; and
- protection of the vegetation and the combating of weeds and invader plants.

The CARA states that no land user shall utilise the vegetation of wetlands (a watercourse or pans) in a manner that will cause its deterioration or damage. This includes cultivation, overgrazing, diverting water run-off and other developments that damage the water resource. The CARA includes regulations on alien invasive plants. According to the amended regulations (GN R280 of March 2001), declared weeds and invader plants are divided into three categories:

- Category 1 may not be grown and must be eradicated and controlled;
- Category 2 may only be grown in an area demarcated for commercial cultivation purposes and for which a permit has been issued, and must be controlled; and
- Category 3 plants may no longer be planted and existing plants may remain as long as their spread is prevented, except within the flood line of watercourses and wetlands. It is the legal duty of the land user or landowner to control invasive alien plants occurring on the land under their control.

Invasive alien species (and their category) likely to occur on site are listed in Chapter 6 and Appendix B of the Terrestrial Biodiversity and Species Scoping Level Assessment (Appendix G.2 of this Final Scoping Report). These alien plant species will be managed in line with the EMPr.

As noted in the Agriculture Assessment (Chapter 6 of this EIA Report), rehabilitation after disturbance to agricultural land is managed by the CARA. A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as “any act by means of which the topsoil is disturbed mechanically”. The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by Anneliza Collett (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the DALRRD). The construction and operation of the facility will therefore not require consent from the DALRRD in terms of this provision of CARA.

#### ***4.1.1.10 Subdivision of Agricultural Land Act (Act 70 of 1970)***

The Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA) requires that any long-term lease associated with the proposed Vhuvhili SEF be approved by the DALRRD. The SALA consent is separate from the Application for EA and needs to be applied for and obtained separately. An application for the change of land use (re-zoning) for the development on agricultural land will be lodged by the Project Applicant for approval in terms of the SALA as required.

#### ***4.1.1.11 National Water Act (Act 36 of 1998)***

One of the important objectives of the National Water Act (Act 36 of 1998) (NWA) is to ensure the protection of the aquatic ecosystems of South Africa’s water resources. Section 21 of this Act identifies certain land uses, infrastructural developments, water supply/demand and waste disposal as ‘water uses’ that require authorisation (licensing) by the Department of Water and Sanitation (DWS). Chapter 4 (Part 1) of the NWA sets out general principles for the regulation of water use. Water use is defined broadly in the NWA, and includes taking and storing water, activities which reduce stream flow, waste discharges and disposals, controlled activities (activities which impact detrimentally on a water resource), altering the bed, banks, course or characteristics of a watercourse, removing water found underground for certain purposes, and recreation. In general, a water use must be licensed unless it is listed in Schedule I, is an existing lawful use, is permissible under a general authorisation, or if a responsible authority waives the need for a licence. The Minister may limit the amount of water which a responsible authority may allocate. In making regulations the Minister may differentiate between different water resources, classes of water resources and geographical areas.

All water users who are using water for agriculture: aquaculture, agriculture: irrigation, agriculture: watering livestock, industrial, mining, power generation, recreation, urban and water supply service must register their water use. This covers the use of surface- and groundwater.

Section 21 of the NWA lists the following water uses that need to be licensed:

- a) taking water from a water resource;
- b) storing water;
- c) impeding or diverting the flow of water in a watercourse;
- d) engaging in a stream flow reduction activity contemplated in section 36;
- e) engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);
- f) discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduit;
- g) disposing of waste in a manner which may detrimentally impact on a water resource;
- h) disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- i) altering the bed, banks, course or characteristics of a watercourse;
- j) removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and
- k) using water for recreational purposes.

Any activities that take place within the outer edge of the 1 in 100 year flood line and /or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; within a watercourse; within 100 m of the edge of a watercourse; or within 500 m of a delineated wetland boundary, will require a water use authorisation in terms of Section 21 (c) and Section 21 (i) of the NWA. An application for water use authorisation for the proposed Vhuvhili SEF may be required should any of the planned structures or infrastructure associated with the proposed project trigger water uses in terms of Section 21 (c) and Section 21 (i) of the NWA.

Based on the preliminary risk matrix assessment undertaken for the proposed project, and assuming that the recommended buffers and mitigation measures will be implemented, the associated risk to the aquatic features would be low. Whether an application for a General Authorisation or a Water Use License will be required, is yet to be confirmed through pre-application consultation by the Project Applicant with the DWS prior to construction.

#### **4.1.1.12 Water Services Act (Act 108 of 1997)**

Water will be required during the construction, operational and decommissioning phases of the proposed project. Potable water is only to be utilised for human consumption purposes, whereas greywater is to be used for earthworks, dust suppression, etc. Water will be sourced from the following potential sources: Govan Mbeki Local Municipality; third-party water supplier; or existing or drilled boreholes on site. Should the latter be selected for water use, the boreholes will be subjected to complete geohydrological testing and an assessment, as well as a Water Use Licence Application process. This will be undertaken as a



separate process, once more detailed information becomes available, outside of the current EA Application for the Vhuvhili SEF. Compliance with the Water Services Act (Act 108 of 1997) will be undertaken during the relevant phase of the proposed project, in consultation with the local and district municipalities.

#### **4.1.1.13 Hazardous Substances Act (Act 15 of 1973)**

During the proposed project, fuel and diesel will be utilised to power vehicles, generators and equipment. In addition, potential spills of hazardous materials could occur during the relevant phases. Such management actions will be recommended in the EMPr, which will be included as an Appendix to the Draft and Final EIA Reports.

#### **4.1.1.14 National Environmental Management: Waste Act (Act 59 of 2008) (NEMWA)**

The National Environmental Management: Waste Act (Act 59 of 2008, as amended) (NEM:WA) was published with one of the main objectives to reform the law regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development. Section 19 of the NEM:WA allows the Minister to publish a List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment published. Such a list specifies the waste management activities that will require a Waste Management Licence. The List of Waste Management Activities was originally published in GN 921 on 29 November 2013, and thereafter amended in GN 332 on 2 May 2014, GN 633 on 24 July 2015, GN 1094 on 11 October 2017.

The List of Waste Management Activities include Categories A, B and C. If any waste management activities listed in Category A are triggered by a development, a BA process must be undertaken in terms of the NEMA EIA Regulations, 2014, as amended, as part of the Waste Management Licence application. Waste management activities in Category B will, however, require a full S&EIA Process in terms of the NEMA EIA Regulations, 2014, as amended, as part of the Waste Management Licence application. If any of the waste management activities in Category C are triggered, then the relevant Norms and Standards must be followed.

General and hazardous waste will be generated during the construction, operational and decommissioning phases, which will require proper management. Such management actions are recommended in the EMPr, which has been included as Part C to this EIA Report.

#### **4.1.1.15 National Environmental Management: Air Quality Act (Act 39 of 2004)**

The National Environmental Management: Air Quality Act (Act 39 of 2004, as amended) (NEM: AQA) was published in 2004 and came into full effect on 31 March 2010, when the Atmospheric Pollution Prevention Act (Act 45 of 1965) (APPA) was repealed. The NEM: AQA was published with the overall objective to:

- “reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; and
- provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto”.

The list of activities which result in atmospheric emissions which have or may have a significant detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions or cultural heritage was published under GN 248, Government Gazette 33064 dated 31 March 2010 and thereafter amended in GN 893, Government Gazette 37054 dated 22 November 2013. The list of activities was further amended in GN 551, Government Gazette 38863 dated 12 June 2015; GN 1207, Government Gazette 42013 dated 31 October 2018; GN 687, Government Gazette 42472 dated 22 May 2019; and GN 421, Government Gazette 43174 dated 27 March 2020.

Section 22 of the NEM: AQA deals with the consequences of listing, and it states that “no person may without a provisional atmospheric emission licence or an atmospheric emission licence conduct an activity (a) listed on the national list anywhere in the Republic; or (b) listed on the list applicable in a province anywhere in that province”. Therefore, a Provisional Atmospheric Emissions Licence (AEL) and/or AEL is required for any plant or proposed development that triggers a listed activity.

The proposed stockpiling activities during the construction phase, including earthworks, may result in the unsettling of, and temporary exposure to, dust. Appropriate dust control methods will need to be applied. Such management actions are recommended in the EMPr, which has been included as Part C to this EIA Report.

#### ***4.1.1.16 Astronomy Geographic Advantage (Act 21 of 2007)***

The Astronomy Geographic Advantage (AGA) Act (Act 21 of 2007) aims to provide for the preservation and protection of areas within the Republic that are uniquely suited for optical and radio astronomy; to provide for intergovernmental co-operation and public consultation on matters concerning nationally significant astronomy advantage areas; and to provide for matters connected therewith. The purpose of the AGA Act is to preserve the geographic advantage areas that attract investment in astronomy. The AGA Act also notes that declared astronomy advantage areas are to be protected and properly maintained in terms of Radio Frequency Interference (RFI). The AGA Act is administered by the Department of Higher Education, Science and Technology (previously the Department of Science and Technology).

#### ***4.1.1.17 Development Facilitation Act (Act 67 of 1995)***

The Development Facilitation Act (Act 67 of 1995) (DFA) sets out several key planning principles which have a bearing on assessing proposed developments in light of the national planning requirements. The planning principles most applicable to the study area include:

- Promoting the integration of the social, economic, institutional and physical aspects of land development;
- Promoting integrated land development in rural and urban areas in support of each other;
- Promoting the availability of residential and employment opportunities in close proximity to or integrated with each other;
- Optimising the use of existing resources including such resources relating to agriculture, land, minerals, bulk infrastructure, roads, transportation and social facilities;

- Contributing to the correction of the historically distorted spatial patterns of settlement in the Republic and to the optimum use of existing infrastructure in excess of current needs;
- Promoting the establishment of viable communities; and
- Promoting sustained protection of the environment.

#### **4.1.1.18 Other Applicable Legislation**

Other applicable national legislation that may apply to the proposed project include:

- Advertising on Roads and Ribbons Act (Act 21 of 1940);
- Electricity Act (Act 41 of 1987);
- Electricity Regulations Amendments (August 2009);
- Energy Efficiency Strategy of the Republic of South Africa (Department of Minerals and Energy (DME), March, 2005);
- Promotion of Administrative Justice Act (Act 2 of 2000);
- Civil Aviation Act (Act 13 of 2009) and Civil Aviation Regulations (CAR) of 1997;
- Civil Aviation Authority Act (Act 40 of 1998);
- White Paper on Renewable Energy (2003);
- Integrated Resource Plan for South Africa (2019);
- Occupational Health and Safety Act (Act 85 of 1993), as amended by Occupational Health and Safety Amendment (Act 181 of 1993)<sup>1</sup>;
- Road Safety Act (Act 93 of 1996);
- Fencing Act (Act 31 of 1963);
- National Environmental Management: Protected Areas Act (NEM:PA) (Act 31 of 2004); and
- National Road Traffic Act (Act 93 of 1996).

### **4.1.2 Provincial Legislation**

#### **4.1.2.1 Mpumalanga Nature Conservation Act (Act 10 of 1998) (MNCA)**

##### **4.1.2.1.1 Flora (see Appendix B of the Terrestrial Biodiversity and Species Assessment)**

#### **Schedule 11: Protected Plants (Section 69(1)(a) of the MNCA 1998)**

A total of thirty (30) plant species are listed as Schedule 11 Protected plant species in the region according to the MNCA (1998) (Appendix B of the Terrestrial Biodiversity and Species Assessment). Most of these species are members of the Amaryllidaceae and Orchidaceae. Twelve of the 30 protected plant species (Schedule 11) were recorded during the site survey undertaken by the Terrestrial Biodiversity specialist in December 2021. Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga:

<i>Drimia angustifolia</i>	LC
<i>Hypoxis hemerocallidea</i>	LC
<i>Khadia beswickii</i>	VU
<i>Nerine gracilis</i>	VU
<i>Trachyandra erythrorrhiza</i>	NT

<sup>1</sup> The proposed Battery Energy Storage Systems (BESS) must be designed, operated, maintained and decommissioned according to the requirements of Occupational Health and Safety Act (Act 85 of 1993).

Some provisions are given in terms of Schedule 11 Protected plants and Schedule 12 Specially Protected plants (Chapter 6, MNCA 1998):

- No person shall pick a protected plant without a permit.
- No person shall pick an indigenous plant in a nature reserve without a permit.
- No person shall pick an indigenous plant on a public road, land next to a public road within a distance of 100 meters from the centre of the road without a permit.
- No person shall pick an indigenous plant which is not a protected plant or specially protected plant on land which he or she is not the owner or occupier.
- No person shall donate, sell or export or remove from the province a protected plant without a permit.
- No person shall possess, pick, sell, purchase, donate or receive as a donation, import or export or remove from the Province a specially protected plant without a permit.

It is recommended in the EMP that a detailed plant search and rescue operation be conducted before the final design process, during the appropriate flowering period where needed, and prior to the commencement of the construction phase. If any of the listed species are found, the relevant permits should be obtained by the Project Applicant prior to their relocation or destruction.

**Schedule 12: Specially Protected Plants (Section 69(1)(b) of the MNCA 1998)**

No Schedule 12 plant species are listed or were recorded on site during the site survey.

**Schedule 13: Invader weeds and plants (MNCA 1998)**

Ten Schedule 13 species were recorded on site (Appendix B of the Terrestrial Biodiversity and Species Assessment). No person shall possess, sell, purchase, donate or receive as a donation, convey, import or cultivate a Schedule 13 declared invader weed or plant without a permit.

**4.1.2.1.2 Fauna (see Appendix C of the Terrestrial Biodiversity and Species Assessment)**

**Schedule 1: Specially Protected Game (Section 4 (1)(a) of MNCA 1998)**

No Schedule 1 species are listed or were recorded on site during the site survey.

**Schedule 2: Protected Game (Section 4 (1)(a) of MNCA 1998)**

Under the provincial Act (MNCA 1998), most mammals, reptiles and amphibians are listed as Schedule 2: Protected Game (see Appendix C of the Terrestrial Biodiversity and Species Assessment). Three species were recorded on site or confirmed by the landowners (Appendix C):

- Steenbok
- Hedgehog
- Serval

**Schedule 3: Ordinary Game (Section 4(1)(c) of MNCA 1998)**

Three species were recorded on site or confirmed by the landowners (Appendix C of the Terrestrial Biodiversity and Species Assessment):

- Springbok
- Blesbok
- Scrub hare



**Schedule 4: Protected Wild Animals (Section 4(1)(d) of MNCA 1998)**

No species were recorded on site (Appendix C of the Terrestrial Biodiversity and Species Assessment).

**Schedule 5: Wild Animals to which Section 33 apply (MNCA 1998)**

Provisions of Section 33 apply (MNCA 1998): No person shall import into the province, keep, possess, sell, purchase, donate or receive as a donation or convey a Schedule 5 live wild animal without a permit. Five species were recorded on site or confirmed by the landowners (Appendix C of the Terrestrial Biodiversity and Species Assessment):

- Serval
- Egyptian mongoose
- Meerkat
- Springhare
- Civet

**Schedule 6: Exotic Animals to which the provisions of Section 34 apply (MNCA 1998)**

Provisions of Section 34 apply (MNCA 1998): No person shall keep, possess, sell, donate or receive as a donation or convey a Schedule 6 live exotic animal without a permit. No species were recorded on site (Appendix C of the Terrestrial Biodiversity and Species Assessment).

**Schedule 7: Invertebrates (Section 35 (1) of the MNCA 1998)**

Provisions of Section 35(1) apply (MNCA 1998): No person shall collect, catch, kill, keep, purchase, sell, donate or receive as a donation, convey, import or export a Schedule 7 invertebrate without a permit.

**Schedule 8: Problem Animals (Section 44(1) of the MNCA 1998)**

One species was recorded on site (Appendix C of the Terrestrial Biodiversity and Species Assessment):

- Black-backed jackal

No permits are required for animal species since none should be harmed by the development.

Based on the Terrestrial Biodiversity and Species Assessment (Chapter 7 of the EIA Report), the Screening Tool listed *Lepidochrysops procera* (Lepidoptera) as a Species of Conservation Concern (SCC) for the site. However, it was not listed in the ADU database, the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists. *Lepidochrysops procera* was not recorded on site and is unlikely to occur there because its host plant (*Ocimum obovatum*) was not present on site.

The said assessment notes that the screening tool, however, did not highlight the possible presence of the giant girdled lizard, a species with a Vulnerable IUCN status. However, the species was not recorded on site. Overall, the sensitivity of the animal species theme (avifaunal component excluded) is rated as medium. If the suggested mitigation measures are followed the animal SCC should not be negatively affected by the development.

The Mpumalanga Tourism and Parks Agency (MTPA) is the regulatory authority in Mpumalanga for the issuing of permits for fauna, flora, hunting and CITES and has been pre-identified as a key stakeholder and is included on the project database (as shown in Appendix D of this EIA Report. The MPTA provided preliminary comments (see Appendix E.4 and Appendix E.5). A hard or electronic copy of the Draft EIA Report will also be couriered to MTPA for further comments.

#### **4.1.2.2 Mpumalanga Vision 2030**

As noted in the Socio-Economic Impact Assessment (Chapter 13 of the EIA Report), the Mpumalanga Vision 2030 Strategic Implementation Framework (2013-2030) provides a provincial expression of the key priorities, objectives and targets outlined in the National Development Plan 2030. In line with the objectives of the NDP the Mpumalanga Vision focusses on the following key socio-economic outcomes:

- Employment and Economic Growth;
- Education and Training;
- Health Care for all; and
- Social Protection.

The Mpumalanga Vision 2030 also identifies nine key drivers that have a bearing on the spatial development of the province. Key Drivers 1 to 6 are focused towards promoting economic development and job creation, Key Drivers 7 and 8 are focused on human settlement in and around the key priority nodes/areas identified and linked to Key Drivers 1-6, and Key Driver 9 is focused on the conservation and sustainable management of the natural environment. The relevant Key Drivers are summarised below.

**Key Driver 1: Nodal Development.** Key Driver 1 identifies corridors linked to key roads where investment should be focussed. Of relevance to the project is the fact that the N17 has been identified as a key corridor. The N17 is located to the north of the study area. It provides a major link between Johannesburg in the West with Ermelo, and the Eswatini Border in the east. Five primary nodes for development are also identified, including Secunda (and Ermelo).

**Key Driver 2: Business, Commercial and Industrial Development.** Key driver 2 focuses on development of business and commercial sectors on the primary, secondary and rural nodes in Mpumalanga and the potential for these activities to generate employment. Of relevance to the study is that the vision notes that the bulk of industrial investment in Mpumalanga Province should be clustered around the existing industrial strongholds, including Secunda (Petrochemical Industry).

**Key Driver 9: Environmental Management and Conservation.** The vision notes that in terms of mining it is important to establish proper environmental management systems during the operational phase of the mines to prevent large-scale water and air pollution. While the section does not specifically refer to renewable energy, much of the mining in Mpumalanga is linked to coal mining and power generation, both of which are large consumers of water. The water demands associated with renewable energy projects are significantly lower than those associated with traditional coal power stations.

#### **4.1.2.3 Mpumalanga Growth and Development Path**

The Mpumalanga Economic Growth and Development Path (MEGDP) (2011) is informed by the National Economic Growth Path. The MEGDP notes that Mpumalanga is committed to increasing local economic development and job creation in the agricultural, industrial, manufacturing, **green economy**, tourism, and mining sectors.

The MEGDP is informed by six key pillars, namely:

1. Job creation;
2. Inclusive and shared growth of a diversified economy;
3. Spatial distribution;
4. Integration of regional economies;
5. Sustainable human development; and
6. Environmental sustainability.

The pillars of job creation, the development of a diversified economy, and sustainable environmental development are all relevant to the proposed Vhuvhili SEF development.

The MEGDP also identifies several key employment drivers aimed at realising the MEGDP objectives and securing strong and sustainable growth for the next decade. Of relevance these include the creation of employment of economic sectors including energy and the development of new economies including green industries. The MEGDP notes that the development of clean forms of energy like wind and hydro power generation opportunities, including gas production from landfill and organic waste should be supported. Although solar PV development is not listed specifically as a potential clean energy form, it shows that the municipality is supporting green energy initiatives in the energy sector of the province.

#### **4.1.2.4 Mpumalanga Spatial Development Framework (2019)**

The spatial vision for Mpumalanga Province is “A sustainable, vibrant and inclusive economy, Mpumalanga”. The Spatial Development Framework (SDF) identifies several opportunities and challenges facing the province. The opportunities are linked to the province’s natural resources, well developed economy, and established economies.

**Natural Environment:** The natural environment is diversified and is associated with the Highveld and the Lowveld areas in the province. Five major river systems flow through Mpumalanga and it is an important catchment area.

**Connectivity and Infrastructure:** The province is well connected in terms of infrastructure and is connected to Maputo and Richards Bay ports by both rail and road.

**Economy:** The province’s rich biodiversity and scenic beauty support the tourism industry, while at the same time mining, specifically coal mining, plays a key role in the province’s economy. The availability of high potential soil and diverse climatic conditions also support a range of crops.

**Urban settlements:** The key urban centres are well established economic centres and offer the opportunity for further economic development by leveraging on the towns’ economic bases.

In terms of challenges, climate change is identified as a key challenge. In this regard the activities in the province, specifically the generation of coal powered energy, account for 90% of South Africa's scheduled emissions. The province is also home to 50% of the most polluted towns in the country. The predicted impacts associated with climate change include decreased rainfall in the province and increased temperatures. This will increase the risk of natural disasters, including droughts, flooding, and fires.

The SDF identifies five spatial objectives, namely:

**Connectivity and corridor functionality:** The aim is to ensure connectivity between nodes, secondary towns, marginalised areas, the surrounding area, and to green open space systems.

**Sustainable concentration and agglomeration:** The aim is to promote the creation of an agglomeration economy that will encourage people and economic activities to locate near one another in urban centres and industrial clusters.

**Conservation and resource utilisation:** The aim is to promote the maximisation, protection and maintenance of ecosystems, scarce natural resources, high-potential agricultural land, and integrated open space systems.

**Liveability and sense of place:** The aim is to create settlements that contribute to people's sense of personal and collective wellbeing and to their sense of satisfaction in being residents of a settlement.

**Rural diversity and transformation:** The aim is to create Urban-Rural anchors and choices for residents within the rural economy linked to access to markets, food security and security of land tenure.

Connectivity and corridor functionality, Sustainable concentration and agglomeration, and Conservation and resource utilisation are of specific relevance to the proposed Vhuvhili SEF development.

#### **Connectivity and corridor functionality**

The Strategic Objectives that are relevant the study area and the proposed development include:

- Strategic Objective 2: Development of the existing corridors and building new linkages to increase capacity and economic opportunities and ensure connectivity to the surrounding areas.
- Strategic Objective 5: Decongestion of the coal haul roads and Improvement of Freight Network.

In terms of Strategic Objective 2, the spatial linkages identified for development and upgrading include the upgrade of the N17, N17/N2 and the N12 and N11 corridor.

#### **Sustainable concentration and agglomeration**

Of specific relevance, Strategic Objective 4, Diversify Economy, focusses on the need to diversify the economy. The SDF notes that the mining sector contributes 25% to Mpumalanga's Gross Value Added (GVA). In addition, there are several other sectors directly or indirectly dependent on mining such as manufacturing (specifically metal processing) and utilities (specifically power generation). The combined GVA of these three sectors makes up more than 40% of the provincial GVA.



However, the SDF recognises that mining is not a sustainable industry and resources are finite. There is therefore a need for a gradual shift from mining-oriented sectors to the sustainable economic sectors to maintain sustained growth of the provincial economy. Mpumalanga's Coal Mining and Coal Fired Power Plant region (located mainly in the Highveld area) will become under increasing pressure due to environmental considerations. As a result, the region is likely to experience a decline in demand for coal and with it a decline in the associated employment it creates. There is therefore a need to diversify the regional economy and facilitate the gradual transition of economic activities in the region. The proposed Vhuvhili Solar development supports the objective of diversifying the province's economy by establishing a green energy project which will create local employment opportunities.

### ***Conservation and resource utilisation***

The strategic objectives that are relevant the study area and the proposed development include:

- Strategic Objective 2: Ensure conservation of all water resources and catchment Areas.
- Strategic Objective 4: Promote a low carbon and climate resilient economy.
- Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment.

### ***Strategic Objective 2: Ensure Conservation of all Water Resources and Catchment Areas***

Achieving Strategic Objective 2, "Ensure Conservation of all Water Resources and Catchment Areas", is closely linked to diversifying the economy. The SDF notes that the province's water resources are under pressure from high demand activities, including Eskom's power stations, mining, and industrial uses. The proposed Vhuvhili SEF development represents a low consumer of water.

### ***Strategic Objective 4: Promote a Low Carbon and Climate Resilient Economy***

Mpumalanga is home to 12 of Eskom's 15 coal-fired power stations; petrochemical plants including Sasol's refinery in Secunda; metal smelters; coal and other mines; brick and stone works; fertiliser and chemical producers; explosives producers; and other smaller industrial operations, making the Highveld one of South Africa's industrial heartlands (CER, 2017). As a result, the air quality within the Mpumalanga Province, especially within the Highveld area, is the poorest in South Africa. The Highveld region accounts for approximately 90 % of South Africa's scheduled emissions of industrial dust, sulphur dioxide and nitrogen oxides (Wells et al. 1996, as cited in Josipovic et al. 2009). Achieving Strategic Objective 4, "Promote a low carbon and climate resilient economy", is closely linked to diversifying the economy. The proposed Vhuvhili SEF development supports the development of a low carbon, climate resistant economy.

### ***Strategic Objective 6: To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment***

Mining contributes R 49.6 billion (approximately 25%) to the Mpumalanga economy. The key mining sector is coal, which represents 83% of South Africa's coal production. The mining sector, specifically coal mining, creates employment opportunities and supports the manufacturing and power generation sector. However, mining is also associated with many issues including water and soil contamination, air pollution and environmental degradation.

Achieving Strategic Objective 6, “To optimally utilise the mining potential without compromising the long-term sustainability of the natural environment”, is closely linked to diversifying and developing a low carbon climate resistant economy. The proposed Vhuvhili SEF development supports the objective of diversifying and developing a low carbon, climate resistant economy. In terms of the high-level composite spatial development framework, Ermelo is identified as a Regional Service Centre (red dot) and the development area located to the south-east of the town falls within a mining area (brown hatched) (Figure 4.1). The economic sectors in the area include mining and power generation. The dominant land use in the area is commercial agriculture (yellow, Figure 4.2).

The proposed Vhuvhili SEF aligns with the focus areas of the Mpumalanga SDF. It will uplift the local communities through employment creation and increased investment in infrastructure. In addition, the proposed development will provide a sustainable source of energy for the national grid or for the Sasol grid. Employment creation would mainly be temporary in nature during the construction phase with limited opportunities created during the operational phase. Refer to Chapter 2 of this EIA Report for additional information on the estimated employment opportunities.

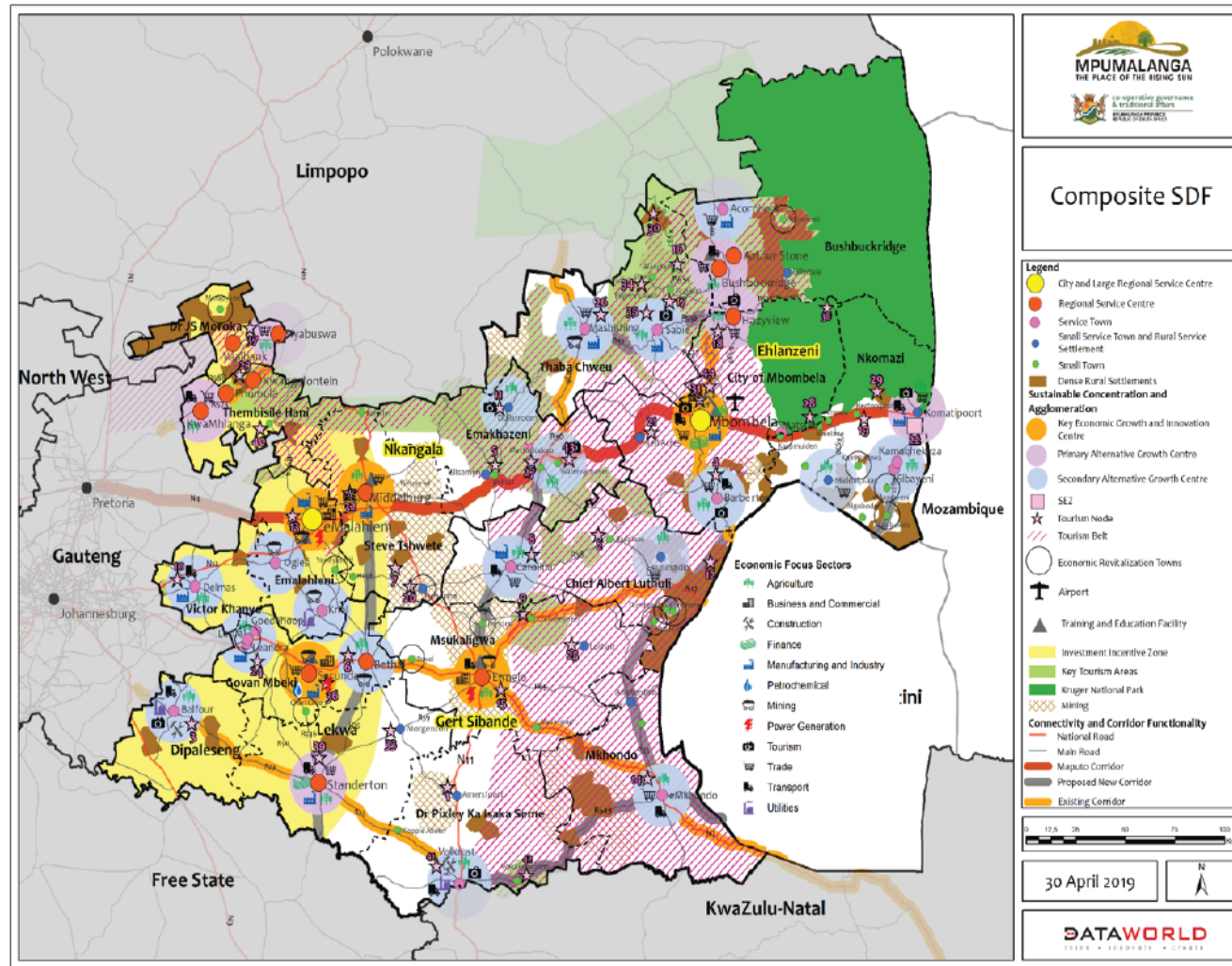


Figure 4.1: Mpumalanga Composite SDF-Economic Activities (Source: Mpumalanga SDF)

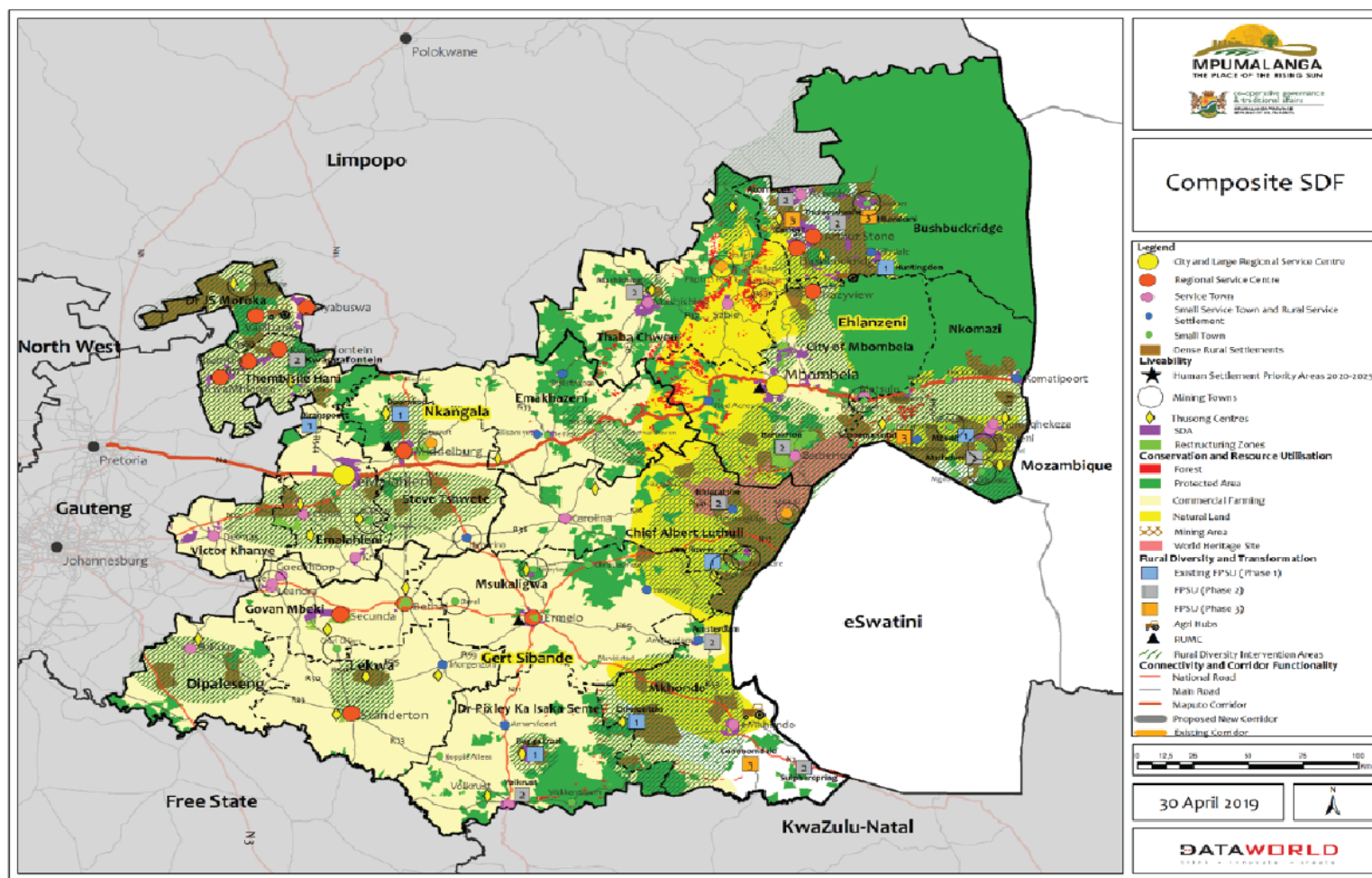


Figure 4.2: Mpumalanga Composite SDF-Land Uses (Source: Mpumalanga SDF)



### **4.1.3 District and Local Planning Legislation**

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#### **4.1.3.1 Environmental Management Framework**

Research indicates that there is no Environmental Management Framework (EMF) for the Gert Sibande District Municipality. The Screening Tool also notes that no intersections with EMF areas have been found.

#### **4.1.3.2 Gert Sibande District Municipality Integrated Development Plan (IDP) 2021/2022**

The Strategic Objectives of the Gert Sibande District Municipality Integrated Development Plan (IDP) 2021/2022, are to:

**Strategic Objective 1:** To develop and retain skilled and capacitated workforce.

**Strategic Objective 2:** To facilitate and coordinate provision of sustainable community and social services.

**Strategic Objective 3:** To facilitate economic growth and development.

**Strategic Objective 4:** To ensure financial viability and provide support to local municipalities.

**Strategic Objective 5:** To ensure effective governance in the administration of the institution.

**Strategic Objective 6:** To support and coordinate spatial transformation.

The IDP states that the Gert Sibande District must achieve sufficient, secure and reliable energy supply and should rapidly expand generation capacity through a diverse energy mix. The proposed Vhuvhili SEF project is in line with the district IDP because it will enable the Gert Sibande District Municipality to expand their generation capacity by developing a 300 MW (export) solar PV project which will contribute to the diverse energy mix. Furthermore, it will contribute to local economic growth and development as it will create employment and support livelihoods.

#### **4.1.3.3 Govan Mbeki Local Municipality IDP 2021/2022**

The vision of the Govan Mbeki Municipality (GMM) as set out in the 2020/2021 IDP review is “To be a Model City and Centre of Excellence.”

The Vision, Mission and Values are informed by six (6) Key Strategic objectives:

**Strategic Objective 1:** To enhance revenue & secure financial sustainability.

**Strategic Objective 2:** To provide sustainable services, optimise operations and improve customer care.

**Strategic Objective 3:** To facilitate and create an enabling environment for diversified local economic development, social cohesion and job creation.

**Strategic Objective 4:** To enhance the capacity of human capital and deliver institutional transformation.

**Strategic Objective 5:** To develop spatially integrated, safe communities and a protected environment.

**Strategic Objective 6:** To promote good corporate governance and effective stakeholder engagement.

Strategic Objectives 2,3 and 5 are relevant to the proposed Vhuvhili SEF project.

The IDP highlights the renewable energy sector as a technical service that can be provided to support the

workforce in delivering on the strategic objectives. Green (renewable) energy & energy efficiency is listed as one of the strategic initiatives and proposed interventions to achieve Strategic Objective 2, “To provide sustainable services, optimise operations and improve customer care”. The proposed Vhuvhili SEF development is therefore directly aligned with this objective as it is a green (renewable) energy initiative.

Strategic Objective 3, “To facilitate and create an enabling environment for diversified local economic development, social cohesion, and job creation”, is of relevance to this project. The IDP notes that this objective can be achieved through the phasing in of renewable energy options, which include concentrated solar power, wind and natural gas thereby reducing its dependence on coal resources. Although solar PV is not specifically listed as a renewable energy option, it shows that the municipality is supporting green energy initiatives to diversify local economic development. The proposed Vhuvhili SEF is therefore aligned with this objective.

Strategic Objective 5, “To develop spatially integrated, safe communities and a protected environment”, is also relevant to the proposed Vhuvhili SEF development.

The proposed project is also aligned with Strategic Objective 6, “Infrastructure Investment”, of the SDF for the Govan Mbeki Municipality. The IDP notes that the municipality should invest in green infrastructure e.g. water tanks and **renewable energy (e.g. solar)**.

The proposed project is aligned with two of the objectives of the IDP in that it will encourage sustainable development and economic growth through increased investment and employment opportunities. The proposed project will create employment opportunities and economic spin offs during the construction and operational phases (if EA is granted by the Mpumalanga DARDLEA). This will also address unemployment and poverty as well as Climate Change which have been identified as “Threats” in the SWOT analysis which was undertaken as part of the IDP process for the Govan Mbeki Local Municipality.

#### **4.1.3.4 Guidelines, Frameworks and Protocols**

The following guidelines, frameworks and protocols are applicable to the proposed project:

- Guidelines published in terms of the NEMA EIA Regulations, in particular:
  - Guideline on Alternatives (DEA, 2014);
  - Guideline on Transitional Arrangements (Department of Environmental Affairs and Development Planning (DEA&DP), 2013);
  - Guideline on Alternatives (DEA&DP, 2013);
  - Guideline on Public Participation (DEA, 2012; DEA&DP, 2013; DEA, 2017);
  - National Noise Control Regulations (GN R154 of 1992) and SANS 10103:2008;
  - Guideline on Need and Desirability (DEA&DP, 2013; DEA, 2017);
- Information Document on Generic Terms of Reference for Environmental Assessment Practitioners (EAPs) and Project Schedules (March 2013);
- Integrated Environmental Management Information Series (Booklets 0 to 23) (Department of Environmental Affairs and Tourism (DEAT), 2002 – 2005);
- Guidelines for Involving Specialists in the EIA Processes Series (DEA&DP; CSIR and Tony Barbour, 2005 – 2007);

- BirdLife South Africa (BLSA) 2017 Guidelines for assessing and monitoring the impact of solar power generating facilities on birds in southern Africa;
- Species Environmental Assessment 2020 Guideline: Guidelines for the implementation of the Terrestrial Fauna and Terrestrial Flora Species Protocols for EIAs in South Africa. South African National Biodiversity Institute (SANBI);
- United Nations Framework Convention on Climate Change (1997); and
- Kyoto Protocol (which South Africa acceded to in 2002).

#### **4.1.4 International Finance Corporation Performance Standards**

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In order to promote responsible environmental stewardship and socially responsible development, the proposed project will as far as practicable incorporate the environmental and social policies of the International Finance Corporation (IFC). These policies provide a frame of reference for lending institutions to review environmental and social risks of projects, particularly those undertaken in developing countries.

Through the Equator Principles, the IFC's standards are now recognised as international best practice in project finance. The IFC screening process categorises projects into A, B or C in order to indicate relative degrees of environmental and social risk. The categories are:

- Category A - Project expected to have significant adverse social and/or environmental impacts that are diverse, irreversible, or unprecedented;
- Category B - Project expected to have limited adverse social and/or environmental impacts that can be readily addressed through mitigation measures; and
- Category C - Project expected to have minimal or no adverse impacts, including certain financial intermediary projects.

Accordingly, projects such as the proposed Vhuvhili SEF are categorised as Category B projects. The EIA Process for Category B projects examines the project's potential negative and positive environmental impacts. As required for Category B projects, a S&EIA Process is being undertaken for the proposed Vhuvhili SEF project.

Other Acts, standards and/or guidelines which may also be applicable will be reviewed in more detail as part of the specialist studies that were conducted as part for the EIA Process.

## **4.2 Legal Context for this EIA**

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In terms of the NEMA and the NEMA EIA Regulations, 2014, as amended, a full S&EIA Process is required for the proposed project. The need for the full S&EIA Process is triggered by, amongst others, the inclusion of Activity 1 listed in GN R325 (Listing Notice 2):

- ***"The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facility or infrastructure is for photovoltaic installations and occurs (a) within an urban area; or (b) on existing infrastructure".***

Note that the proposed Vhuvhili SEF is not located within any of the 11 Renewable Energy Development Zones (REDZs) gazetted in GN 114 on 16 February 2018 and GN 144 on 26 February 2021, nor is it located within any of the strategic power corridors gazetted in GN 113 on 16 February 2018 and GN 383 on 29 April 2021; therefore, a full S&EIA Process is being undertaken for the proposed project, subjected to a 107-day decision-making timeframe. Additional information on the REDZs and power corridors are provided in Chapter 5 of this EIA Report.

The proposed Vhuvhili SEF project site is nevertheless located approximately 29 km away (at its closest point) from the Emalahleni REDZ (i.e., REDZ 9). In addition, it is located approximately 34 km away (at its closest points) from the International Strategic Transmission Corridor. While the proposed SEF is not located within the Emalahleni REDZ or International Strategic Transmission Corridor, the proposed project still indeed supports the development of a large-scale renewable energy project at the proposed location. The proposed project is linked to the national planning vision for Renewable Energy development as well as the development of the Green Hydrogen economy in South Africa.

All the listed activities forming part of this proposed development and therefore requiring EA are included in the Application Form for EA that was been prepared and submitted to the Mpumalanga DARDLEA with this Draft Scoping Report for a 30-day public comment period which extended from 13 June 2022 to 14 July 2022. The listed activities triggered by the proposed Vhuvhili SEF are indicated in Table 4.1. **Note that the listed activities noted below only address the current S&EIA Project (Vhuvhili SEF) and not the EGI project which will be subjected to a separate BA Process.**

It should be noted that a precautionary approach was followed when identifying listed activities (for inclusion in the Application for EA and to be assessed as part of the S&EIA Process), i.e., if the activity potentially forms part of the project, it is listed. However, the final project description will be shaped by the findings of the EIA Process and certain activities may be added or removed from the project proposal, followed by the submission of an Amended Application Form for EA to the Mpumalanga DARDLEA, as required.



**Table 4.1: Listed Activities in GN R327, GN R325, and GN R324 that will be potentially triggered by the proposed Vhuvhili SEF**

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
<b>Listing Notice 1, GN R327</b>		
<b>Activity 11 (i)</b>	<p>The development of facilities or infrastructure for the transmission and distribution of electricity —</p> <p>(i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275 kilovolts;</p>	<p>The proposed project will entail the construction of an on-site substation complex, as indicated below:</p> <p>The footprint of the on-site substation complex will extend approximately 4 ha, respectively. The internal distribution electrical infrastructure required to connect the respective electrical components related to the project, and the onsite substation, including cabling (buried or overhead) will be between 33kV and 132kV. The on-site substation will be rated 33/132kV whereas internal cabling will be up to 33kV.</p> <p>This constitutes facilities for the distribution and transmission of electricity.</p> <p>The proposed Vhuvhili SEF project will take place on various affected farm portions outside of an urban area. It will be constructed, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 12 (ii) [(a) and (c)]</b>	<p>The development of—</p> <p>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</p>	<p>The proposed Vhuvhili SEF project will take place outside of an urban area. It will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province.</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	<p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; —</p>	<p>The proposed Vhuvhili SEF will entail the construction of various building infrastructure and structures (such as the solar fields, offices, warehouses/workshops, ablution facilities, guard houses, Operational and Maintenance (O&amp;M) control centres, inverter/transformer stations, an on-site substation complex, laydown areas and an on-site Battery Energy Storage System (BESS) etc.). The infrastructure and structures will exceed a footprint of 100 m<sup>2</sup> and some will occur within minor watercourses and drainage features and within 32 m of these aquatic features.</p> <p>The aquatic features within the study area for the Vhuvhili SEF comprise of several un/channelled valley bottom wetlands, seepage wetlands and floodplain wetlands, most of which are captured in the Critical Biodiversity Area (CBA). Several of the above-mentioned wetlands and rivers are located on the study site and all drain into the Klipspruit River (which is classified as a floodplain wetland) in the middle of the study site. The Klipspruit River drains into Trichardspruit and then into the Kleinspruit approximately 10 km west of the study site.</p> <p>The study site is situated within an upstream Freshwater Ecosystem Protected Area (FEPA). Upstream FEPA's are areas in which human activities need to be managed to prevent damage to downstream FEPA's. The Klipspruit River and associated wetlands that drain into the Klipspruit River are all classified as NFEPA Wetlands.</p> <p>The sensitivity model that was applied in the Aquatic Biodiversity Assessment classified the drainage lines in the FEPA as being of high</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>sensitivity with most of the area classified as low sensitivity and a few areas of medium sensitivity.</p> <p>Refer to the Aquatic Biodiversity Assessment (Chapter 8 of the EIA Report) for additional feedback on the aquatic features within the study area.</p> <p>In addition, the proposed project site contains areas of CBA in terms of the Mpumalanga Biodiversity Sector Plan (MBSP) CBA Map within which the proposed infrastructure will be constructed. The road upgrading may also occur within these areas.</p> <p>Based on an access investigation conducted for the site by the Traffic Specialist (Johnson, 2022)), two site access points are recommended for the site. The access points are proposed off the gravel sections of the D823 and D619 road. The access points are located off existing gravel access roads thus access spacing restrictions are not envisaged. Sight lines along the access points are within the recommended limits. The final site access points will be based on the access investigation findings, geometric considerations and site layout restrictions.</p> <p>This existing gravel road will be widened and upgraded for the proposed project, with an upgraded width ranging up to approximately 10 m. Exact specifications of the widening and upgrading of the farm gravel road will be confirmed during the detailed design phase. The road widening and upgrading will exceed a footprint of 100 m<sup>2</sup>.</p> <p><i>This activity would therefore be triggered.</i></p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
<b>Activity 14</b>	The development and related operation of facilities or infrastructure, for the storage, or for the storage and handling, of a dangerous good, where such storage occurs in containers with a combined capacity of 80 cubic metres or more but not exceeding 500 cubic metres.	<p>The proposed Vhuvhili SEF will require storage and handling of dangerous goods, including fuel, cement and chemical storage onsite, that will be greater than 80m<sup>3</sup> but not exceeding 500m<sup>3</sup>.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 19</b>	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse.</p> <p>but excluding where such infilling, depositing, dredging, excavation, removal or moving-</p> <p>a) will occur behind a development setback;</p> <p>b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	<p>The proposed Vhuvhili SEF project may entail the excavation, removal and moving of more than 10 m<sup>3</sup> of soil, sand, pebbles or rock from nearby watercourses on site. The proposed project may also entail the infilling of more than 10 m<sup>3</sup> of material into the nearby watercourses. The aquatic features within the study area for the Vhuvhili SEF comprise of un/channelled valley bottom wetlands, seepage wetlands and floodplain wetlands. Several of the above-mentioned wetlands and rivers are located on the study site and all drain into the Klipspruit River in the middle of the study site.</p> <p>This access road will be widened and upgraded for the proposed project, with a width of up to 10 m. Exact specifications of the widening and upgrading of the farm gravel road will be confirmed during the detailed design phase.</p> <p>Refer to Chapter 8 of the EIA Report (Aquatic Biodiversity Assessment) for additional feedback on the aquatic features within the study area.</p> <p><i>This activity would therefore be triggered.</i></p>



Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
<b>Activity 24 (ii)</b>	<p>The development of a road –</p> <p>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road–</p> <p>a) which is identified and included in activity 27 in Listing Notice 2 of 2014; or</p> <p>b) where the entire road falls within an urban area; or</p> <p>c) which is 1 km or shorter.</p>	<p>Internal access roads required by the facility will be between 5 m and 6 m wide and longer than 1 km. Where required for turning circle/bypass areas, however, access or internal roads may be up to 10 m to allow for larger component transport. The exact values will be confirmed once final designs have been provided.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 28 (ii)</b>	<p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</p> <p>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</p> <p>excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.</p>	<p>The proposed Vhuvhili SEF will be developed outside of an urban area. It will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area. The land earmarked for the development of the proposed Vhuvhili SEF is currently used for agricultural purposes (mainly maize cultivation and limited livestock farming).</p> <p>The proposed Vhuvhili SEF which is considered as a commercial/industrial development, will have an estimated footprint of approximately 843 ha (as presented in the project description in Chapter 2 of this report). Based on the finding from the specialist studies, an area of 150 ha of cropland is excluded from the project footprint. A project footprint of 694 ha is therefore recommended in Chapter 19 (Recommendations) for approval. The proposed project will entail the construction of various building infrastructure and structures (such as the solar fields, offices, warehouses/workshops, ablution facilities, guard houses, O&amp;M control centres, inverter/transformer stations, on-site substation complex, laydown</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>areas and BESS etc.). This will constitute infrastructure with a physical footprint of very much more than 1 ha.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 48(i)(a)(c)</b>	<p>The expansion of—</p> <p>(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or</p> <p>(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;</p> <p>where such expansion occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;</p>	<p>Transport of large infrastructure components related to the facility will require the expansion of existing access and/or internal roads, culverts or similar drainage crossing infrastructure collectively exceeding 100 m<sup>2</sup> or more beyond existing road or road reserves located within delineated watercourses on site, or within 32 m of the outer extent of the delineated watercourses on site.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 56 (ii)</b>	<p>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre-</p> <p>(i) where the existing reserve is wider than 13,5 meters; or</p> <p>(ii) where no reserve exists, where the existing road is wider than 8 metres;</p> <p>excluding where widening or lengthening occur inside urban areas.</p>	<p>The access points off the gravel sections of the D823 and D619 roads and existing onsite gravel roads may be widened by more than 6 m in some places to provide access to the SEF site. Internal access roads will be up to 20 m wide. Where possible existing gravel roads will be upgraded, and may be widened by more than 6 m and/or lengthened by more than 1 km.</p> <p><i>This activity would therefore be triggered.</i></p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
<b>Listing Notice 2, GN R325</b>		
<b>Activity 1</b>	<p>The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20 megawatts or more, excluding where such development of facilities or infrastructure is for photovoltaic installations and occurs —</p> <p>(a) within an urban area; or</p> <p>(b) on existing infrastructure.</p>	<p>The proposed Vhuvhili SEF project will entail the construction of a Solar PV facility (i.e., a facility for the generation of electricity from a renewable resource), with a capacity of up to 300 M (export).</p> <p>It will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 15</b>	<p>The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>The proposed Vhuvhili SEF as presented in Chapter 2 (Project Description) has a project footprint of 843 ha, with a residual footprint (after mitigation) of 694 ha recommended in Chapter 19 for approval.</p> <p>As a result, more than 20 ha of indigenous vegetation would be removed for the construction of the proposed solar PV facility.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>GN R324 (Listing notice 3)</b>		
<b>Activity 4 (f) (i) (ee)</b>	<p>The development of a road wider than 4 meters with a reserve less than 13.5 meters.</p> <p>f. Mpumalanga</p>	<p>The proposed Vhuvhili SEF project will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area.</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	<p>i. Outside urban areas:</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>Internal roads will be constructed within the footprint of the proposed Vhuvhili SEF. The internal roads are expected to be composed of gravel and will extend approximately 4 to 5 m wide. The total internal road length will be confirmed during the final design.</p> <p>In 2014, the Mpumalanga Parks and Tourism Agency developed the Mpumalanga Biodiversity Sector Plan (MBSP). In essence the MBSP is a map guiding areas of conservation concern for the Mpumalanga Province. Two maps have been developed, namely one for terrestrial biodiversity, and the other for freshwater biodiversity. Based on the terrestrial MBSP, the majority of the site is classified as CBA I (mostly in Habitats 4 &amp; 5 (natural and disturbed grassland – low sensitivity rating in current survey) and on the rocky grassland habitat (Habitat 3 – medium sensitivity rating) in the southeast of the site) with medium to large areas classified as heavily or moderately modified. Old lands also occupy some sections especially in the south. A large section associated with the Klipspruit River is classified as a CBA. The freshwater map indicated that the aquatic ecosystems in and around the study site are classified as Other Natural Areas (ONAs). There is also an Ecological Support Area (ESA) to the west of the study site.</p> <p>Refer to the Terrestrial Biodiversity and Species Assessment (Chapter 7 of the EIA Report), and Aquatic Biodiversity Assessment (Chapter 8 of the EIA Report) for additional information on the CBAs, ESAs and species recorded on site.</p>



Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>Therefore, the proposed internal road network may be constructed within CBA and/or 'Heavily or moderately modified' areas as captured in the MBSP Terrestrial Biodiversity CBA Map.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 12 (f) (ii)</b>	<p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>f. Mpumalanga</p> <p>ii. Within critical biodiversity areas identified in bioregional plans;</p>	<p>The proposed Vhuvhili SEF as presented in Chapter 2 (Project Description) has a project footprint of 843 ha, with a residual footprint (after mitigation) of 694 ha recommended in Chapter 19 for approval.</p> <p>As a result, more than 300 m<sup>2</sup> of indigenous vegetation may be cleared for the construction of the proposed Vhuvhili SEF and associated infrastructure. The proposed project site contains areas of CBA in terms of the Mpumalanga Terrestrial Biodiversity CBA Map.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 14 (ii) (a) and (c); (f), (i) (ff)</b>	<p>The development of –</p> <p>(ii) infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs –</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p>	<p>The proposed Vhuvhili SEF project will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area.</p> <p>The proposed Vhuvhili SEF will entail the construction of various building infrastructure and structures (such as the solar fields, offices, warehouses/workshops, ablution facilities, guard houses, O&amp;M control centres, inverter/transformer stations, on-site substation complexes, laydown areas and BESS etc.). The infrastructure and structures will exceed</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
	<p>f. Mpumalanga</p> <p>i. Outside urban areas:</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>a footprint of 10 m<sup>2</sup> and some will occur within minor watercourses and drainage features and within 32 m of these aquatic features.</p> <p>The aquatic features within the study area for the Vhuvhili SEF comprise of several un/channelled valley bottom wetlands, seepage wetlands and floodplain wetlands, most of which are captured in the CBA. Several of the above-mentioned wetlands and rivers are located on the study site and all drain into the Klipspruit River (which is classified as a floodplain wetland) in the middle of the study site. The Klipspruit River drains into Trichardspruit and then into the Kleinspruit approximately 10 km west of the study site.</p> <p>The study site is situated within an upstream FEPA. Upstream FEPA's are areas in which human activities need to be managed to prevent damage to downstream FEPA's. The Klipspruit River and associated wetlands that drain into the Klipspruit River are all classified as NFEPA Wetlands.</p> <p>The sensitivity model that was applied in the Aquatic Biodiversity Assessment classified the drainage lines in the FEPA as being of high sensitivity with most of the area classified as low sensitivity and a few areas of medium sensitivity.</p> <p>Refer to the Aquatic Biodiversity Assessment for additional feedback on the aquatic features within the study area.</p> <p>In addition, the proposed project site contains areas of CBA in terms of the MBSP CBA Map within which the proposed infrastructure will be constructed. The road upgrading may also occur within these areas.</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>Based on an access investigation conducted for the site by the Traffic Specialist (Johnson, 2022), two site access points are recommended for the site. The access points are proposed off the gravel sections of the D823 and D619 road. The access points are located off existing gravel access roads thus access spacing restrictions are not envisaged. Sight lines along the access points are within the recommended limits. The final site access points will be based on the access investigation findings, geometric considerations and site layout restrictions.</p> <p>This existing gravel road will be widened and upgraded for the proposed project, with an upgraded width ranging up to approximately 10 m. Exact specifications of the widening and upgrading of the farm gravel road will be confirmed during the detailed design phase. The road widening and upgrading will exceed a footprint of 100 m<sup>2</sup>.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 18 (f)(i)(ee)</b>	<p>The widening of a road by more than 4 meters, or the lengthening of a road by more than 1 kilometre:</p> <p>f. Mpumalanga</p> <p>i. Outside urban areas:</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>The proposed Vhuvhili SEF project will be constructed on various affected farm portions, south-east of the town of Secunda in the Govan Mbeki Local Municipality and Gert Sibande District Municipality, in the Mpumalanga Province. Hence the proposed project will take place outside of an urban area.</p> <p>In 2014, the Mpumalanga Parks and Tourism Agency developed the MBSP. In essence the MBSP is a map guiding areas of conservation concern for the Mpumalanga Province. Two maps have been developed, namely one for terrestrial biodiversity, and the other for freshwater biodiversity. Based on</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>the terrestrial MBSP the majority of the site is classified as CBA 1 (mostly in Habitats 4 &amp; 5 (natural and disturbed grassland – low sensitivity rating in current survey) and on the rocky grassland habitat (Habitat 3 – medium sensitivity rating) in the southeast of the site) with medium to large areas classified as heavily or moderately modified. Old lands also occupy some section especially in the south.</p> <p>The freshwater map indicated that the aquatic ecosystems in and around the study site are classified as ONAs. There is also an ESA to the west of the study site. The aquatic features within the study area for the Vhuvhili SEF comprise of several un/channelled valley bottom wetlands, seepage wetlands and floodplain wetlands, most of which are captured in the CBA. Several of the above-mentioned wetlands and rivers are located on the study site and all drain into the Klipspruit River (which is classified as a floodplain wetland) in the middle of the study site.</p> <p>Refer to the Aquatic Biodiversity Assessment (Chapter 8 of the EIA Report) for additional feedback on the aquatic features within the study area.</p> <p>In addition, the proposed project site contains areas of CBA in terms of the MBSP CBA Map and the road upgrading may occur within these areas.</p> <p>Based on an access investigation conducted for the site by the Traffic Specialist (Johnson, 2022), two site access points are recommended for the site. The access points are proposed off the gravel sections of the D823 and D619 road. The access points are located off existing gravel access roads thus access spacing restrictions are not envisaged. Sight lines along the access</p>

Listed Activity Number	Listed Activity Description	Description of the portion of the proposed project to which the applicable listed activity relates
		<p>points are within the recommended limits. The final site access points will be based on the access investigation findings, geometric considerations and site layout restrictions.</p> <p>This existing gravel road will be widened and upgraded for the proposed project, with an upgraded width ranging up to approximately 10 m. Exact specifications of the widening and upgrading of the farm gravel road will be confirmed during the detailed design phase. The road widening and upgrading will exceed a footprint of 100 m<sup>2</sup>.</p> <p><i>This activity would therefore be triggered.</i></p>
<b>Activity 23 (ii)</b> <b>(a)(c)</b> <b>(f) (i) (ee)</b>	<p>The expansion of—</p> <p>(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs—</p> <p>(a) within a watercourse;</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>f. Mpumalanga</p> <p>i. Outside urban areas:</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p>	<p>The proposed Vhuvhili SEF may entail development of infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs within a watercourse; or within 32 m from a watercourse within an area marked as a CBA 1 on farms near Secunda in the Mpumalanga Province.</p> <p><i>This activity would therefore be triggered.</i></p>



### 4.3 National Web-Based Screening Tool

As noted above, GN R960 (dated 5 July 2019) published a notice of the compulsory requirement (as from 4 October 2019) to submit a report generated by the National Web Based Environmental Screening Tool, when submitting an Application for EA. The proposed Vhuvhili SEF project has accordingly been run through the National Web Based Environmental Screening Tool, and the associated report generated and attached to the Application for EA.

Based on the selected classification, the National Web Based Environmental Screening Tool provides a list of specialist assessments that should be undertaken as part of the S&EIA Process, as well as identifies the sensitivities on site that need to be verified by either the EAP or the specialists, where relevant, as noted in the Assessment Protocols of 20 March 2020 (GN 320) and 30 October 2020 (GN 1150). The classification that applies to the proposed project is **Utilities Infrastructure; Electricity; Generation; Renewable; Solar, PV and Solar PV.**

The following list of Specialist Assessments have been identified by the National Web Based Screening Tool for inclusion in the S&EIA Processes (Table 4.2). The National Web Based Environmental Screening Tool Report notes that it is the responsibility of the EAP to confirm this list and to motivate in the Scoping Report, the reason for not including any of the identified specialist assessments, where relevant.

**Table 4.2: List of Specialist Assessments identified by the Screening Tool for the proposed Vhuvhili SEF**

Specialist Assessment Required by the Screening Tool		Assessment undertaken in S&EIA Process	Type of Assessment undertaken in S&EIA Process	Chapter in EIA Report
1	Agriculture and Soils	Yes	Protocol GN 320: Part B: Agriculture (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Agricultural Resources by Onshore Solar PV Energy Generation Facilities where the Electricity Output is 20 MW or more): Impact Assessment	Chapter 6
2	Terrestrial Biodiversity and Species Assessment	Yes	Protocol GN 320: Part B: Biodiversity (Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity): Impact Assessment  The Terrestrial Biodiversity Impact Assessment includes feedback on Terrestrial Plant and Animal Species. This study was commissioned prior to the Species Protocol being gazetted in GN R1150 dated 30 October 2020 (as discussed above in Section 4.1.1.5). The Impact Assessment that was undertaken as part of this S&EIA Process is referred to as a Terrestrial Biodiversity and Species Assessment. Terrestrial	Chapter 7
3	Plant Species Assessment	Yes		
4	Animal Species Assessment	Yes		

Specialist Assessment Required by the Screening Tool		Assessment undertaken in S&EIA Process	Type of Assessment undertaken in S&EIA Process	Chapter in EIA Report
			Biodiversity and Terrestrial Plant Species is combined in one report.	
5	Aquatic Biodiversity Impact Assessment	Yes	Protocol GN R320 – Part B – Aquatic Biodiversity (Protocol for the specialist assessment and impacts on aquatic biodiversity): Impact Assessment  The Impact Assessment that was undertaken as part of this S&EIA Process is referred to as an Aquatic Biodiversity and Species Impact Assessment. Note there is currently no Species Protocol applicable to Aquatic Plants and Animals.	Chapter 8
6	Avifauna Impact Assessment	Yes	Protocol GN 1150: Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species: Impact Assessment	Chapter 9
7	Landscape/Visual Impact Assessment	Yes	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the NEMA EIA Regulations, 2014, as amended: Impact Assessment	Chapter 10
	Flicker Impact Assessment	Yes		
8	Archaeological and Cultural Heritage Impact Assessment	Yes	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the NEMA EIA Regulations, 2014, as amended: Impact Assessment	Chapter 11
9	Palaeontology Impact Assessment	Yes	An integrated Heritage Impact Assessment including Archaeology, Cultural Landscape and Palaeontology was undertaken. This is in line with previous reporting requirements.	Chapter 12
10	Socio-Economic Assessment	Yes	Appendix 6 of the NEMA EIA Regulations, 2014, as amended: Impact Assessment  There are no themes on the Screening Tool that currently relate to Socio-Economic features that could be verified on site. Hence Part A of GN 320 (Site Sensitivity Verification) is not applicable in this regard.	Chapter 13
11	Geotechnical Assessment	Yes	Protocol GN 320: Part A: Site Sensitivity Verification; and Appendix 6 of the NEMA EIA Regulations, 2014, as amended: Impact Assessment	Chapter 15

Specialist Assessment Required by the Screening Tool		Assessment undertaken in S&EIA Process	Type of Assessment undertaken in S&EIA Process	Chapter in EIA Report
12	Civil Aviation	Yes	<p>Protocol GN 320: Part B: Civil Aviation (Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Civil Aviation Installations): Compliance Statement</p> <p>A Site Sensitivity Verification was undertaken instead of a Compliance Statement as indicated by the DFFE Screening Tool. Motivation for this is provided in Section 4.3.1 below.</p> <p>indicates that the south-eastern portion and a small portion on the north-western section of the proposed project area is of “medium” sensitivity with the classification of “within 8 km of another civil aviation aerodrome”. This still needs to be verified on site. Should the medium sensitivity, or a higher sensitivity, be verified, then a Compliance Statement is to be undertaken during the EIA Phase. Should the site be verified as low sensitivity, then only a Site Sensitivity Verification will be required.</p>	Chapter 16
13	Defence Assessment	Yes	<p>Protocol GN R320 – Part B - Defence (Protocol for the specialist assessment and minimum report content requirements for environmental impacts on defence installations): No further assessment requirements are identified as the entire area of interest for the proposed Vhuvhili SEF project site is classified as ‘low’ sensitivity. Only a site sensitivity verification is provided to confirm the site as a low sensitivity, as required by GN R320.</p>	Chapter 17
14	Radio Frequency Interference (RFI) Assessment	No	Motivation not to undertake this specialist assessment is provided in Section 4.3.1 below.	Not applicable
15	Geotechnical Assessment	Yes	A desktop Geotechnical Impact Assessment will be undertaken during the EIA phase. It should be noted that this is a technical study and therefore will not comply with Appendix 6 of the NEMA EIA Regulations, 2014, as amended:	Chapter 18
16	Radio Frequency Interference (RFI) Assessment	No	Motivation not to undertake this specialist assessment is provided in Section 4.3.1 below.	Not applicable

#### **4.3.1 Motivation not to undertake Specialist Assessments as identified in the National Screening Tool**

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##### **4.3.1.1 Civil Aviation**

The map of the relative Civil Aviation (Solar PV) theme sensitivity generated and included in the Screening Tool depicted that the south-eastern portion of the proposed SEF project site is of 'medium' sensitivity with the classification of "Within 8 km of another civil aviation aerodrome," whereas the remainder of the site is of 'low' sensitivity from a civil aviation perspective i.e. there are no major or other types of civil aviation installations such as aerodromes or buffers that intersect with the remaining portion of the proposed development footprint. However, the site visit confirmed that the 'medium' sensitivity in the south-eastern portion of the proposed project site is in fact of 'low' sensitivity. In terms of GN 320, this means that no further requirements are applicable i.e., a Compliance Statement is not required, since the site was indeed found to be of low sensitivity during the site visit.

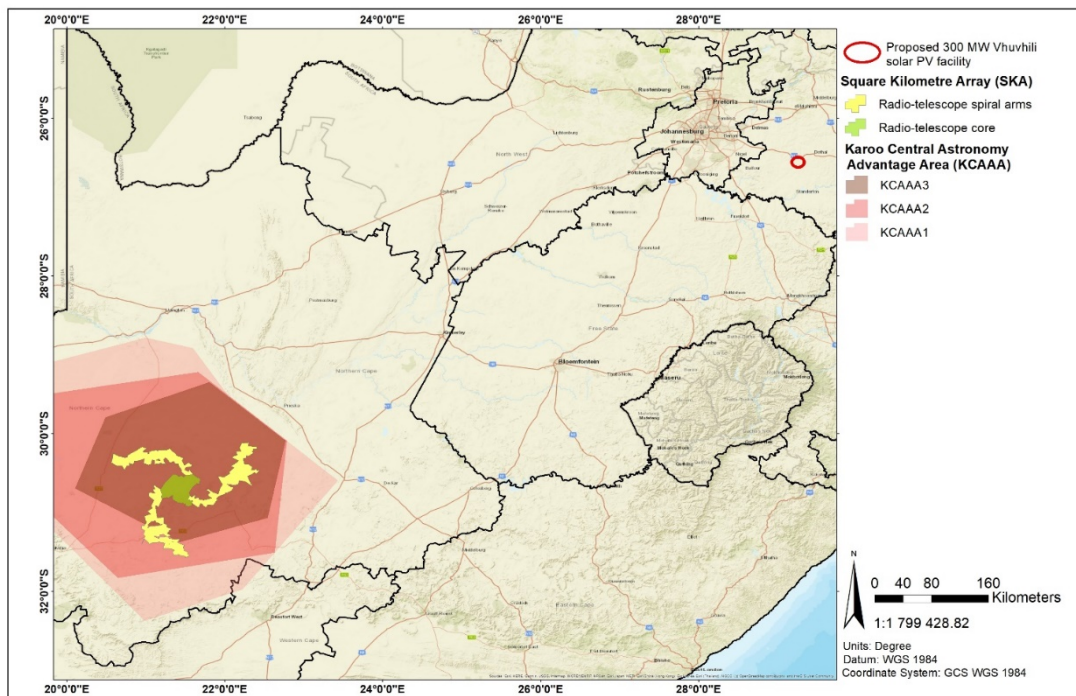
The ATNS data further indicates that there is an unlicensed aerodrome (i.e., Petrusrus Airfiel - FAPW) located approximately 3.5 km south-east (at its closest point) of the proposed Vhuvhili SEF project site. During the site visit it was concluded that, although mapped, the Petrusrus Airfield does not formally exist at the specified coordinates as it appears to be a two-track gravel road located in between existing crop fields. This finding was confirmed by the site manager at the Secunda Airfield, who stated that they were not aware of an airfield located in the vicinity. Furthermore, Google Earth historical imagery, dating from 1985 to 2022 spanning a period of 37 years shows no airfield present at the mapped location. Although the Screening Tool classified the south-eastern portion of the Vhuvhili SEF project site that is in close proximity to the Petrusrus Airfield as 'medium' sensitivity with the classification of 'within 8 km of another civil aviation aerodrome', the site visit confirmed the area to be of 'low' sensitivity as it relates to civil aviation. Consequently, the Petrusrus aerodrome will not impact the proposed SEF.

Please refer to Chapter 16 of this EIA Report for the Site Sensitivity Verification that was undertaken for Civil Aviation.

##### **4.3.1.2 Radio Frequency Interference (RFI) Assessment**

The DFFE Screening Tool results for RFI for the proposed Vhuvhili SEF indicated "medium" sensitivity. This result arose because some of the south-western part of the proposed Vhuvhili project site "lies within 1 km of a telecommunication facility." This sensitivity is therefore not related to the Square Kilometre Array (SKA).

The location of the proposed project does not pose an EMI or RFI risk to the SKA, as the proposed project is located outside of the Northern Cape and outside of the SKA and Karoo Central Astronomy Advantage Area (KCAAA). The proposed Vhuvhili SEF site is located approximately 743 km from the KCAAA. The distance from site to the SKA spiral arm (spiral arm 2) and to the SKA core are 780 km and 864 km respectively (see Figure 4.3).



**Figure 4-31: Map showing the proposed Vhuvhili SEF project site relating to RFI sensitivity in relation to SKA and KCAA**

The SKA has been pre-identified as a key stakeholder and therefore included on the project database of I&APs (Appendix D of this EIA Report). The SKA Project Office was requested to comment on the Draft Scoping Report during the 30-day review period which extended from 13 June 2022 to 14 July 2022. Proof of email correspondence sent to officials at the SKA have been included Appendix E.3 of this Final Scoping Report. The SKA Project Office was requested to comment again on the Draft EIA Report during the 30-day review period which extends from 14 November to 14 December 2022.

Therefore, based on the motivation provided above, a RFI Assessment was not undertaken as part of the EIA process for the proposed Vhuvhili SEF.

#### **4.3.2 Additional Specialist Assessments**

It must be noted that the Screening Tool did not identify the need for the following specialist assessments, however these studies have been commissioned as part of the S&EIA Process to ensure that all potential impacts resulting from the proposed project are considered and assessed as best as possible:

- **Traffic Impact Assessment:** A Traffic Impact Assessment was undertaken in compliance with Appendix 6 of the NEMA EIA Regulations, 2014, as amended (Chapter 15 of this EIA Report); and
- **Battery Energy Storage System (BESS) High Level Safety, Health and Environment Risk Assessment:** A high-level BESS Risk Assessment was undertaken. It comprises a technical report and therefore does not need to fulfil the requirements of the NEMA EIA Regulations, 2014, as amended (Chapter 18 of this EIA Report).



#### **4.4 Overview of approach to preparing the EIA Report and EMPr**

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The specialist assessments were undertaken based on compliance with relevant legislation and based on the Terms of Reference indicated in Chapter 7 of the accepted Final Scoping Report. The Terms of Reference has also been included in the relevant specialist assessment chapters of this EIA Report. The findings of the specialist assessments and other relevant project information for the Vhuvhili SEF project have been integrated and summarised in this EIA Report (refer to Chapters 6 – 18). The Draft EIA Report (this report) is currently being released for a 30-day I&AP and authority commenting period (excluding public holidays). All registered I&APs on the project database were notified in writing of the release of the Draft EIA Report for review.

Comments raised, through written correspondence (emails, comments, forms, text messages) will be captured in a Comments and Responses Report for inclusion in the Final EIA Report that will be submitted to the Mpumalanga DARDLEA for decision-making in terms of Regulation 23 (1) (a) of the 2014 EIA Regulations (as amended). Comments raised will be responded to by the EIA project team and/or the Project Developer, where relevant. These responses will indicate how the issue has been dealt with in the EIA Process. Should the comment received fall beyond the scope of this EIA, clear reasoning will be provided.

The EIA Report includes an EMPr, prepared in compliance with the relevant regulations (i.e., Appendix 4 of the NEMA EIA Regulations, 2014, as amended). This EMPr is based broadly on the environmental management philosophy presented in the ISO 14001 standard, which embodies an approach of continual improvement. Actions in the EMPr have been primarily drawn from the management actions in the specialist assessments for the construction and operational phases of the project. If the project components are decommissioned or re-developed, this will need to be done in accordance with the relevant environmental standards and clean-up/remediation requirements applicable at the time. However, general management actions for the decommissioning phase will be provided.

##### **4.4.1 Public Participation Process**

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This section provides an overview of the tasks being undertaken in the EIA Phase, with a particular emphasis on providing a clear record of the Public Participation Process (PPP) followed.

##### **4.4.1.1 Principles for Public Participation**

The PPP is being driven by a stakeholder engagement process that will include inputs from authorities, I&APs, technical specialists and the Project Developer. Guideline 4 on “*Public Participation in support of the EIA Regulations*” published by the former Department of Environmental Affairs and Tourism (DEAT) in May 2006, states that public participation is one of the most important aspects of the Environmental Assessment Process. This stems from the requirement that people have a right to be informed about potential decisions that may affect them and that they must be afforded an opportunity to influence those decisions. Effective public participation also improves the ability of the Competent Authority to make informed decisions and results in improved decision-making as the views of all parties are considered.

An effective PPP could therefore result in stakeholders working together to produce better decisions than if they had worked independently. The DEAT guideline states the following in terms of PPP:

- “Provides an opportunity for I&APs, EAPs and the Competent Authority to obtain clear, accurate and understandable information about the environmental impacts of the proposed activity or implications of a decision;
  - Provides I&APs with an opportunity to voice their support, concern and question regarding the project, application or decision;
  - Enables an applicant to incorporate the needs, preferences and values of affected parties into its application;
  - Provides opportunities for clearing up misunderstanding about technical issues, resolving disputes and reconciling conflicting interests;
  - Is an important aspect of securing transparency and accountability in decision-making; and
  - Contributes toward maintaining a health, vibrant democracy.”

To the above, one can add the following universally recognised principles for public participation:

- Inclusive consultation that enables all sectors of society to participate in the consultation and assessment processes;
- Provision of accurate and easily accessible information in a language that is clear and sufficiently non-technical for I&APs to understand, and that is sufficient to enable meaningful participation;
- Active empowerment of grassroots people to understand concepts and information with a view to active and meaningful participation;
- Use of a variety of methods for information dissemination in order to improve accessibility, for example, by way of discussion, documents, meetings, workshops, focus group discussions, and the printed and broadcast media;
- Affording I&APs sufficient time to study material, to exchange information, and to make contributions at various stages during the assessment process;
- Provision of opportunities for I&APs to provide their inputs via a range of methods, for example, via briefing sessions, public meetings, written submissions or direct contact with members of the EIA team; and
- Public participation is a process and vehicle to provide sufficient and accessible information to I&APs in an objective manner to assist I&APs to identify issues of concern, to identify alternatives, to suggest opportunities to reduce potentially negative or enhance potentially positive impacts, and to verify that issues and/or inputs have been captured and addressed during the assessment process.

At the outset it is important to highlight two key aspects of public participation:

- There are practical and financial limitations to the involvement of all individuals within a PPP. Hence, the PPP aims to generate issues that are representative of societal sectors, not each individual and will be designed to be inclusive of a broad range of sectors relevant to the proposed project; and
- The PPP will aim to raise a diversity of perspectives and will not be designed to force consensus amongst I&APs. Indeed, diversity of opinion rather than consensus building is likely to enrich ultimate decision-making. Therefore, where possible, the PPP will aim to obtain an indication of trade-offs that

all stakeholders (i.e., I&APs, technical specialists, the authorities and the development proponent) are willing to accept the ecological sustainability, social equity and economic growth associated with the project.

The Department of Environmental Affairs (2017), Public Participation guideline in terms of the NEMA EIA Regulations is also being considered during this S&EIA Process.

#### **4.4.2 Pre-Application Consultation with the Competent Authority**

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A request for a Pre-Application Meeting was submitted to the Mpumalanga DARDLEA, on 11 May 2022 after which the EAP received verbal response from the Mpumalanga DARDLEA on 13 May 2022 confirming that a Pre-Application Meeting was scheduled for 23 May 2022. The Pre-Application Meeting was undertaken in order to discuss and agree on various aspects prior to release of the Draft Scoping Report. The following points were discussed with the Mpumalanga DARDLEA:

- An overview of the proposed project;
- A description of the proposed project
- Findings of the National Web-Based Screening Tool Report;
- Discussion and confirmation on the specialist assessments and compliance statements to be undertaken;
- Discussion and confirmation on the approach towards the specialist reporting, including that of the Assessment Protocols (GN 320, dated 20 March 2020; and GN1150, dated 30 October 2020);
- Approach to the PPP;
- Discussion and confirmation on the proposed project schedule and overall process for the S&EIA, including the Cumulative Impact Assessment approach; and
- Points for clarification.

The Mpumalanga DARDLEA confirmed that a Public Participation Plan is not required for this project. Refer to Appendix F.1 of this EIA Report for a copy of the Agenda for the Pre-Application Meeting with Mpumalanga DARDLEA; Appendix F.2 for a copy of the presentation delivered at the Pre-Application Meeting and Appendix F.3 for a copy of the Pre-Application Meeting Notes. The Pre-Application Meeting Notes were submitted to the Mpumalanga DARDLEA via email on 1 June 2022 and approved by the Mpumalanga DARDLEA on 8 June 2022.

#### **4.4.3 Landowner Written Consent**

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Regulation 39(1) of the NEMA EIA Regulations, 2014, as amended states that *“if the proponent is not the owner or person in control of the land on which the activity is to be undertaken, the proponent must, before applying for an environmental authorisation in respect of such activity, obtain the written consent of the landowner or person in control of the land to undertake such activity on that land”*.

Regulation 39 (2) of the NEMA EIA Regulations, 2014, as amended further states that *“sub-regulation (1) does not apply in respect of: (a) linear activities; and (c) strategic integrated project as contemplated in the Infrastructure Development Act, 2014”*.

The proposed Vhuvhili SEF project constitutes non-linear activities, and landowner consent is therefore required for the following land portions to be affected by this proposed Vhuvhili Solar PV development:

Farm name	Farm No.	Farm Portion	SG code
GROOTVLEI	584	RE	TOIS00000000058400000
GROOTVLEI	293	18	TOIS00000000029300018
GROOTVLEI	293	20	TOIS00000000029300020
GROOTVLEI	293	21	TOIS00000000029300021
POVERTY ACRES	585	RE	TOIS00000000058500000
VLAKSPRUIT	292	21	TOIS00000000029200021

The above six farm portions total 2920 ha. Written consent has been obtained from the respective landowners of the affected farm portions on which the proposed Vhuvhili SEF is proposed to be located. The written consent has been included as an appendix to the Application for EA, which was submitted to the CA, together with the Draft Scoping Report for comment.

For the access road leading to the proposed Vhuvhili SEF, which will be upgraded and potentially widened, landowner consent is not legally required in terms of Regulation 39 of the NEMA EIA Regulations, 2014, as amended as the access road constitutes a linear activity.

#### **4.4.4 Key steps undertaken in the PPP in the EIA phase**

The key steps in the PPP for this S&EIA Process are described below. This approach is structured in line with the requirements of Chapter 6 (PPP) of the NEMA EIA Regulations, 2014, as amended, i.e., GN R326. Various mechanisms were undertaken to provide notice to all potential and registered I&APs of the proposed project, as described below.

The application for this SEF was submitted to DARDLEA, with the Draft Scoping Report for comment on 13 June 2022. The Draft Scoping Report was released to I&APs, Stakeholders and Organs of State (including the Mpumalanga DARDLEA and the National DFFE) for a 30-day comment period extending from 13 June 2022 to 14 July 2022 (excluding public holidays).

The Scoping Report was then finalised based on comments received during the 30-day public comment period and submitted to the Mpumalanga DARDLEA. Notification of acceptance of the Final Scoping Report along with permission to proceed with the EIA Phase was provided by the Mpumalanga DARDLEA on 29 August 2022 (via email received on 28 September 2022) (refer to Appendix F.2 and F.3 for proof of this notification).

##### **4.4.4.1 Task 1 – I&AP Review of the EIA Report and EMPr**

The first stage in the process entails the release of the Draft EIA Report for a 30-day I&AP and authority commenting period, excluding public holidays. An initial database of I&APs (including key stakeholders and Organs of State) was developed prior to the commencement of the S&EIA Process and advertising the EA

process in the local print media, in line with Regulation 41 (2) (c) of GN R326. While I&APs have been encouraged to register their interest in the project from the start of the process, following the public announcements, the identification and registration of I&APs is ongoing for the duration of the study. As per Regulation 42 of the GN R326, in terms of the electronic database, I&AP details have been captured and automatically updated as and when information is distributed to or received from I&APs. This ongoing record of communication is an important component of the PPP. It must be noted that while not required by the regulations, those I&APs proactively identified at the outset of the S&EIA Process will remain on the project database throughout the process and will be kept informed of all opportunities to comment and will only be removed from the database by request. In order to accommodate the varying needs of I&APs and develop their capacity to participate in the process, information sharing forms an integral and ongoing component of the EIA Process to ensure effective public participation.

Appendix C of this EIA Report includes a copy of the updated I&AP database, which indicates interaction with I&APs, key stakeholders and all I&APs that have been added to the electronic project database.

In line with Regulation 41 (2) (b) of GN R326, the database includes the details of the following:

- Landowners of the affected farm portions;
- Occupiers of the affected farm portions;
- Landowners of the neighbouring adjacent farm portions;
- The municipal councillor of the ward in which the proposed project will be undertaken;
- The municipality which has jurisdiction in the area (i.e. Govan Mbeki Local Municipality and the Gert Sibande District Municipality);
- Relevant Organs of State that have jurisdiction in respect of any aspect of the activity; and
- Any other party as required by the Competent Authority.

Relevant stakeholders, Organs of State and I&APs will be informed of the review period in the following manner:

- **Database Maintenance:** As indicated above, in line with Regulation 42 of GN R326, an initial database of potential I&APs was developed for the S&EIA process and was updated throughout the process. The updated database was used to provide written notification of the release of the Draft EIA Report for comment.
- **Advertisement to Register Interest:** An advertisement announcing the commencement of the 30-day comment period for the Draft EIA Report was placed in Afrikaans and English in one local newspaper i.e., “*Ridge Times*” dated Friday, 11 November 2022.
- **Letter to I&APs (Commencement of the EIA Phase and the availability of the Draft EIA Report for public comment):** Written notification of the commencement of the EIA Phase, the availability of the Draft EIA Report for comment and the outcome of decision-making on the Final Scoping Report will be sent to all I&APs and Organs of State included on the project database via email, where email addresses are available. This letter was sent at the commencement of the 30-day review period on the DEIA Report and includes information on the proposed projects and notification of the release and availability of the report. Proof of email, as well as copies of the Letter and emails sent will be included in the Final EIA Report that will be submitted to the DFFE for decision-making.



- **Text Messaging:** SMS texts were sent to all I&APs on the updated project database, where cell phone numbers were available, to inform them of the proposed project and how to access the Draft EIA Report.
- **Executive Summary of the EIA Report:** An Executive Summary of the Draft EIA Report was emailed to I&APs on the project database (where email addresses were available) and uploaded to the project website, as well as to Google Drive.
- **30-day Comment Period:** As noted above, potential I&APs, including authorities and Organs of State were notified, of the 30-day comment period within which to submit comments on the Draft EIA Report (i.e., from 14 November to 14 December 2022).
- **Availability of Information:** The Draft EIA Report was uploaded to the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>) for I&APs to access it. As a supplementary mechanism, the DEIA Report was also uploaded to Google Drive. If an I&AP cannot access the reports via the project website, via the alternative web-platforms such as Google Drive, and if additional information is required (other than what is provided in the Executive Summary), then the I&AP can contact the Project Manager, who will then make **an electronic copy** available (where feasibly possible).

#### **4.4.4.2 Task 2 – Comments and Responses Report**

A key component of the S&EIA Process is documenting and responding to the comments received from I&APs and the authorities. Copies of all written comments received during the review of the DEIA Report will be compiled into a Comments and Responses Report for inclusion in the Final EIA Report that will be submitted to the DARDLEA for decision-making. The Comments and Responses Report will indicate the nature of the comment, as well as when and who raised the comment. The comments received will be carefully considered by the EIA project team and appropriate responses will be provided by the relevant member of the EIA project team, the Project Developer and/or specialists. The response provided will indicate how the comment received has been dealt with in the EIA Process and considered in the Final EIA Report and in the project design or EMPr. Should the comment received fall beyond the scope of this EIA, clear reasoning will be provided.

#### **4.4.4.3 Task 3 – Compilation of the Final EIA Report for Submission to Mpumalanga DARDLEA**

Following the 30-day commenting period of the Draft EIA Report and incorporation of the comments received into the report, a hard copy of the Final EIA Report will be submitted to the DARDLEA for decision-making in line with Regulation 23 (1) (a) of the 2014 NEMA EIA Regulations, as amended.

In line with best practice, I&APs on the project database will be notified via a letter via email (where email addresses are available) of the submission of the Final EIA Report to the DFFE for decision-making. To ensure ongoing access to information, a copy of the Final EIA Report that has been submitted for decision-making and the Comments and Response Report (detailing comments received during the EIA Phase and responses thereto) will be placed on the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>). As a supplementary mechanism, the Final EIA Report will also be uploaded to other alternative web-platforms such as Google Drive.

The Final EIA Report, which will have been submitted for decision-making to the DARDLEA, will include proof of the PPP that was undertaken to inform Organs of State, Stakeholders and I&APs of the availability of the Draft EIA Report for the 30-day comment period (as explained above).

The Mpumalanga DARDLEA will have 107 days (from receipt of the Final EIA Report) to either grant or refuse EA (in line with Regulation 24 (1) of the NEMA EIA Regulations, 2014, as amended).

#### **4.4.4.4 Task 4 – Environmental Authorisation (EA) and Appeal Process**

Subsequent to the decision-making phase, if EA is granted by the Mpumalanga DARDLEA for the proposed project, all registered I&APs, Organs of State and Stakeholders on the project database will receive notification of the issuing of the EA and the associated appeal period. The NEMA EIA Regulations, 2014, as amended (i.e., Regulation 4 (1)) states that after the Competent Authority has reached a decision, it must inform the Project Applicant of the decision, in writing, within five (5) days of such decision. Regulation 4 (2) of the NEMA EIA Regulations, 2014, as amended, stipulates that I&APs need to be informed of the EA and associated appeal period within 14 days of the date of the decision. All registered I&APs will be informed of the outcome of the EA and the appeal procedure, as well as the respective timelines.

The distribution of the EA (should such authorisation be granted), as well as the notification of the appeal period, will include a letter (i.e., Release of EA and Notification of Opportunity to Appeal) to be sent via email to all registered I&APs, Stakeholders and Organs of State on the project database, where email addresses are available. The letter will include information on the appeal period, as well as details regarding where to obtain a copy of the EA. A copy of the EA will also be emailed along with the Letter. The EA will also be uploaded to the project website (i.e. <https://www.csir.co.za/environmental-impact-assessment>), and a similar supplementary mechanism (as explained above). SMS texts will also be sent to all I&APs on the database, where cell phone numbers are available, to inform them of the EA (should they be granted).

At the end of the Appeal period, in line with best practice, I&APs on the project database will be notified of the outcome of the Appeal period, via a letter via email (where email addresses are available).

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## **4.5 Authority consultation**

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Authority consultation is integrated into the PPP, with additional meetings held on online platforms with the lead authorities, where necessary. It is proposed that the CA (Mpumalanga DARDLEA) as well as other lead authorities will be consulted at various stages during the EIA Process, if required. At this stage, the following authorities have been identified for the purpose of this EIA Process (additional authorities might be added to this list as the EIA Process proceeds):

- Gert Sibande District Municipality;
- Govan Mbeki Local Municipality;
- Department of Agriculture, Rural Development and Land Reform (Mpumalanga);
- Department of Mineral Resources and Energy (Mpumalanga);
- Department of Water and Sanitation;
- Endangered Wildlife Trust;
- Eskom Holdings SOC Ltd;

- Independent Communications Authority of South Africa (ICASA);
- Department of Transport and Public Works;
- Mpumalanga Tourism and Parks Agency;
- National Energy Regulator of South Africa (NERSA);
- South African National Roads Authority (SANRAL);
- South African Civil Aviation Authority (CAA);
- South African Heritage Resource Agency (SAHRA);
- South African Local Government Association (SALGA)
- South African National Parks (SANParks);
- South African Radio Astronomy Observatory (SARAO);
- Transnet SOC Ltd; and
- Wildlife and Environmental Society of South Africa (WESSA).

The authority consultation process for the EIA Phase is outlined in Table 4.3 below.

**Table 4.1: Authority Communication Schedule**

STAGE IN EIA PHASE	FORM OF CONSULTATION
During the EIA Process	Site visit with authorities (including DARDLEA), if required.
During preparation of EIA Report	Communication (via email or telephone) with the DARDLEA on aspects of the EIA process.
On submission of EIA Report for decision-making	Online meetings with dedicated departments, if requested by the DARDLEA, with jurisdiction over particular aspects of the project (e.g., Local Authority) and potentially including relevant specialists.

#### 4.6 Schedule for the Scoping and EIA Process

The proposed schedule for the S&EIA Process, based on the legislated EIA timeframes, is presented in Table 4.4. It should be noted that this schedule was revised during the EIA Process, depending on factors such as revised timeframes to submit the Final EIA Report.

#### 4.7 Schedule for the S&EIA Process

The proposed schedule for the S&EIA Process, based on the legislated EIA timeframes, is presented in Table 4.4. It should be noted that this schedule may be revised during the EIA Process, depending on comments received during the EIA process.

**Table 4.4: Provisional Schedule for the proposed Vhuvhili SEF Project**

<b>Key Milestones</b>	<b>Proposed Timeframe</b>
Project Initiation and Pre-Application Consultation with the Mpumalanga DARDLEA	23 May 2022
Prepare Draft Scoping Report and Plan of Study for EIA including specialist inputs for the Vhuvhili SEF EIA Project	April 2022 to June 2022
Submit Application Form to Mpumalanga DARDLEA for the Vhuvhili SEF EIA Project	Mid-June 2022
Release Draft Scoping Report for the Vhuvhili SEF EIA Project for 30 day commenting period	13 June 2022 to 14 July 2022
Submit Final Scoping Report for the Vhuvhili SEF EIA Project to the Mpumalanga DARDLEA for Decision-Making	26 July 2022
Mpumalanga DARDLEA Accepted Final Scoping Report for the Vhuvhili SEF EIA Project or Refuse EA	29 August 2022
Specialist Assessments for the Vhuvhili SEF EIA Report	August 2022 to November 2022
Prepare Draft EIA Report for the Vhuvhili SEF EIA Project	September 2022 to November 2022
Release Draft EIA Report for the Vhuvhili SEF EIA Project for 30-day commenting period	14 November 2022 to 14 December 2022
Submit Final EIA Report for the Vhuvhili SEF EIA Project to Mpumalanga DARDLEA for Decision-Making	January/February 2023
Mpumalanga DARDLEA Decision-Making on the Final EIA Report and issue of Decision (i.e. grant or refuse EA): 107 days	May 2023
EAP to Notify I&APs of Decisions (14 days)	Within 14 days of Environmental Decision being issued: May/June 2023



# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed  
development of the Vhuvhili Solar  
Photovoltaic (PV) Facility near Secunda in  
the Mpumalanga Province



## CHAPTER 5:

# Project Alternatives



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## 5. ASSESSMENT OF ALTERNATIVES

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This chapter discusses the alternatives that have been considered as part of the Scoping and EIA Phase, as well as the selection process of the preferred alternatives that are assessed as part of the Environmental Impact Assessment (EIA) Phase. Sections 24(4) (b) (i) and 24(4A) of the National Environmental Management Act, 1998 (Act 107 of 1998), as amended (NEMA) require an Environmental Assessment to include investigation and assessment of impacts associated with alternatives to the proposed project. In addition, Section 24O (1)(b)(iv) requires that the Competent Authority, when considering an application for EA, takes into account “*where appropriate, any feasible and reasonable alternatives to the activity which is the subject of the application and any feasible and reasonable modifications or changes to the activity that may minimise harm to the environment*”.

Therefore, the assessment of alternatives should, as a minimum, include the following:

- The consideration of the no-go alternative as a baseline scenario;
- A comparison of the reasonable and feasible alternatives; and
- Providing a methodology for the elimination of an alternative.

The NEMA EIA Regulations, 2014, as amended, define “alternatives”, in relation to a proposed activity, “as different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:

- property on which or location where the activity is proposed to be undertaken;
- type of activity to be undertaken;
- design or layout of the activity;
- technology to be used in the activity;
- operational aspects of the activity; and
- includes the option of not implementing the activity”.

This chapter therefore provides a full description of the process followed to reach the proposed preferred activity and technology alternative, site and location of the development footprint within the site, including details of all the alternatives considered and the outcome of the site selection matrix. The chapter concludes with a summary of the legislative requirements for the assessment of alternatives as required in the NEMA EIA Regulations, 2014, as amended (refer to section 5.7).

### 5.1 No-go Alternative

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The no-go alternative assumes that the proposed project will not go ahead i.e., it is the option of not developing the proposed Vhuvhili SEF and associated infrastructure. This alternative would result in no environmental impacts on the site or surrounding local area as a result of the proposed project. It provides the baseline against which other alternatives are compared. If the “no-go” alternative is implemented (i.e. the project does not proceed), the following negative implications will occur:

- No benefits will be derived from the implementation of an additional land-use;

- No additional power of up to 300 MW (export) will be generated or supplied through means of renewable energy resources by the proposed project at this location;
- The “no go” alternative will not contribute to and assist the government in achieving its renewable energy target of 26 630 MW total installed capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power) (Integrated Resource Plan (IRP), 2019);
- Electricity generation will remain constant (i.e. no renewable energy generation will occur on the site for the proposed project) and as a result the local economy in terms of surrounding communities and towns within the local municipality will not be diversified, while existing electricity generation sources nationally will age and degrade over time, with increasing maintenance requirements leading to ongoing power outages;
- There will be lost opportunity for skills transfer and education/training of local communities;
- The positive socio-economic impacts likely to result from the project such as increased local spending and the creation of local employment opportunities will not be realised;
- There will be no opportunity for additional employment in the local area during the construction and operation phases, where job creation is identified as a key priority (approximately 200 jobs are predicted for the construction phase of up to 36 months and approximately 20 jobs over the operational phase of 25 years);
- The local economic benefits associated with the private off-taker agreement between ENERTRAG and Sasol, or the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or similar bidding processes, will not be realised, and socio-economic contribution payments into the local community trust will not be realised;
- The development of a solar PV Facility at a time when coal fired power stations are reaching the end-of-life and being closed down, can directly contribute to South Africa’s response to climate mitigation and our international commitments under the Paris Agreement;
- Benefits of wind and solar PV energy being cheapest sources of new electricity generation in South Africa are not realised (national modelling conducted by CSIR and outcomes from the REIPPPP program convey that wind and solar PV are the cheapest forms of new power generation in South Africa);
- The contribution of 300 MW (export) of renewable energy to Sasol’s international competitiveness to produce Sustainable Aviation Fuel is not realised; or, if power is provided to the REIPPPP, then the benefits of this affordable and clean electricity is not realised for South Africa; and
- The local, national, and international benefits associated with the production of Sustainable Aviation Fuel and Green Hydrogen at Sasol will not be realised. Sustainable Aviation Fuels<sup>1</sup> are predicted to become a highly tradable global commodity.

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<sup>1</sup> **Sustainable aviation fuels** provide a large reduction of greenhouse gas emissions with little changes to current Technology, as they are very similar in chemistry to traditional fossil jet fuel. They are therefore an alternative in that they are produced primarily from non-petroleum sources of hydrocarbons using a potentially broad range of biochemical and thermochemical conversion processes. The energy source is from renewable energy, the hydrogen can be sourced from water and the carbon can be sourced from biomass, waste, extracted from the air etc.

Converse to the above, the following benefits could occur if the “no-go” alternative is implemented:

- The current land-use of cattle grazing will continue on the area recommended in this EIA Report for PV, which supports one large stock unit per 5 hectares and generates 2 jobs (Lanz, 2022);
- No vegetation or species of special concern (flora and fauna) will be removed or disturbed during the development of the proposed project;
- No risk of disturbing aquatic features that are located adjacent to sections of the Vhuvhili SEF;
- No modification or destruction of habitat will occur;
- No change to the current landscape will occur (i.e., the visual character of the area will remain unchanged);
- No risk of disturbing heritage artefacts or palaeontological resources as a result of the Vhuvhili SEF;
- No noise impacts associated with construction activities will occur;
- No avifaunal impacts will occur due to construction and operation of the proposed Vhuvhili SEF; and
- No additional water use will be required for construction and operations of the PV facility.

The no-go alternative has been considered further by the specialists during the EIA Phase. It is important to note that none of the Specialist Studies or Assessments identified any environmental fatal flaws, and overall, the Impact Assessments (as provided in Chapters 6 to 15 of this EIA Report) have not resulted in any unacceptable residual impacts.

The no-go alternative means no addition of renewable energy, which means further reliance on fossil fuels that will continue to have a negative environmental impact. While the no-go alternative (i.e. not developing the proposed Vhuvhili SEF) will not result in any additional negative environmental impacts in the area (besides the ongoing impacts of existing farming activities, such as grazing), it will also not have any positive community development or socio-economic benefits. It will not assist government in supplying the increasing electricity demand within the country. In addition, it will not assist in building national capacity to address the decarbonisation of the aviation sector and green hydrogen production. The no-go alternative will also impede the government in addressing climate change and reaching its set targets for renewable energy. **Hence, the no-go alternative is not the preferred alternative.**

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## 5.2 Land-Use Alternatives

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The Agricultural Assessment (Chapter 6 of this EIA Report) states that the site is located in a grain farming agricultural region, but the soils vary in their suitability for crop production. Because of the favourable climate and the potentially high grain yields, farmers in the area tend to utilise all suitable soil for grain production. Only soil that is not suitable for grain production is used for cattle grazing. The long-term grazing capacity of the farm is 5 hectares per large stock unit.

Limitations that render the soil unsuitable for grain production are depth limitations due to rock or dense clay in the subsoil, and the limited drainage associated with the dense, poorly drained clay layers in the subsoil. The grazing lands are rooigras (*Themeda triandra*) grasslands. Grass fields are burned or mowed from time to time.



The study area has **moderate agricultural potential** predominantly because of favourable climatic conditions which favour grain production. It should be noted that the layout of the proposed Vhuvhili SEF went through several iterations to address preferences by landowners and to avoid the sensitivities identified by the specialists during the Scoping and EIA phase. In Summary:

- The original study area considered by specialists in the EIA covered 8 farm portions and 3244 ha.
- Of this area, 843 ha was taken into the EIA Phase as the proposed footprint for the SEF, which included 150 ha of cropland (maize production).
- The EIA findings are that the cropland be excluded from the SEF layout and a reduced area of 698 ha is recommended in Chapter 19 (Conclusions and Recommendations) of this EIA Report for approval for the SEF.

The Agricultural Assessment concluded that the proposed Vhuvhili SEF development will not have an unacceptable negative impact on the agricultural production capability of the site, providing all cropland is avoided by the footprint of the development. This is substantiated by the following facts:

- The proposed Vhuvhili SEF will only occupy land that is of limited land capability and is not suitable for crop production;
- The amount of agricultural land loss is within the allowable development limits prescribed by the Agricultural Protocol;
- The SEF offers improved financial security, as well as wider, societal benefits;
- The SEF poses a low risk in terms of causing soil degradation; and the
- Loss by occupation is not permanent and land will become available again when the SEF ceases.

**Therefore, the proposed Solar Energy Facility development is acceptable from an agricultural impact point of view, and it is recommended in the Agricultural Assessment (Chapter 6) that it be approved.**

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### 5.3 Renewable Energy Alternatives

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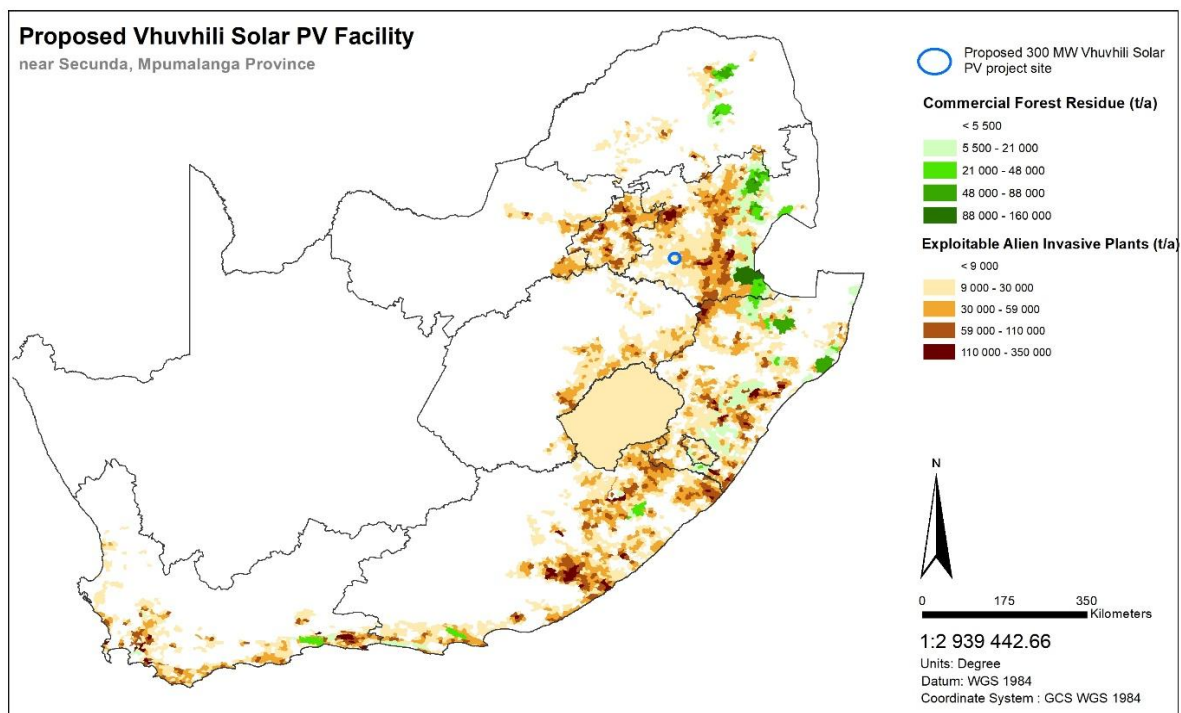
In terms of the type of activity, this relates to the generation of up to 300 MW (export) of electricity from a renewable energy source, and in this particular case, from **solar** resources using photovoltaic technology. ENERTRAG South Africa focuses on solar, wind and hydrogen technologies and works with landowners, technology providers, regulators and investors to source and develop renewable energy projects. In addition, the project will form an integral component of the proposed production of Sustainable Aviation Fuel at the Sasol Secunda Synfuels plant in Mpumalanga (should EA be granted) and contribute to the developing green hydrogen economy within South Africa. Therefore, the **generation of electricity from a renewable energy source** was the only activity considered by the Project Applicant, and thus considered in this S&EIA process. **No other activity types were considered or deemed appropriate based on the expertise of the Project Applicant and the requirements for green energy.**

Where the “activity” is the generation of electricity from a renewable energy source, possible alternatives that could potentially be considered include renewable energy technologies such as Biomass, Hydro Energy, Wind Energy and Solar Energy. However, based on the preliminary investigations undertaken by the Project Applicant, **Solar PV development is the preferred technology**

**alternative** and no other renewable energy technologies are deemed to be feasible for this study area. The unsuitability of other renewable energy technologies for this study area, and impacts of each, are discussed below.

### 5.3.1 Biomass Energy

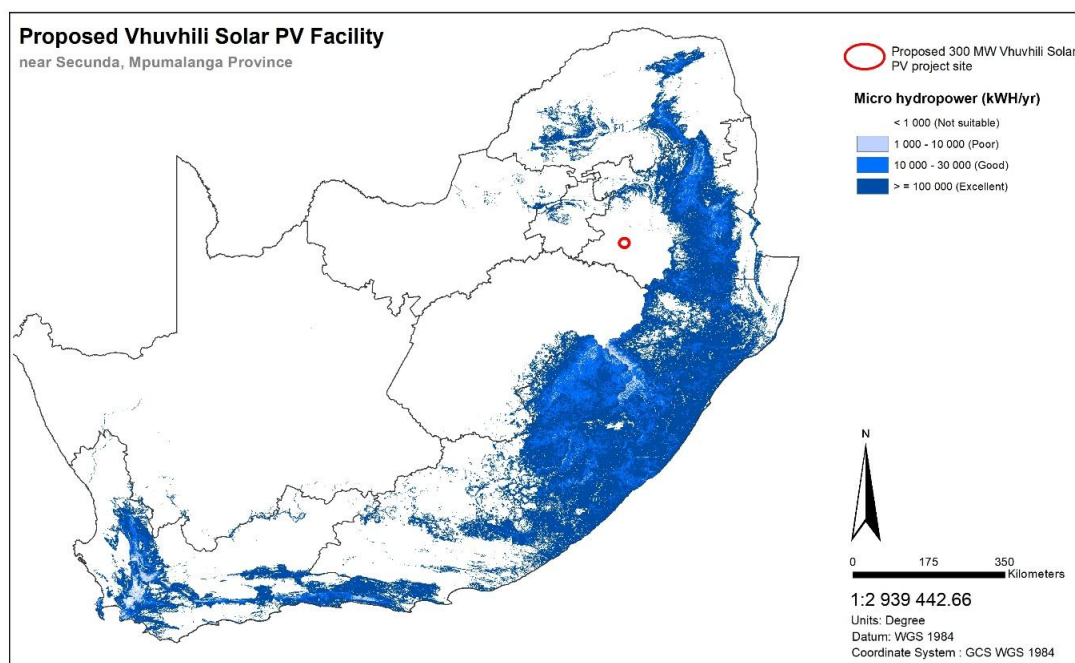
The proposed project study area does not contain any abundant or sustainable supply of biomass. As indicated in Figure 5-1, the proposed project area has less than 5 500 tonnes per annum (t/a) commercial forest residue and between 9 000 and 30 000 t/a exploitable alien invasive plants, which are the among the lowest for both categories. Therefore, the study area does not have any viable biomass energy potential. **Therefore, the implementation of a Biomass Energy Facility within the study area is not considered to be a reasonable and feasible alternative to be assessed as part of this S&EIA Process.**



**Figure 5-1: Biomass Potential in terms of Commercial Forest Residue and Exploitable Alien Invasive Plants. Note that the Vhuvhili SEF study area is depicted in red (Source: De Lange, 2013; Hugo, 2014).**

### 5.3.2 Hydro Energy

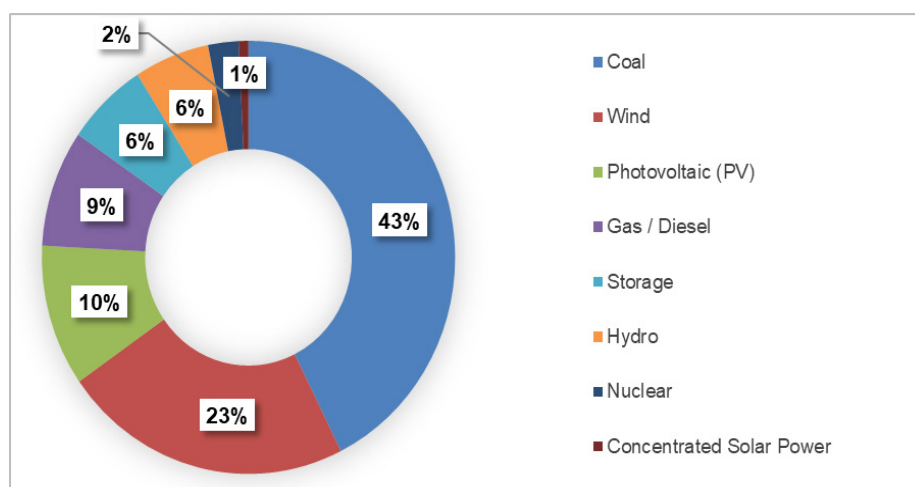
The proposed project study area does not contain any large inland water bodies, nor suitable topography, which excludes the possibility of renewable energy from small- or large-scale hydro energy generation. In terms of micro hydropower potential (Figure 5-2), the study area falls within an area classified as “Not Suitable” (i.e. less than 1 000 kWh/year). **Therefore, the implementation of a Hydro Energy Facility within the study area is not considered to be a reasonable and feasible alternative to be assessed as part of this S&EIA Process.**



**Figure 5-2: Micro Hydropower Potential (kWh/year).** Note that the Vhuvhili SEF study area is depicted in red (Source: Eskom and CSIR, 1999).

### 5.3.3 National planning context for wind and solar energy

National energy planning is guided by the Integrated Resource Plan (IRP). The current IRP was published in Government Gazette 42784, Government Notice (GN) 1360 on 18 October 2019 for the period 2019 to 2030. As indicated in Figure 5-3 for the projection to 2030, coal makes up approximately 43 % of the total installed capacity, whereas Wind and Solar PV respectively make up 23 % and 10 % (Table 5, Page 42 of the IRP 2019 published in the Government Gazette of 18/10/2019).



**Figure 5-3: Total Installed Capacity for 2030 (% of MW) in the IRP of 2019.**

The 2019 IRP proposes to secure 26 630 MW of renewable energy capacity by 2030 (for Wind, Solar PV and Concentrated Solar Power). This amount excludes Hydropower and Storage. Of this total, 1 474 MW of Solar PV, 1 980 MW of Wind and 300 MW of Concentrated Solar Power is already installed capacity. In addition, of the 26 630 MW, approximately 814 MW of Solar PV, 1 362 of Wind and 300 MW of Concentrated Solar Power is committed or already contracted capacity. Furthermore, of the 26 630 MW total, and 6 000 MW is allocated to solar PV, and 14 400 MW is allocated to wind as new additional capacity. Therefore approximately 3714 MW of new solar PV capacity is required by 2030 to meet the IRP targets.

Linked to the 2010 IRP, the Department of Mineral Resources and Energy (DMRE) entered into a bidding process for the procurement of 3 725 MW of renewable energy from Independent Power Producers (IPPs) by 2016 and beyond. On 18 August 2015, an additional procurement target of 6 300 MW to be generated from renewable energy sources was added to the REIPPPP for the years 2021 - 2025, as published in Government Gazette 39111. The additional target allocated for wind energy, solar PV energy and solar CSP energy is 3 040 MW, 2 200 MW, and 600 MW respectively. This brings the additional solar PV required to 5914 MW.

According to the Minister of Mineral Resources and Energy, in an announcement made on 28 October 2021 (DMRE, 2021a<sup>2</sup>), the DMRE has to date procured and signed agreements with 93 IPP projects, with a total combined capacity of 7 308 MW. These consist of 86 renewable energy projects, two diesel fired peaking plants, and five small power plants (i.e. hydropower, landfill gas and biomass). About 89 of the 93 projects, including the Bid Window 4 projects signed in 2018, are connected to the grid and currently supply approximately 6 855 MW of electricity (DMRE, 2021a<sup>2</sup>).

On 7 July 2020, in Government Gazette 43509, GN R753, the Minister of Mineral Resources and Energy, in consultation with the National Energy Regulator of South Africa (NERSA), determined that new generation capacity needs to be procured to contribute towards energy security. Specifically, the gazette noted that 2000 MW needs to be procured from a range of energy source technologies in accordance with the short-term risk mitigation capacity allocated for the years 2019 to 2022 (under “other” in the allocation table contained in 2019 IRP). In line with this, the Risk Mitigation IPP Procurement Programme (RMIPPPP) was designed and launched in August 2020 by the DMRE to fulfil the GN R753 Ministerial Determination. Bids were submitted by various IPPs on 22 December 2020, and on 18 March 2021, the Minister of Mineral Resources and Energy, announced eight Preferred Bidders selected under the RMIPPPP, totalling 1 845 MW (DMRE, 2021b<sup>3</sup>). Three additional Preferred Bidder projects were also announced on 1 June 2021 under the RMIPPPP with a combined capacity of 150 MW, resulting in a total of approximately 1 995 MW to be procured under the RMIPPPP (DMRE, 2021c<sup>4</sup>). These projects are understood to reach Financial Close in early 2021.

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<sup>2</sup> DMRE (2021a). Announcement by the Minister of Mineral Resources and Energy, the Honourable Gwede Mantashe 28 October 2021 Renewable Energy IPP Procurement Programme (REIPPPP) Bid Window 5 Announcement of Preferred Bidders. <https://ipp-projects.co.za/PressCentre> [online]. Accessed November 2021.

<sup>3</sup> DMRE (2021b). Media Statement: To Announce Preferred Bidders for the Risk Mitigation IPP Procurement Programme (RMIPPPP). <https://www.dmr.gov.za/news-room/post/1894/media-statement-to-announce-preferred-bidders-for-the-risk-mitigation-ipp-procurement-programme-rmipppp> [online]. Accessed November 2021.

<sup>4</sup> DMRE (2021c). Media Statement: Department of Mineral Resources and Energy Announces Three Additional Preferred Bidders Appointed under the Risk Mitigation Independent Power Producer Procurement Programme (RMIPPPP). <https://www.ipp-rm.co.za/> [online]. Accessed November 2021.

On 28 October 2021, the Minister of Mineral Resources and Energy (DMRE, 2021a) announced the Preferred Bidders of Bid Window 5 of the REIPPPP, which was released in April 2021. The aim was to procure a total of 2 600 MW (consisting of 1 600 MW from onshore wind and 1 000 MW from Solar PV). Approximately 102 bids were submitted in August 2021. Twenty-five (25) referred Bidder Projects, totalling 2 583 MW, were selected (DMRE, 2021a). In Bid Window 5, the preferred bidders provided an average tariff of 50 c/kWh for wind and of 43 c/kWh for solar PV. This is a considerable reduction in tariff from Bid Window 4 in November 2015 where the tariff provided for wind and solar PV were both 78 c/kWh. This confirms the crucial role that renewable energy is playing in being the lowest cost energy alternative in South Africa, while supporting the decarbonisation of the power system and ensuring that electricity is cost-effective and sustainable.

Thereafter, a total of 56 wind and solar projects have been submitted by prospective bidders under Bid Window 6 which closed on 03 October 2022 and intends to procure 4 200 MW of renewable energy from an initial allocation of 2 600 MW.

As indicated in Chapter 1 and Chapter 2 of this EIA Report, the proposed Vhuvhili SEF has a generation capacity of up to 300 MW (export). It is intended that this project supplies solar energy to the Sasol hydrogen electrolyser to produce Green Hydrogen and Sustainable Aviation Fuel (SAF) at the Sasol Secunda Synfuels plant in Mpumalanga.

Should the proposed Vhuvhili SEF not provide energy to Sasol, it is intended that it will be bid into a future bidding program such as the REIPPPP or similar suitable tender process.

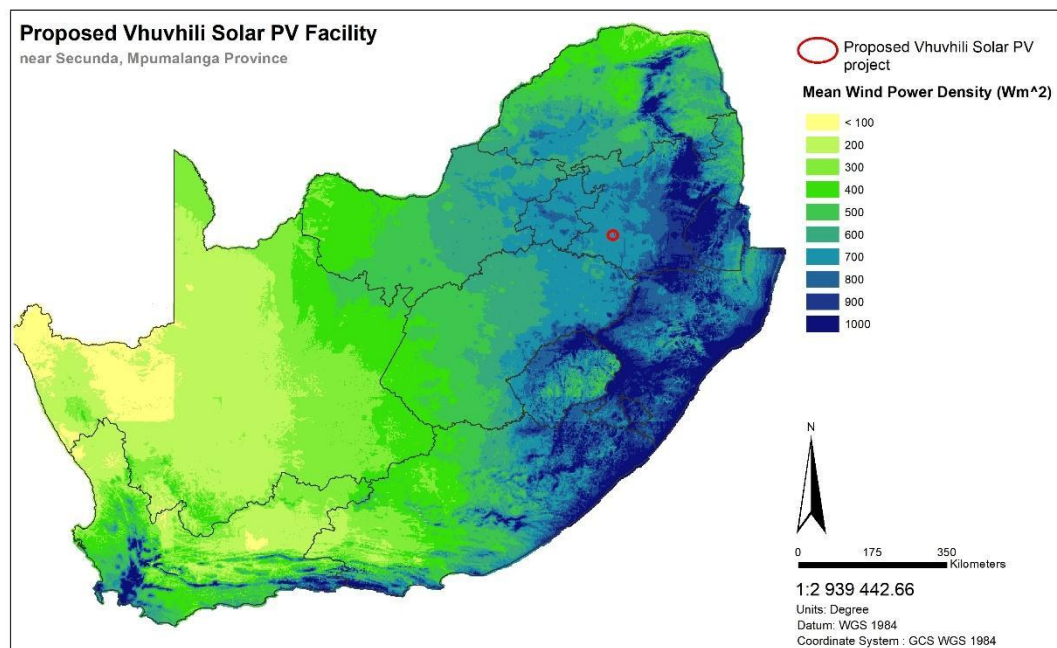
**In summary, development of new electricity generation capacity using wind and solar energy forms an integral part of South Africa's national energy planning.**

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#### **5.3.4 Wind Energy**

In order to ensure that a Wind Energy Facility (WEF) is successful, a reliable wind resource is required. A wind resource is defined in terms of average wind speed and includes Weibull distribution (used to describe wind speed distributions); turbulence, wind direction, and pattern of wind direction (as depicted by a wind rose). These factors are all key considerations used in determining whether a site is suitable for the development of a WEF. A mean wind power density map has also been created (CSIR, 2018), which is not related to any specific turbine type and demonstrates the wind resource of the country. The mean wind power density map shows that the project study area falls within an area of approximately 700 W/m<sup>2</sup> (Figure 5.4).





**Figure 5-4: Annual Mean Wind Power Density for South Africa ( $W/m^2$ ). Note that the proposed Vhuvhili SEF study area is depicted in red (Source: CSIR, 2018).**

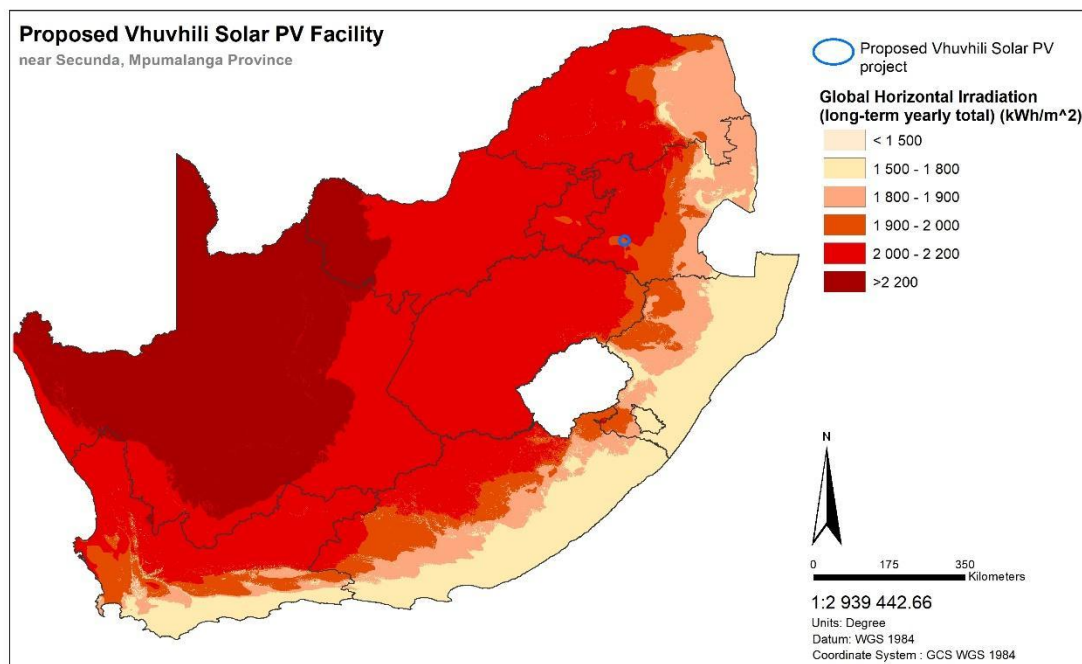
Overall, wind energy development can occur within the Secunda area, although other localities in South Africa have better wind energy resources.

Of particular relevance for the Vhuvhili site is that the Study Area for the EIA (considered by the specialists) is 1 km from the town of Secunda (at its closest point) and approximately 5km east of the Secunda Airfield. The airfield has an east-west runway alignment. Therefore, the Vhuvhili site is Medium to High sensitivity on the DFFE Screening Tool for aviation for Wind Turbines; and mostly Low sensitivity for aviation for Solar PV (largely due to the considerably lower elevation of PV compared to wind turbines). The site is therefore more suitable for Solar PV than Wind Turbines. The proximity of the Vhuvhili site to the town of Secunda also makes it more sensitive to visual impacts from wind turbines, and more suitable for solar PV which has a low elevation of up to 6m for the PV arrays. Furthermore, given the undermining occurring in the general area as a result of coal mining, wind turbines would require more complex geotechnical designs to address potential stability risks on this specific site area.

Site specific requirements for a WEF however make this proposed project study area a **less feasible alternative** when compared to solar PV. **Therefore, the implementation of a WEF within the proposed project study area is not considered to be a feasible alternative to be assessed as part of this current Application for EA.**

### 5.3.5 Solar Energy

In terms of the suitability of solar energy development at this location, the proposed project area falls within the third **highest** Global Horizontal Irradiation<sup>5</sup> (GHI) category, relevant to PV installations (Figure 5-5). As indicated in this figure, the site for the proposed Vhuvhili SEF has a GHI between 1 900 – 2 000 kWh/m<sup>2</sup> in terms of the long-term yearly total.



**Figure 5-5: Solar Resource Availability for South Africa (kWh/m<sup>2</sup>) with the Vhuvhili SEF site depicted in blue (Source: CSIR, 2018).**

Therefore, this area is deemed as one of the most suitable for the construction and operation of a SEF. Furthermore, as indicated in the earlier discussion on the outcomes of Bid Window 5 in October 2021, solar PV is currently the least cost energy generation option for South Africa. These factors substantiate that the use of solar resources in the area is extremely viable and support the development of Solar PV within the proposed project study area.

In addition, other economic activities can still continue in combination with the solar PV. Unlike opencast coal mining within the broader Mpumalanga coal area, the proposed Vhuvhili SEF project facilitates multiple land use functions within the development area. As solar modules are clustered on surface developments this allows multiple land use functions such as operating the solar farm in tandem with underground coal mining and grazing of small stock units. This will boost the economic activities in the area which will in turn increase job opportunities in that area and help improve the local community's welfare without jeopardizing the environment.

<sup>5</sup> Global Horizontal Irradiance is the total amount of shortwave radiation received from above by a surface horizontal to the ground

Finally, since the alternative renewable energy generation activities considered were deemed to be unfeasible for the study area, no other renewable energy alternatives were further assessed as part of the S&EIA Process.

**Therefore, the implementation of a SEF within the study area is more favourable and feasible than wind energy, biomass and hydropower development, especially from a project economic and energy generation viability and location compatibility perspective. Therefore, the proposed Vhuvhili SEF project is the most feasible and preferred Renewable Energy Alternative.**

### **5.3.6 Summary of the Renewable Energy Alternatives**

Table 5-1 presents a summary and an evaluation matrix for the possible renewable energy alternatives with regards to resource suitability and availability, and potential risks and impacts.

**Table 5-1: Summary of Evaluation of Potential Risks and Impacts for Renewable Energy Alternatives**

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Main Potential Impacts and Risks	Is this the preferred Alternative?
Biomass Energy	<ul style="list-style-type: none"> <li>No – not suitable i.e. less than 5 500 t/a commercial forest residue and less between 9 000 and 30 000 t/a exploitable alien invasive plants).</li> </ul>	<ul style="list-style-type: none"> <li>Significant waste generation with the potential need for a Waste Management Licence.</li> <li>Air emissions with the potential need for an Atmospheric Emissions Licence.</li> </ul>	No
Hydro Energy	<ul style="list-style-type: none"> <li>No – “Not Suitable” (i.e. less than 1 000 kWh/year), lack of water and topography unsuitable.</li> </ul>	<ul style="list-style-type: none"> <li>Significant impacts on aquatic biodiversity and hydrology of the affected river system.</li> <li>Water Use Licence would be required for the establishment of an in-stream hydropower development.</li> <li>Long lead times would be required for the various permits needed for such development.</li> </ul>	No
Wind Energy	<ul style="list-style-type: none"> <li>Yes (approximately 700 W/m<sup>2</sup>) but less economically competitive than solar PV and other regions in South</li> </ul>	<ul style="list-style-type: none"> <li>Visual impacts from turbines on nearby town.</li> <li>Noise generation from turbines on residents.</li> <li>Bird and bat collisions with turbines during the operational phase as well</li> </ul>	No

Type of Renewable Energy Alternative	Are suitable resources available at the proposed project site?	Main Potential Impacts and Risks	Is this the preferred Alternative?
	Africa have better wind resources.	<ul style="list-style-type: none"> <li>as mortalities to bats due to barotrauma.</li> <li>Impacts on aquatic and terrestrial biodiversity.</li> <li>Impact on archaeology and palaeontology.</li> <li>Impact on Civil Aviation due to nearby aerodromes.</li> </ul>	
Solar Energy	<ul style="list-style-type: none"> <li>Yes, 1 900 – 2 000 kWh/m<sup>2</sup></li> </ul>	<ul style="list-style-type: none"> <li>Visual impacts as a result of PV panels.</li> <li>Impacts on heritage resources (archaeology and palaeontology).</li> <li>Impacts on the water balance as a result of water required for panel cleaning.</li> <li>Impacts on avifauna, aquatic and terrestrial biodiversity.</li> </ul>	<b>Yes</b>

#### 5.4 Site Alternatives and site selection factors

As an initial step, ENERTRAG conducted a desktop screening study in 2020 to determine a baseline description of the prevalent environmental sensitivities within a wider area of 13 000 to 14 000 ha. This led to the selection of a project site with suitable solar radiation and in close proximity to the Sasol Secunda Synfuels plant (should the energy be provided to Sasol) and an available Eskom substation (should the project be entered into the REIPPPP or similar bidding process). This section presents the approach to the site selection.

As per the requirements listed within Appendix 2, sections (1) (d) and (2) (1) (g) (ix) of the NEMA EIA Regulations 2014 (as amended), a site selection matrix should be provided to show how the preferred site was determined through a site selection process (refer to Table 5.3). It is understood that the “site” referred to in the Regulations comprises the farms or land portions proposed for development of the Vhuvhili SEF.

The study area used by the specialists for this EIA for the Vhuvhili SEF comprised eight farm portions and covered an area of 3244 ha (refer to Figure 1.1 in Chapter 1 of this EIA Report). As a result of the findings by the specialists, two farm portions have been excluded. The study area being taken into the EIA phase (refer to Figure 1.4 in Chapter 1 of this EIA Report) comprises 6 farm portions (refer to Table 5-2) and covers an area of 2920 ha.

**Table 5-2: Preferred site for the proposed Vhuvhili SEF project comprising 6 farm portions**

Farm name	Farm No.	Farm Portion	SG code	Area (ha)
GROOTVLEI	584	RE	TOIS00000000058400000	1438
GROOTVLEI	293	18	TOIS00000000029300018	114
GROOTVLEI	293	20	TOIS00000000029300020	113
GROOTVLEI	293	21	TOIS00000000029300021	207
POVERTY ACRES	585	RE	TOIS00000000058500000	843
VLAKSPRUIT	292	21	TOIS00000000029200021	207

At a local level, the proposed affected farm portions for the development of the Vhuvhili SEF were selected as the general area has already been heavily disturbed by industry (e.g. the Sasol coal-to-liquid facility), coal mining activities, transmission lines and agriculture. Thus, preliminary investigations indicated that the development of these farms would have a minimal impact on the region's flora, fauna and water resources. Furthermore, from an impact and risk assessment perspective, the implementation of the Vhuvhili SEF at the preferred site will most likely result in fewer risks in comparison to its implementation at alternative sites within Mpumalanga (i.e., regions with similar solar radiation levels), based on the following points:

- There is no guarantee that the current land use of alternative sites will be flexible in terms of development potential, for example, the agricultural potential at the alternative sites might be higher and of greater significance and more areas may be under cultivation.
- There is no guarantee of the willingness of other landowners to allow the implementation of a solar facility on their land and if the landowners strongly object, then the project will not be feasible.
- There is no guarantee that other sites will be located close to the Sasol Secunda Synfuels plant to enable connection to its proposed electrolyser to produce green Hydrogen and sustainable aviation fuel. The further away a project is located from the Synfuels plant, the higher the potential for significant environmental and economic impacts and the production of Sustainable Aviation fuels being unfeasible.
- There is no guarantee that other sites will be located close to the Eskom substation (should the project be entered into the REIPPPP or similar bidding process). The further away a project is from the grid, the higher the potential for significant environmental and economic impacts.

On a site specific level, the preferred site was deemed suitable due to all the site selection factors being favourable. These factors included land availability, environmental sensitivities, distance to the Sasol Secunda Synfuels plant and the national grid, site accessibility, topography, current land use and landowner willingness. The site selection criteria considered by ENERTRAG are discussed in detail below in Table 5.3.



**Table 5-3: Site selection factors and suitability of the preferred site for the development of the proposed Vhuvhili SEF**

<b>Factor</b>	<b>Suitability of the Preferred Site</b>
<b>Land Availability</b>	The six farm portions comprising the preferred site are of a suitable size (2 920 ha) for the proposed development of the Vhuvhili SEF project which comprises a maximum of 300 MW capacity (export). Following the exclusion of environmental sensitivities as identified by the specialists, including cropland of 150 ha, there is still sufficient land available for the development of the proposed Vhuvhili SEF which comprises a preferred footprint of 694 ha.
<b>Environmental Sensitivity</b>	After a thorough evaluation of the regional farms, the specific farms were selected because they were already heavily disturbed by agricultural and coal mining activities. Thus, it was concluded that the development of these farms would have a minimal impact on the region's flora, fauna, and water resources. The initial site area investigated by ENERTRAG was approximately 13 000 to 14 000 ha for the development of proposed Vhuvhili SEF. Based on the initial screening and environmental sensitivities identified by ENERTRAG and specialists, this area was reduced to a total site area of approximately 3244 ha. Within this area, sensitive environmental features that needed to be avoided were mapped and excluded from the SEF footprint. The site was further reduced to 2920 ha as two portions were excluded. The footprint of the SEF taken into the EIA Phase was 843 ha (which is 29% of the area of 2920 ha). This footprint was further reduced by 150 ha to avoid cropland. The resulting footprint of the SEF that is considered suitable for development of the SEF is 694 ha, as recommended in Chapter 19 of this EIA Report.
<b>Irradiation Levels</b>	The Project site was also selected based on the availability of solar resource in the Mpumalanga region (i.e., Good to Very Good, between 1900 to 2000 kWh/m <sup>2</sup> ). The availability of the solar resource is the main driver of project viability. The Project site was identified by the Project Developer through a desktop pre-feasibility analysis based on the estimation of the solar energy resource. This viable solar resource ensures the best value for money is gained from the project, allowing for competitive pricing and maximum generation potential, with the resulting direct and indirect benefits for the South African economy.
<b>Distance to the proposed Hydrogen Electrolyser at the Sasol Secunda Synfuels plant</b>	The proposed Vhuvhili SEF is located approximately 9 km east of the Sasol Secunda Synfuels plant. It is proposed that the electricity will be transferred to a proposed hydrogen electrolyser at Sasol to produce sustainable aviation fuel via a switching station at the proposed Mukondeleli WEF. The proposed 132 kV power line to transfer the electricity from the proposed on-site substation at the Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF is subject to a separate BA process which is also currently being undertaken by the Project Applicant.
<b>Distance to and availability of the Grid</b>	The proposed Vhuvhili SEF is located close to the Sasol Synfuels plant and will therefore reduce the environmental, social, and financial impacts caused by a long powerline connection. Thus, this Project site has ideal grid connection

Factor	Suitability of the Preferred Site
	<p>potential as it will ultimately connect to the proposed step-down substation at Sasol, which is located approximately 9 km west from the project site.</p> <p>The proposed project also has ideal potential to connect to the national grid as it is located approximately 14 km east of the Eskom Sol Substation (should this option be pursued by ENERTRAG).</p> <p>With regards to grid connection to Eskom, there is minimal competition in the area, as there are only a few proposed REFs. Should the project be authorised and constructed, it will be the one of the first commercial scale solar PV facilities in the province and will act as one of the pioneering developments and will open opportunities for other renewable energy developments. It will also serve as a case study for solar resource in the province, showing that commercially viable SEFs are suitable for certain parts of Mpumalanga Province.</p>
<b>Site Accessibility</b>	<p>The Project site can be accessed easily via the tarred N17 road which runs along the northern boundary of the site. There are existing roads that traverse land parcels to allow for direct access to the project development area.</p> <p>Based on an investigation conducted by the Traffic Specialist (Johnson, 2022), two site access points are recommended for the site. As the access points are located off the existing gravel access roads of the D823 and D619, spacing restrictions regarding access are not envisaged. Sight lines along the access points are within the recommended limits. The final site access points will be based on the access investigation findings, geometric considerations and site layout restrictions. The existing gravel road will be widened and upgraded for the proposed project, with an upgraded width ranging up to approximately 10 m. Exact specifications of the widening and upgrading of the farm gravel road will be confirmed during the detailed design phase.</p> <p>Internal gravel roads will also be constructed within the Vhuvhili SEF footprint. The internal roads are expected to be 4 to 5 m wide and approximately 20 km long, but these specifications may change, depending on the final design.</p>
<b>Topography</b>	<p>The Visual Impact Assessment (Chapter 10 of this EIA Report) notes that the broader area surrounding the proposed Vhuvhili SEF is characterised by relatively flat to slightly undulating terrain which is suitable for the development of a solar project. Areas of slightly higher elevation occur along the south-eastern boundary of the study area. Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys. Average gradients across the study area are generally between 1:50 – 1:20. The proposed Vhuvhili SEF site is located on the flattest ground near the Sasol facility and thus in combination with suitable solar resource within the study area is optimized from a construction and technical perspective.</p>

<b>Factor</b>	<b>Suitability of the Preferred Site</b>
<b>Visual character</b>	The Visual Impact Assessment notes that the study area has a somewhat mixed visual character, transitioning from the heavily transformed urban / peri-urban landscape associated with the Secunda and Trichardt urban areas, the Sasol Secunda synthetic fuel plant and associated infrastructure in the north / north-west to a more rural / pastoral character across the remainder of the study area. Hence, although a solar PV development would alter the visual character and contrast with this rural / pastoral character, the location of the proposed Vhuvhili SEF in relatively close proximity to Secunda, Trichardt and the Sasol fuel plant will significantly reduce the level of contrast.
<b>Current Land Use</b>	Agriculture - the wider study area is mainly used for grain cultivation and livestock grazing and the current site extent for the project is limited to grazing areas. The Agricultural Assessment concludes that the proposed Vhuvhili SEF is a viable alternative land use for the project site and is therefore acceptable from an agricultural perspective, provided the cropland/areas under cultivation are avoided.
<b>Landowner Willingness</b>	The landowners have signed letters of consent for the use of the land for the proposed project (should EA be granted). This is considered an important aspect of the proposed project in terms of its viability (i.e. this will limit potential appeals during the decision-making process, as the landowner is willing and supportive of the proposed Vhuvhili SEF project being undertaken on the affected farm portions).

Furthermore, one of the main determining factors for the Project Developer was to find suitable, developable land in a concentrated area to (i) consolidate and optimise design, (ii) minimise construction and operational costs, and (iii) minimise sprawling development and limit the impact footprints. The Agricultural screening study (Lanz, 2021) concluded that the proposed Vhuvhili project site comprises fairly large contiguous pieces of land (up to about 300 ha) on which solar technology could potentially be developed from an agricultural approval point of view.

In order to submit a bid in terms of the REIPPPP, the proponent is required to have obtained an EA in terms of the NEMA EIA Regulations, 2014, as amended, as well as several additional authorisations or consents. It is important to note that the National Department of Environmental Affairs (DEA) in discussion with the Department of Energy (DoE) (now respectively operating as the DFFE and DMRE), was mandated by MinMec to commission a Strategic Environmental Assessment (SEA) to identify the areas in South Africa that are of strategic importance for Wind and Solar PV development.

The Phase 1 Wind and Solar PV SEA<sup>6</sup> was completed in 2015 and was in support of the Strategic Infrastructure Plan (SIP) 8, which focuses on the promotion of green energy in South Africa. Similarly, the Phase 2 Wind and Solar SEA was commissioned in 2017 and completed in 2019. The SEA aimed to identify strategic geographical areas best suited for the roll-out of large-scale wind and solar PV energy

<sup>6</sup> More information on the SEA can be accessed at <https://redzs.csir.co.za>

project, referred to as Renewable Energy Development Zones (REDZs). Through the identification of the REDZs, the key objective of the SEA was to enable strategic planning for the development of large-scale wind and solar PV energy facilities in a manner that avoids or minimises significant negative impact on the environment while being commercially attractive and yielding the highest possible social and economic benefit to the country – for example through strategic investment to lower the cost and reduce timeframes of grid access.

Following the completion of the Phase 1 Wind and Solar SEA, eight REDZs were gazetted in February 2018 in GN 114 by the Minister of Environmental Affairs. In addition, following the completion of the Phase 2 Wind and Solar SEA, three REDZs were gazetted in February 2021 in GN 144 by the Minister of Forestry, Fisheries and the Environment.

The proposed Vhuvhili SEF is located approximately 29 km away (at its closest point) from the Emalahleni REDZ (i.e., REDZ 9). In addition, the proposed Vhuvhili SEF is located approximately 34 km away (at its closest point) from the National Strategic Transmission Corridor (as gazetted on 16 February 2018 in GN 113). While the proposed Vhuvhili SEF is not located within the Emalahleni REDZ or National Strategic Transmission Corridor, the proposed project still indeed supports the development of a large-scale renewable energy project at the proposed location. The proposed project is linked to the national planning vision for Renewable Energy development as well the development of the Green Hydrogen economy in South Africa.

Given the site selection requirements associated with the SEF and the suitability of the land available on the **preferred site**, and the fact that no fatal flaws are present on the site, **no other site alternatives were considered as part of this S&EIA Process. Therefore, the site for the Vhuvhili SEF is therefore deemed feasible and selected as the preferred site.**

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## **5.5 Location Alternatives – Development Footprint within the Preferred Site**

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Once the site was chosen for the Vhuvhili SEF, a sensitivity analysis was done to identify exclusion areas and location alternatives within the site. Research and consultation with the affected landowners was undertaken to identify areas within the initial study site to be excluded from development. This guided the selection of the best suitable location on the site, based on specialist inputs on environmental sensitivities and practical/technical requirements. Therefore, the location selection was based on the following:

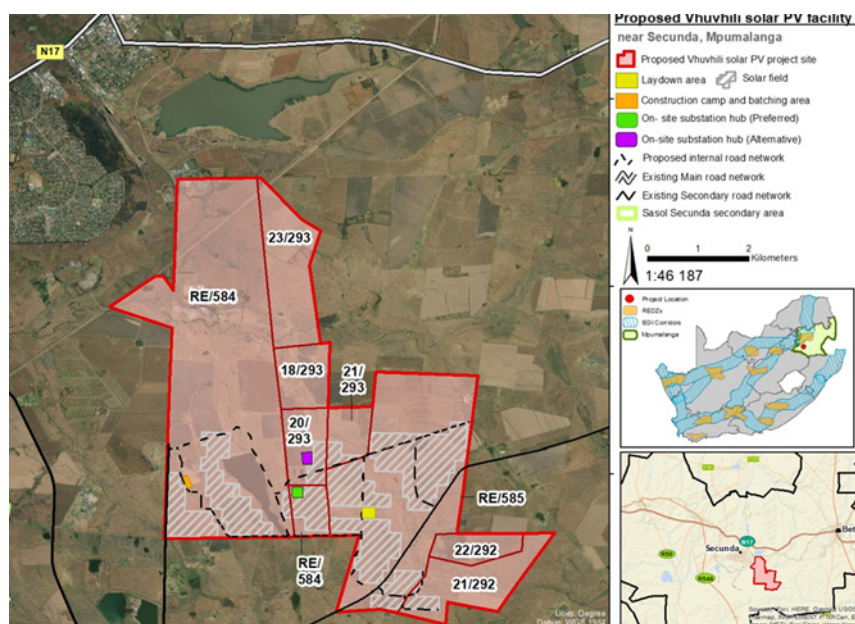
- **Buildable areas:** Consideration of all preliminary technical and environmental parameters (prior to the S&EIA Process) which demarcate where solar PV panel and project infrastructure placement is feasible and exclude areas where not. This is based on maximum allowable slopes, setbacks from farmsteads, setbacks from neighbouring farms required by provincial land-use regulations and finally required buffers from Eskom power lines. In addition, the process of identifying buildable areas takes into account certain ‘no-go’ zones to avoid potential environmental sensitivities identified by specialists.
- **Landowner input:** The landowners were provided with the opportunity to state preference for certain areas of their properties to be excluded from the development.

### 5.5.1 Development footprint taken into the Scoping Phase

Following the initial Agricultural Screening that was done by ENERTRAG, a preliminary project layout of the proposed Vhuvhili SEF, was provided by ENERTRAG (Figure 5.8). This layout included PV panels extending to the east of the river and was assessed by the specialists during the Scoping Phase. The assessed area includes eight farm portions (covering 3244 ha) as indicated in Table 5.4 and the red portions in Figure 5.6.

**Table 5-4: Eight farm portions assessed by specialists in the Scoping Phase**

Farm name	Farm No.	Farm Portion	SG code	Total farm area (ha)
GROOTVLEI	584	RE	TOIS00000000058400000	113.7
GROOTVLEI	293	18	TOIS00000000029300018	113.1
GROOTVLEI	293	20	TOIS00000000029300020	206.7
GROOTVLEI	293	21	TOIS00000000029300021	241.9
GROOTVLEI	293	23	TOIS00000000029300023	1437.7
POVERTY ACRES	585	RE	TOIS00000000058500000	842.6
VLAKSPRUIT	292	21	TOIS00000000029200021	206.7
VLAKSPRUIT	292	22	TOIS00000000029200022	81.4
				<b>3243.7</b>



**Figure 5-6: Farm portions and project layout assessed by specialists in the Scoping Phase**

Based on the scoping level findings from the specialist assessments, the preliminary layout was refined to avoid (where possible) the most sensitive features within the original assessed footprint/buildable area. A revised layout overlain with a combined sensitivity map based on the sensitivities identified by the specialists during the scoping phase is illustrated in Figure 3.99 of Chapter 3 of the Final Scoping Report.

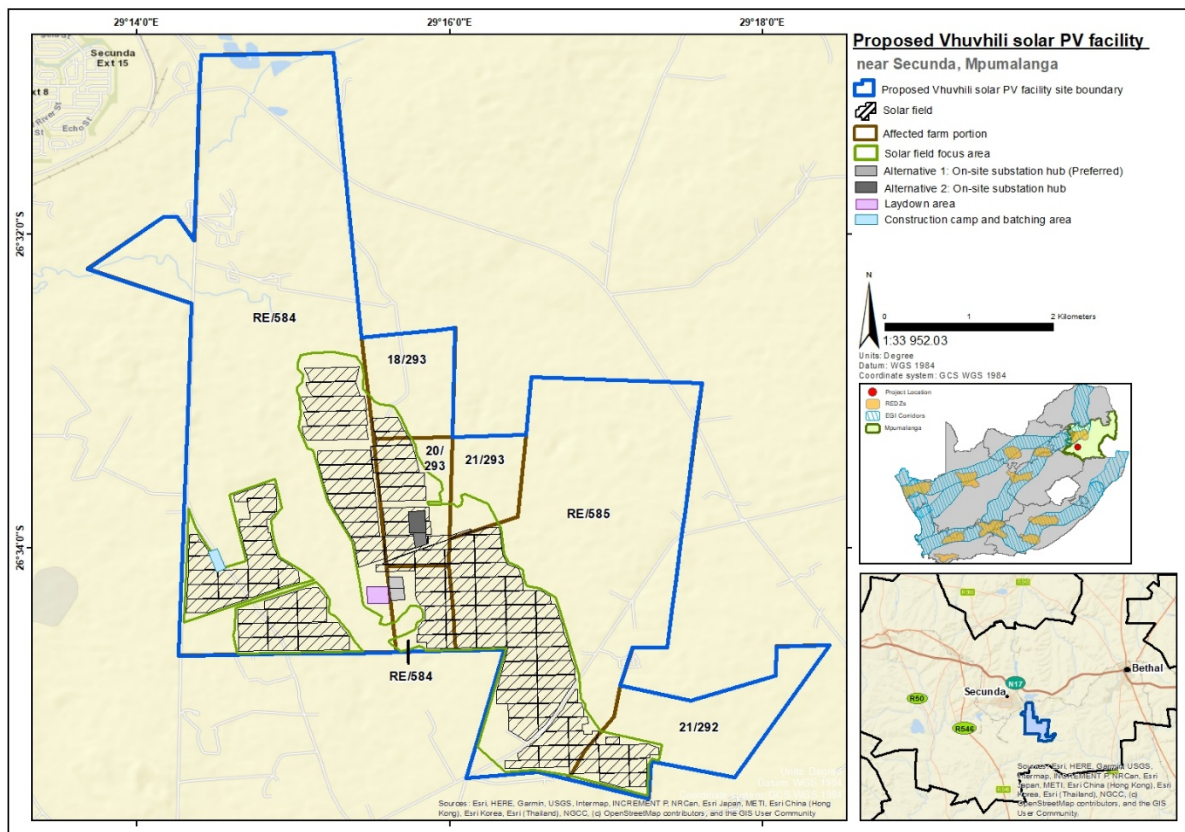


### 5.5.2 Development footprint taken into the EIA phase

Detailed specialist assessments were conducted for the 3244 ha study area in the EIA Phase, including further desktop analysis and field surveys. This resulted in an updated project layout to avoid environmental sensitivities verified by the specialists from these surveys; and to avoid areas east of the river on the Remaining Extent of Poverty Acres Farm 585 where the land owner plans to establish orchards. This revised project SEF footprint layout, comprising 843 ha, was taken forward into the EIA Phase for further assessment by the specialist team (Figure 5.9). In the EIA report, portions 23/293 and 22/292 were excluded from the project site. Approval from DARDLEA is sought for development on the 6 farm portions in Table 5.5 below (comprising an area of 2920 ha) and shown in the blue portions in Figure 5.7 below.

**Table 5-5: Six farm portions assessed by specialists in the EIA Phase**

Farm name	Farm No.	Farm Portion	SG code	Total farm area (ha)
GROOTVLEI	584	RE	T0IS00000000058400000	1 438
GROOTVLEI	293	18	T0IS00000000029300018	114
GROOTVLEI	293	20	T0IS00000000029300020	113
GROOTVLEI	293	21	T0IS00000000029300021	207
POVERTY ACRES	585	RE	T0IS00000000058500000	843
VLAKSPRUIT	292	21	T0IS00000000029200021	207
				<b>2 920</b>



**Figure 5-7: Farm portions and project layout assessed by specialists in the EIA Phase**

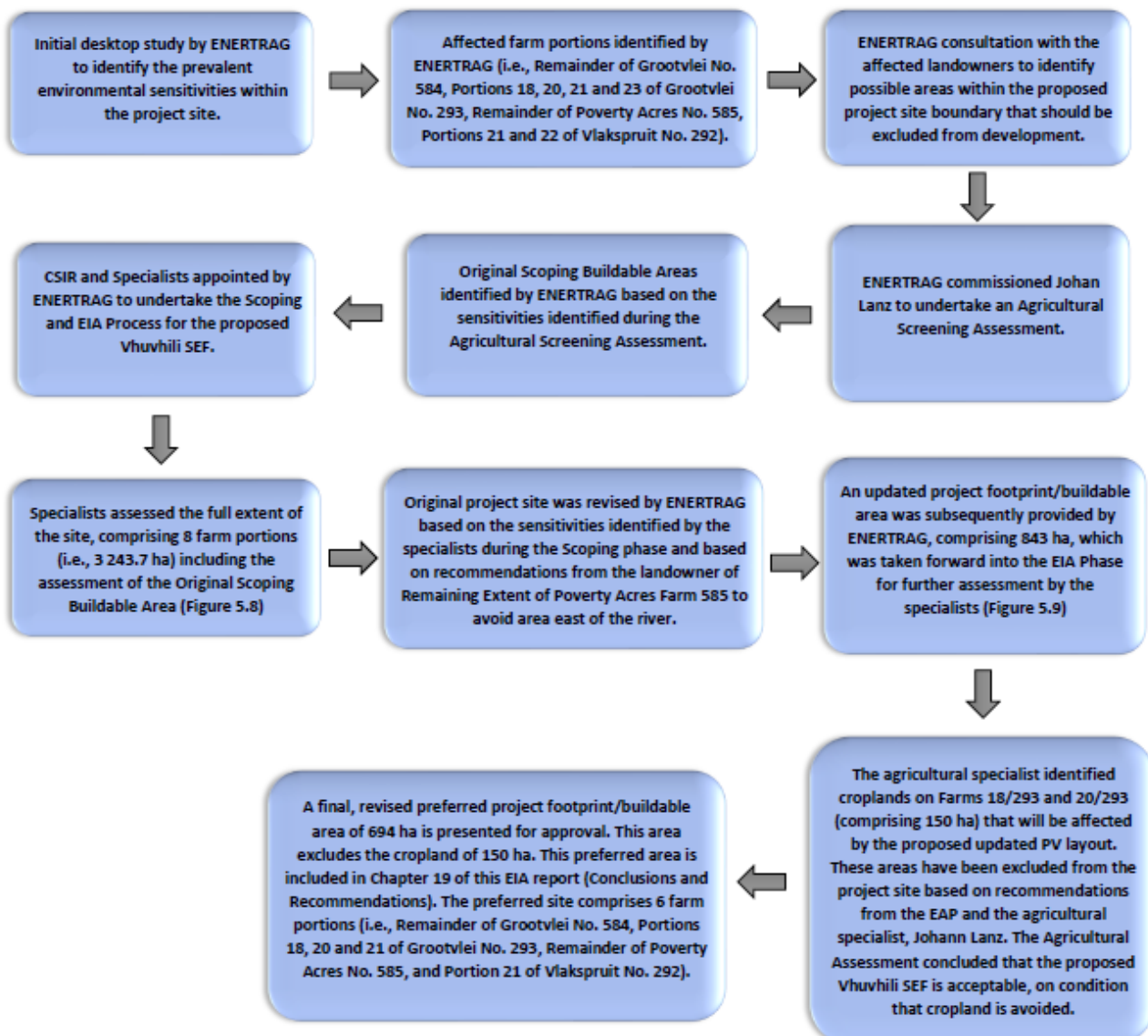
### 5.5.3 Development footprint recommended by EAP for approval

Based on the integration of the impact assessments and mitigation actions for the proposed 843 ha footprint of the Vhuvhili SEF that was undertaken by specialists in the EIA phase, the EAP has recommended a reduced SEF footprint that is suitable for development. This is informed by the mapping of features such as agricultural potential, terrestrial biodiversity, watercourse features, avifauna 'no-go' areas and sensitive heritage features. Buffers and exclusion areas provided by specialists, have been applied. In addition, this is based on mitigation recommendations by the agricultural specialist study and the socio-economic specialist that approximately 150 ha of croplands in current use on Farms 18/293 and 20/293 should be excluded from PV development. In Chapter 19 of the EIA Report, the EAP recommends a revised SEF footprint of approximately 694 ha for approval (Table 5.6).

**Table 5.6 SEF Footprint and PV arrays assessed in the EIA Phase**

	SEF footprint taken into EIA phase (ha)	SEF footprint recommended for approval (ha)
SEF Footprint (buildable area)	843 (included 150 ha on cropland)	694 (no cropland affected)
PV Array	672 (included 134 ha on cropland)	538 (no cropland affected)

The process conducted over the past three years to determine the development footprint within the project site is summarised in Figure 5.8.



**Figure 5-8: Process conducted to identify the Preferred Site and Development Footprint**

#### **5.5.4 Project Infrastructure Location Alternatives**

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Various infrastructure alternatives have been considered assessed in this S&EIA Process. This includes alternative locations for the substation hubs, as well as alternative technologies for the Battery Energy Storage Systems (BESS).

- **Substation Complex**

The proposed project includes a substation and BESS complex on site (refer to Chapter 2 for the Project Description). Two potential location alternatives for the substation and BESS complex have been identified at the proposed Vhuvhili SEF project site. These are listed below:

- Substation and BESS complex (Alternative 1: A-B) is located on Remainder of the Farm Grootvlei No. 584.
- Substation and BESS complex (Alternative 2: C-D) is located on Portion 20 of the Farm Grootvlei No. 293.

However, the Alternative 2 Substation (C-D) was ruled out as a feasible alternative by the Agricultural specialist as it is located on cropland. The Agricultural Assessment concluded that the proposed development of the Vhuvhili SEF is acceptable from an agricultural perspective, provided cropland or cultivated areas are avoided. **Therefore, based on this condition imposed by the Agricultural specialist, substation complex (A-B) is the preferred alternative.**

### **5.6 Technology Alternatives**

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The following technology alternatives are being considered as part of this Scoping and EIA Process.

#### **5.6.1 Solar Technology Types**

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Only the PV solar panel technology type will be considered in this Scoping and EIA Process. Due to the scarcity of water in the proposed project area and the large volume of water required for Concentrated Solar Power (CSP), this technology is not deemed feasible or sustainable and will not be considered in this Scoping and EIA Process. This is the main difference between PV and CSP technology that led to the selection of PV as the preferred solar panel technology for the proposed Vhuvhili SEF.

Furthermore, CSP technology requires a larger development footprint to obtain the same energy output as PV technology, and it requires active solar tracking to be effective. As described above, in terms of the 2019 IRP, 300 MW capacity is already installed for CSP; and an additional 300 MW has been allocated for 2019, whilst there is no new additional capacity allocated for this technology. Solar PV is allocated an additional new capacity of 6 000 MW in terms of the 2019 IRP. This means that the need and desirability of CSP is not as evident and justified compared to PV.

### 5.6.2 PV Mounting System

Solar panels can be mounted in various ways to ensure maximum exposure of the PV panels to sunlight. The mounting systems considered for this project are Single Axis Tracking structures (aligned north-south); Fixed Axis Tracking (aligned east-west); Dual Axis Tracking (aligned east-west and north-south); and Fixed Tilt Mounting Structure.

### 5.6.3 Battery Energy Storage Systems

It is proposed that Lithium Battery Technologies, such as Lithium-Ion Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology, however, the specific technology will only be determined following Engineering, Procurement and Construction (EPC) procurement. The advantages and disadvantages of Lithium-Ion BESS and Redox Flow BESS technologies are considered in Table 5-7. Refer to Chapter 15 of this EIA Report for a high-level Risk Assessment undertaken by ISHECON on the safety, health and environmental risks of the BESS technology.

**Table 5-7: Advantages and disadvantages associated with the BESS technologies that were considered for the proposed Vhuvhili Solar Energy Facility (Sources: Parsons, 2017; Zhang *et al.*, 2016)**

BESS technologies being considered	Advantages	Disadvantages
<u>Lithium-ion BESS</u>	<ul style="list-style-type: none"> <li>Sealed systems i.e., pre-assembled off site and delivered to site for placement (i.e., carries less potential risk to the environment in terms of spillages). Hence, they are easier to install and will not likely need many permanent staff.</li> <li>Does not require active cooling unlike other BESS technologies.</li> <li>Reduced risk of spillage as storage of large quantities of electrolyte is not required.</li> </ul>	<ul style="list-style-type: none"> <li>Explosions and fires can occur as well as the possibility of generating noxious smoke under these circumstances. This can occur as result of electrolytes mixing when a breach occurs due to: <ul style="list-style-type: none"> <li>improper maintenance near operating temperature,</li> <li>thermal expansion, or</li> <li>freeze thaw cycles.</li> </ul> </li> <li>Over the long term these BESS may be more difficult to repurpose / dispose of and may present cumulative long term environmental impacts.</li> </ul>
<u>Redox Flow Batteries (RFB): Vanadium-Vanadium Redox Flow Battery (VRFB)</u>	<ul style="list-style-type: none"> <li>RFBs are self-discharging systems therefore generally require little maintenance. However, RFBs are more difficult to install, i.e. formal brick and mortar structures, and will potentially require many permanent staff.</li> <li>High economic efficiency as Vanadium has a high economic value and can be recycled.</li> </ul>	<ul style="list-style-type: none"> <li>Risk of spillage tends to be higher for RFB as opposed to sealed solid-state BESS as the storage tanks of RFB, may be subjected to leaks or spills during the replacement or blending of the electrolyte, or during transport of the battery to and from site.</li> </ul>



## 5.7 Summary of Legislative Requirements for the Assessment of Alternatives

The NEMA EIA Regulations, 2014, as amended, have certain requirements in terms of the selection of the **proposed preferred activity, site and location of the development footprint within the site**. Table 5.8 below indicates the requirements of the NEMA EIA Regulations, 2014, as amended, in terms of the process leading to the preferred activity, site and development footprint location alternatives. Table 5.8 also includes a response from the EAP showing how the requirements of the NEMA EIA Regulations, 2014, as amended, have been addressed in this report.

**Table 5-8: Requirements for consideration of Alternatives based on the NEMA EIA Regulations**

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
1.	Appendix 3 – (2)	The objective of the EIA Process is to, through a consultative process:	Refer to responses below.
2.	Appendix 3 – (2) (c)	identify the location of the <u>development footprint within the preferred site</u> based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.	<p>A worst-case scenario was adopted by the specialists in terms of the area of assessment (an initial area of 3244 ha) was initially assessed by the specialists in the Scoping phase. The specialist assessments included in Chapters 6 to 15 of this EIA Report therefore include an impact assessment process (inclusive of cumulative impacts) and a ranking process of the identified development footprint focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment.</p> <p>As noted in the preceding sections in Chapter 5 and in Chapter 19 (Conclusions and Recommendations) of this EIA Report, the preferred site for the proposed Vhuvhili SEF project extends over 6 farm portions and is approximately 2920 ha in extent (Table 5.5). Following a detailed assessment of this site by the specialists in the EIA phase, the preferred development footprint for the proposed Vhuvhili SEF and its associated infrastructure comprises an area approximately 694 ha (24% of the study site). Areas that have a high or very high environmental sensitivity have been avoided. Therefore, the overall impact of the proposed project on the sensitive features is predicted to be low.</p>
3.	Appendix 3 – (2) (d)	determine the nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and the degree to which these impacts (a) can be reversed; (b) may cause irreplaceable loss of resources, and (c) can be avoided, managed or mitigated.	The specialist assessments included in Chapters 6 to 15 of this EIA Report include a description and assessment of the nature, significance, consequence, extent, duration and probability of the identified impacts for the preferred alternatives. The specialist assessments also include the assessment of the reversibility and irreplaceability of the potential identified impacts, as well as the degree to which the

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
			identified impacts can be avoided, managed or mitigated.
4.	Appendix 3 – (2) (e)	identify the most ideal location for the activity within the preferred site based on the lowest level of environmental sensitivity identified during the assessment.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.
5.	Appendix 3 – (2) (f)	identify, assess, and rank the impacts the activity will impose on the preferred location through the life of the activity.	The specialist assessments included in Chapters 6 to 15 of this EIA Report include a description, identification and assessment of identified impacts that the proposed Vhuvhili SEF will impose on the preferred location of the proposed project.
6.	Appendix 3 – (2) (g)	identify suitable measures to avoid, manage or mitigate identified impacts.	The specialist assessments included in Chapters 6 to 15 of this EIA Report include an identification of suitable measures to avoid, manage or mitigate identified impacts.
7.	Appendix 3 – (2) (h)	identify residual risks that need to be managed and monitored.	The specialist assessments included in Chapters 6 to 15 of this EIA Report include an identification of residual risks that need to be managed and monitored.
8.	Appendix 3 – (3)(1)(h)	<p>A full description of the process followed to reach the proposed development footprint within the approved site, including -</p> <ul style="list-style-type: none"> <li>▪ (i) details of the development footprint alternatives considered;</li> <li>▪ (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</li> <li>▪ (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;</li> <li>▪ (ix) if no alternative development locations for the activity were investigated, the motivation for not considering such; and</li> <li>▪ (x) a concluding statement indicating the preferred alternative development location within the approved site.</li> </ul>	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.
9.	Appendix 3 – (3)(1) (l)	An environmental impact statement which contains (iii) a summary of the positive and	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.

	Section of the EIA Regulations	Requirements for an EIA Report in terms of Appendix 3 of the 2014 NEMA EIA Regulations (as amended)	Response from EAP
		negative impacts and risks of the proposed activity and identified alternatives.	
10.	Appendix 3 – (3)(1) (n)	The final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment.	Refer to the development footprint and sensitivity mapping approach described in Point 2 above.

## 5.8 Concluding Statement on Preferred Alternatives

Based on the aspects considered in this chapter, the following concluding statement has been provided in terms of the preferred alternatives that have been considered in the EIA Phase:

- **No-Go Alternative:**

- The no-go alternative assumes that the proposed Vhuvhili SEF project will not go ahead. There is no generation of the 300 MW (export) of renewable energy and no associated social and economic benefits. This alternative has no environmental impacts (positive or negative) on the site or surrounding local area as a result of the proposed project. It provides a baseline against which other alternatives are compared and considered during the EIA Phase. The current land use (cattle grazing) is expected to continue. The no-go alternative is assessed by the specialists in Chapters 6 to 15. **The no-go alternative is not preferred.**

- **Land-Use Alternative:**

- The current land-use in the study area is mostly agriculture, specifically grain farming (e.g. maize) and cattle grazing. The study area has **moderate agricultural potential** predominantly because of favourable climatic conditions which favour grain production. The footprint of the Vhuvhili SEF that is recommended for approval in Chapter 19 avoids cropland areas.

Findings from the Agricultural Agro-Ecosystem Specialist Assessment indicated that most of the areas identified as high sensitivity (i.e. cropland) by the Screening Tool are no longer or have never been used as cropland. Instead, as can be seen from photographs and the latest Google Earth image (refer to Chapter 6), they are used for pasture. Therefore, these areas should not be classified as cropland or allocated high sensitivity because of it (Lanz, 2022). In addition, most of the farm portions on which the proposed Vhuvhili SEF footprint is located, form only a small part of a much bigger farming operation that utilises many different farms with a total cropland of approximately 6000 hectares and cattle grazing of around 7000 to 8000 hectares. The proposed SEF footprint of 843 ha (taken into the EIA Phase) only occupies about 6% of this wider farming area of approximately 14 000 ha.

The proposed development offers some positive impact on agriculture by way of an additional income stream to the landowners, as well as enhanced agricultural potential through improved security against stock theft and other crime and wider, societal benefits (Lanz, 2022). Based on this, the proposed Vhuvhili SEF project is viable and from the EIA process perspective, it is preferred to the current grazing usage on approximately 694 ha that is recommended for the Vhuvhili SEF project. It is important to note that there are no flaws from an agricultural perspective and that the proposed Vhuvhili SEF project is not seen as a significant impact to the current farming practices on site.

- **Type of Activity Alternative:**

- This relates to the generation of electricity from a renewable energy source, and in this particular case, from solar resources. The **generation of electricity from a renewable energy source was the only activity considered** by the Project Applicant, and thus considered in this EIA Report. **No other activity types were considered or deemed appropriate** based on the expertise of the Project Applicant.

- **Renewable Energy Alternatives:**

- Given the above, the development of a Solar PV project is the preferred and only renewable energy technology to be developed on site because:
  - The site has a **good to very good solar resource availability** (i.e. GHI of between 1 900 – 2 000 kWh/m<sup>2</sup> in terms of the long-term yearly total) and the **local conditions are favourable**.
  - In addition, **Hydro Power and Biomass Energy** are deemed **unsuitable**.
  - The study area does have wind resources (i.e., 700 W/m<sup>2</sup>), however other sites might have better wind resources and would therefore be more economically viable at those sites. Furthermore, the proximity of the Vhuvhili site to the town of Secunda and Secunda Airfield make the site less suitable for wind turbines than for PV.

- **Preferred Site and Development Footprint within the site:**

- The preferred project site for the proposed Vhuvhili SEF comprises the following farm portions:
  - Remaining Extent (RE) of the Farm Grootvlei No. 584 (SG Code: TOIS00000000058400000);
  - Portion 18 of Farm Grootvlei No. 293 (SG code: TOIS00000000029300018);
  - Portion 20 of Farm Grootvlei No. 293 (SG code: TOIS00000000029300020);
  - Portion 21 of Farm Grootvlei No. 293 (SG code: TOIS00000000029300021);
  - RE of Farm Poverty Acres No. 585 (SG code: TOIS00000000058500000); and
  - Portion 21 of Farm Vlakspruit No. 292 (SG code: TOIS00000000029200021).
- The initial project site was determined based on the Agricultural Screening Study undertaken by Lanz (2021). This led to the identification of the Original Scoping Buildable

Area within the project site which was assessed by the specialists during the Scoping Phase.

- Site Sensitivity Verifications Reports and scoping level expert inputs were provided by specialists during the Scoping Phase to identify sensitive areas that should preferably be avoided and thus are excluded from development (i.e., 'no-go' areas).
- Based on these sensitivities identified by the specialists, as well as consultation with the affected landowners to avoid areas proposed for orchards, an updated layout was provided by the Project Applicant. This updated layout was taken forward and assessed by the specialists in the EIA phase.
- The Agricultural specialist identified croplands in the revised layout and recommended that these areas be avoided. This recommendation is supported by the EAP.
- Therefore, a final, updated, preferred layout has been prepared, which avoids the cropland, as illustrated and discussed in Chapter 19 of this EIA Report.
- The preferred project layout for the proposed Vhuvhili SEF has been determined, refined and confirmed following detailed input from the various specialists during the EIA Phase. The specialist assessments have identified various environmental sensitivities within the development footprint that should be avoided, which have been taken into consideration during the determination and refinement of the preferred project layout of the WEF. Detailed specialist assessments are included in Chapters 6 to 15 of this EIA Report.
- **In Chapter 19 of this EIA Report, the development footprint of 694 ha for the Vhuvhili SEF is recommended by the EAP for approval.**

- **Project Infrastructure Location Alternatives**

- Two possible locations for the substation complex have been considered and assessed in the EIA Phase. However, the Alternative 2 Substation (C-D) was ruled out as a feasible alternative by the Agricultural specialist as it is located on cropland. The Agricultural Assessment concluded that the proposed development of the Vhuvhili SEF is acceptable from an agricultural perspective, provided cropland or cultivated areas are avoided. **Therefore, based on this condition imposed by the Agricultural specialist, substation complex (A-B) is the preferred alternative.**

- **Technology Alternatives**

- Only the PV solar panel type will be considered in this Scoping and EIA Process, along with various mounting options that will be considered in the design.
- The different BESS technologies have been assessed in the detailed BESS Risk Assessment which was undertaken by ISHECON in the EIA phase (Chapter 18). It is proposed that Lithium Battery Technologies, such as Lithium-Ion Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies be considered as the preferred battery technology, however, the specific technology will only be determined following EPC procurement.



# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed  
development of the Vhuvhili Solar  
Photovoltaic (PV) Facility near Secunda in  
the Mpumalanga Province



## CHAPTER 6:

# Agricultural Assessment

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**SITE SENSITIVITY VERIFICATION  
AND  
AGRICULTURAL AGRO-ECOSYSTEM SPECIALIST ASSESSMENT  
FOR  
THE PROPOSED VHUVHILI SOLAR ENERGY FACILITY  
NEAR SECUNDA IN MPUMALANGA PROVINCE**

**Report by  
Johann Lanz**

**28 October 2022**

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## EXECUTIVE SUMMARY

Vhuvhili Solar RF (Pty) Ltd is proposing to develop the Vhuvhili Solar Energy Facility (SEF) (maximum capacity of 300 MW) and its associated infrastructure near Secunda in the Mpumalanga province. This study comprises the Agricultural Agro-Ecosystem Specialist Assessment that was undertaken by Johann Lanz to inform the Scoping and Environmental Impact Assessment (S&EIA) process that is undertaken for the proposed Vhuvhili SEF.

Despite the screening tool showing some areas of high agricultural sensitivity, the development site (excluding those parts of it that are not recommended by this assessment for development) was verified as being of medium agricultural sensitivity. The soils are predominantly high clay content, dark coloured vertic and melanic soils, underlain by rock in upland positions and clay in bottomland positions. Soil forms are Arcadia, Rensburg, Valsrivier, Swartland, Mayo and Milkwood. The soils across the investigated area vary in their suitability for crop production.

Because of the favourable climate and the potentially high grain yields, farmers in the area utilise all suitable soil for crop production. Only soil that is not suitable for crop production is used for cattle grazing. Limitations that render the soil unsuitable for crop production are depth limitations due to rock or dense clay in the subsoil, and the limited drainage associated with the dense, poorly drained clay layers in the subsoil.

In order to mitigate the loss of valuable agricultural cropland, it is recommended that all cropland is excluded from the footprint of the development of the proposed Vhuvhili SEF. This is also in line with the requirements of the national protocol for agriculture for PV development. The protocol states that in areas of high agricultural capability there should be no PV development on cultivated land.

Two potential negative, direct agricultural impacts have been identified as loss of agricultural potential by occupation of land and loss of agricultural potential by soil degradation. The loss by occupation will translate to a loss of 139 head of cattle. One positive, indirect agricultural impact has been identified as enhanced agricultural potential through increased financial security for farming operations.

Mitigation measures to prevent soil degradation are all inherent in the project design and / or are standard, best-practice for construction sites and are included in Section 9.12 and Section 10 of this assessment.

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site, providing all cropland is avoided by the footprint of the development. This is substantiated by the facts that the facility will only occupy land that is of limited land capability and is not suitable for crop

production; the amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol; it offers improved financial security, as well as wider, societal benefits; it poses a low risk in terms of causing soil degradation; and the loss by occupation is not permanent and land will become available again after the activity ceases.

The proposed development is therefore acceptable from an agricultural impact point of view, and it is recommended that it be approved.

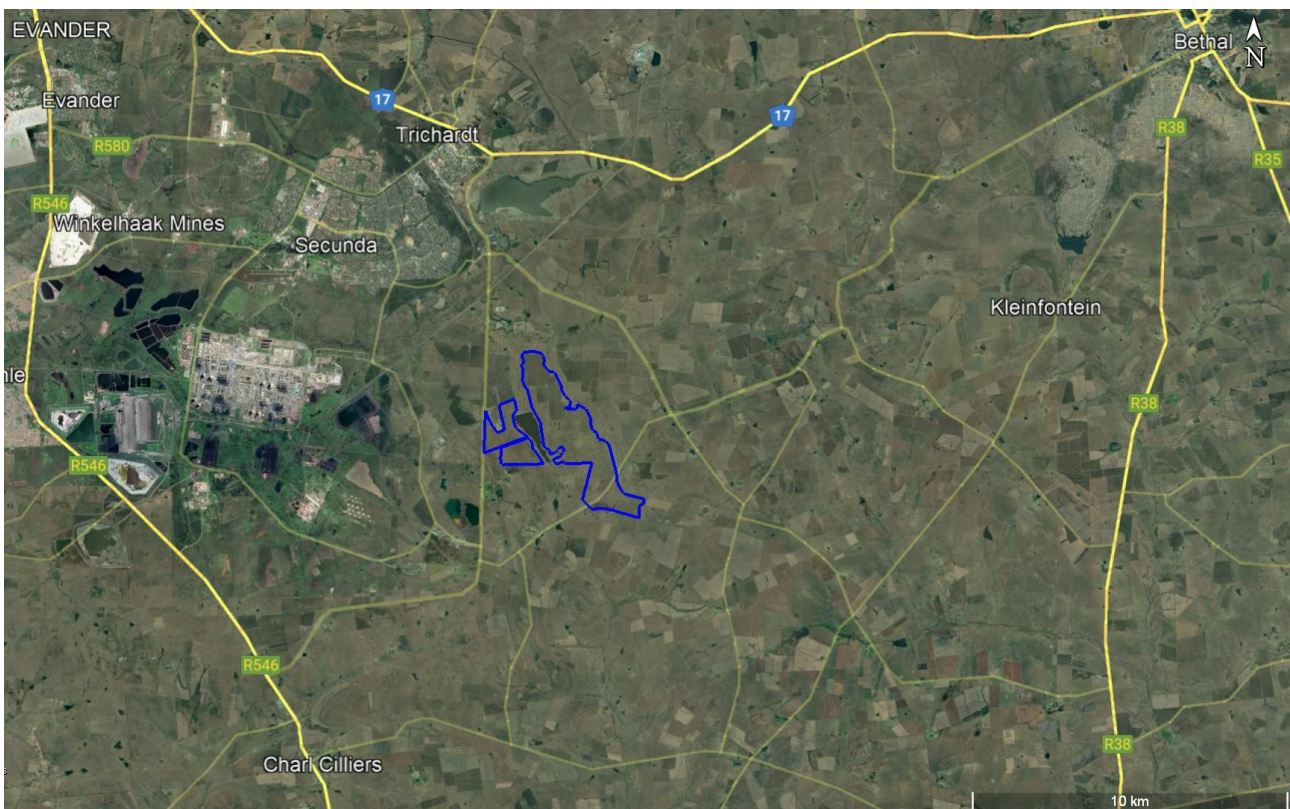
The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is subject to the condition that that all cropland as identified in Figures 2 and 3, is excluded from the footprint of the development. The updated project layout excludes the croplands as identified, and the development of the proposed Vhuvhili SEF is therefore acceptable from an agricultural perspective.



## 1 INTRODUCTION

Environmental authorisation is being sought for the proposed Vhuvhili Solar Energy Facility (SEF) near Secunda in the Mpumalanga Province (see location in Figure 1). In terms of the National Environmental Management Act, 1998 (Act No 107 of 1998), as amended (NEMA), an application for environmental authorisation requires an agricultural assessment, in this case an Agricultural Agro-Ecosystem Specialist Assessment.

Johann Lanz was appointed as an independent agricultural specialist to conduct the agricultural assessment. The objective and focus of an agricultural assessment are to assess whether or not the proposed development will have an unacceptable agricultural impact, and based on this, to make a recommendation on whether or not it should be approved.



**Figure 1.** Locality map of the proposed Vhuvhili solar energy facility (blue outline) to the south-east of the town of Secunda.

The purpose of the agricultural component in the environmental assessment process is to preserve the agricultural production potential, particularly of scarce arable land, by ensuring that development does not exclude existing or potential agricultural production from such land or impact it to the extent that its future production potential is reduced.

## 2 PROJECT DESCRIPTION

The proposed facility will consist of the standard infrastructure of a PV energy facility including PV array; inverters; on-site substation and grid connection (which is subject to a separate Basic Assessment and EA); battery storage; auxiliary buildings; access and internal roads; temporary construction laydown areas; and perimeter fencing and will have a total generating capacity of up to 300MW.

The exact nature and layout of the different infrastructure within the boundary fence of a solar energy facility has absolutely no bearing on the significance of agricultural impacts. It is therefore not necessary to detail this design and layout of the facility any further in this assessment. All that is of relevance is simply the total footprint of the facility that excludes agricultural land use or impacts agricultural land, referred to as the agricultural footprint. This is the area within the facility fence. Whether that footprint comprises a solar array, a road or a substation is irrelevant to agricultural impact.

## 3 TERMS OF REFERENCE

The terms of reference for this study is to fulfil the requirements of the *Protocol for the specialist assessment and minimum report content requirements of environmental impacts on agricultural resources by onshore wind and/or solar photovoltaic energy generation facilities where the electricity output is 20 megawatts or more*, gazetted on 20 March 2020 in GN 320 (in terms of Sections 24(5)(A) and (H) and 44 of NEMA, 1998).

The verified agricultural sensitivity of the site includes land that is of high or more agricultural sensitivity. The level of agricultural assessment required in terms of the agricultural protocol for sites verified as high or more sensitivity is an Agricultural Agro-Ecosystem Specialist Assessment.

The terms of reference for such an assessment, as stipulated in the protocol, are listed below, and the section number of this report which fulfils each stipulation is given after it in brackets.

1. The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP) (Appendix 1).
2. The assessment must be undertaken on the preferred site and within the proposed development footprint (section 9).
3. The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within the past 5 years, and must identify:
  1. the extent of the impact of the proposed development on the agricultural resources (Section 9.11);

2. whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site (Section 9.13), and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
4. The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:
  1. The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope (Sections 8.1 & 8.2);
  2. Where applicable, the vegetation composition, available water sources as well as agro-climatic information (Sections 8.3, 8.4 & 8.5);
  3. The current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units (Section 8.8);
  4. The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure (Section 8.9);
  5. Existing impacts on the site, located on a map where relevant (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.)(Section 8.10).
5. Assessment of Impacts, including the following which must be considered as a minimum in the predicted impact of the proposed development on the agro-ecosystem:
  1. Change in productivity for all agricultural activities based on the figures of the past 5 years, expressed as an annual figure and broken down into production units (Section 9.12);
  2. Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure (Section 9.12);
  3. Any alternative development footprints within the preferred site which would be of “medium” or “low” sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification (Section 9.5).
6. The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be written up in an Agricultural Agro-Ecosystem Specialist Report that contains as a minimum the following information:
  1. Details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vita (Appendix 1);
  2. A signed statement of independence by the specialist (Appendix 2);
  3. The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment (Section 4.1);
  4. A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant (Section 4.1);
  5. A map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool (Figure 2);

6. An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development (Section 9.12);
7. An indication of possible long-term benefits that will be generated by the project in comparison to the benefits of the agricultural activities on the affected land (Section 9.6);
8. Additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc. (Section 9.7);
9. Information on the current agricultural activities being undertaken on adjacent land parcels (Section 8.6);
10. A motivation must be provided if there were development footprints identified as per point 5.3 above that were identified as having a medium or low agricultural sensitivity and that were not considered appropriate (not applicable);
11. Confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities (Section 9.8);
12. A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development (Section 9.13);
13. Any conditions to which this statement is subjected (Section 11);
14. Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr) (Section 10);
15. A description of the assumptions made and any uncertainties or gaps in knowledge or data (Section 5).
16. Calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development (including supporting infrastructure) (Section 9.9);
17. Confirmation whether the development footprint is in line with the allowable development limits set in Table 1 above, including where applicable any deviation from the set development limits and motivation to support the deviation, including (Section 9.9):
  - a. where relevant, reasons why the proposed development footprint is required to exceed the limit;
  - b. where relevant, reasons why this exceedance will be in the national interest; and
  - c. where relevant, reasons why there are no alternative options available including evidence of alternatives considered; and
18. A map showing the renewable energy facilities within a 50km radius of the proposed development (Appendix 3)

#### 4 METHODOLOGY OF STUDY

The assessment was based on an on-site investigation of the soils and agricultural conditions and was also informed by existing soil and agricultural potential data for the site. The following sources of existing information were used:

- Soil data was sourced from the land type data set, of the Department of Agriculture, Forestry and Fisheries (DAFF). This data set originates from the land type survey that was conducted from the 1970's until 2002. It is the most reliable and comprehensive national database of soil information in South Africa and although the data was collected some time ago, it is still entirely relevant as the soil characteristics included in the land type data do not change within time scales of hundreds of years.
- Land capability data was sourced from the 2017 National land capability evaluation raster data layer produced by the DAFF, Pretoria.
- Field crop boundaries were sourced from Crop Estimates Consortium, 2019. *Field Crop Boundary data layer, 2019*. Pretoria. Department of Agriculture, Forestry and Fisheries.
- Rainfall and evaporation data was sourced from the SA Atlas of Climatology and Agrohydrology (2009, R.E. Schulze) available on Cape Farm Mapper. Note that Cape Farm Mapper includes national coverage of climate, grazing and certain other data.
- Grazing capacity data was sourced from the 2018 DAFF long-term grazing capacity map for South Africa, available on Cape Farm Mapper.
- Satellite imagery of the site and surrounds was sourced from Google Earth.

The aim of the on-site Site Sensitivity Verification was to:

1. ground truth cropland status and consequent agricultural sensitivity;
2. ground-truth the land type soil data and assess the soil potential across the site that will be impacted; and
3. gain an understanding of overall agricultural production potential across the site.

This was achieved by a drive and walk-over investigation across the site. The site investigation was conducted on 12 October 2021.

The soil investigation was based on the investigation of existing excavations, soil auger samples as well as indications of the surface conditions and topography. Soils were classified according to the South African soil classification system (Soil Classification Working Group, 1991). This level of soil assessment is considered entirely adequate for an understanding of on-site soil potential for the purposes of this assessment.



An assessment of soils and long-term agricultural potential is in no way affected by the season in which the assessment is made, and therefore the fact that the assessment was done in summer has no bearing on its results.

Telephonic interviews with Mr Te Water and Mr Louis Ludik were conducted on 12 October 2021 for information on farming activities on the site.

## **5 ASSUMPTIONS, UNCERTAINTIES OR GAPS IN KNOWLEDGE OR DATA**

There are no specific assumptions, uncertainties or gaps in knowledge or data that affect the findings of this study.

## **6 APPLICABLE LEGISLATION AND PERMIT REQUIREMENTS**

A renewable energy facility requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) if the facility is on agriculturally zoned land. There are two approvals that apply. The first is a No Objection Letter for the change in land use. This letter is one of the requirements for receiving municipal rezoning. It is advisable to apply for this as early in the development process as possible because not receiving this DALRRD approval is a fatal flaw for a project. Note that a EA does not assure DALRRD's approval of this. This application requires a motivation backed by good evidence that the development is acceptable in terms of its impact on the agricultural production potential of the development site. This assessment report will serve that purpose.

The second required approval is a consent for long-term lease in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval should not present any difficulties. Note that SALA approval is not required if the lease is over the entire farm portion. SALA approval (if required) can only be applied for once the Municipal Rezoning Certificate and Environmental Authorisation has been obtained.

Rehabilitation after disturbance to agricultural land is managed by the Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA). A consent in terms of CARA is required for the cultivation of virgin land. Cultivation is defined in CARA as "any act by means of which the topsoil is disturbed mechanically". The purpose of this consent for the cultivation of virgin land is to ensure that only land that is suitable as arable land is cultivated. Therefore, despite the above definition of cultivation, disturbance to the topsoil that results from the construction of a renewable energy facility and its associated infrastructure does not constitute cultivation as it is understood in CARA. This has been corroborated by Anneliza Collett (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the DALRRD. The

construction and operation of the facility will therefore not require consent from the DALRRD in terms of this provision of CARA.

## **7 SITE SENSITIVITY VERIFICATION**

In terms of the gazetted agricultural protocol, a site sensitivity verification must be submitted that:

1. confirms or disputes the current use of the land and the environmental sensitivity as identified by the screening tool, such as new developments or infrastructure, the change in vegetation cover or status etc;
2. contains a motivation and evidence (e.g., photographs) of either the verified or different use of the land and environmental sensitivity.

The purpose of including an agricultural component in the environmental assessment process is to ensure that South Africa balances the need for development against the need to ensure the conservation of the natural agricultural resources, including land required for agricultural production and national food security. The different categories of agricultural sensitivity, used in the national web-based environmental screening tool, indicate the priority by which land should be conserved as agricultural production land.

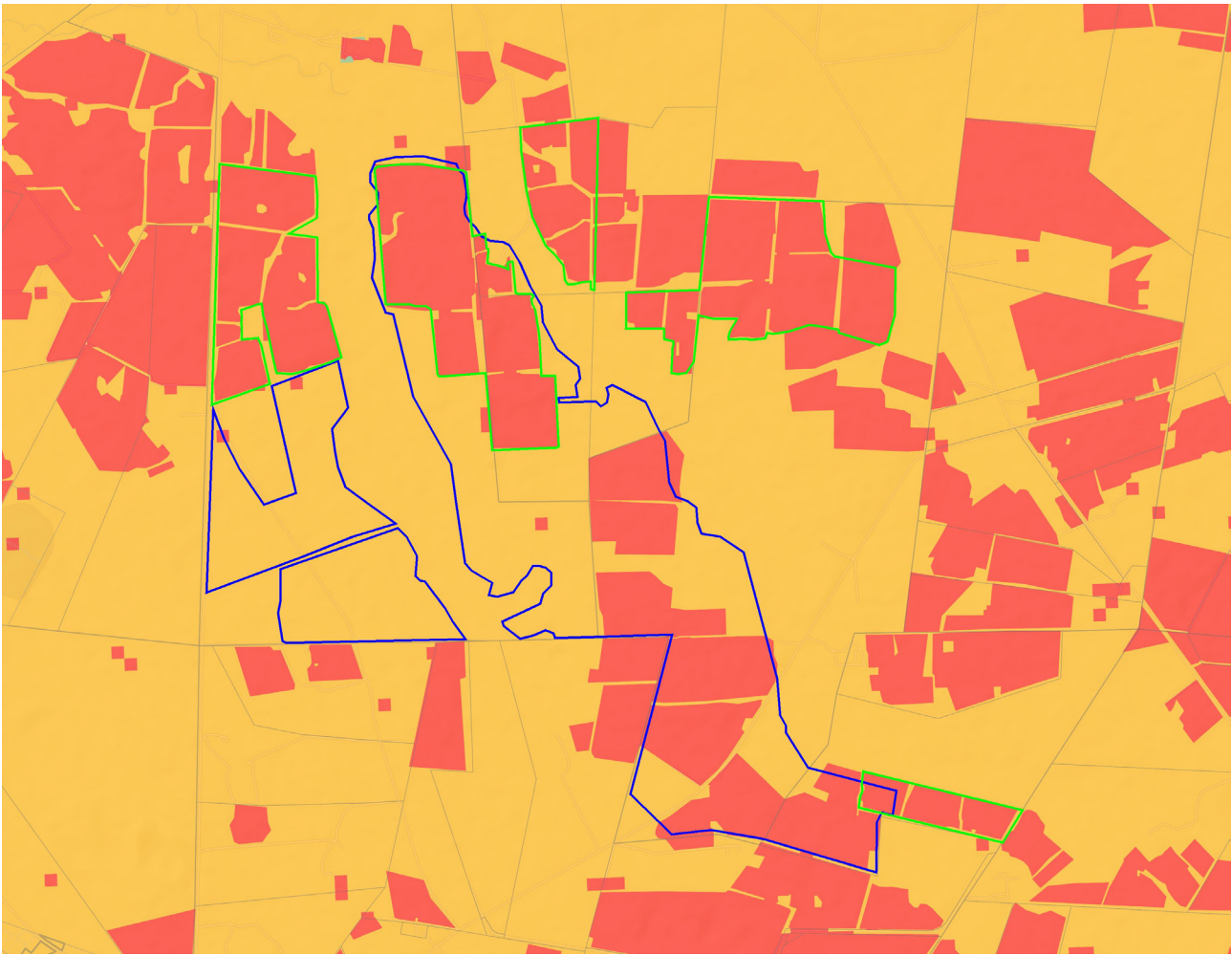
Agricultural sensitivity is a direct function of the capability of the land for agricultural production. All arable land that can support viable crop production, is classified as high (or very high) sensitivity. This is because there is a scarcity of arable production land in South Africa and its conservation for agricultural use is therefore a priority. Land which cannot support viable crop production is much less of a priority to conserve for agricultural use, and is rated as medium or low agricultural sensitivity.

The screening tool classifies agricultural sensitivity according to only two independent criteria – the land capability rating and whether the land is used for cropland or not. All cropland is classified as at least high sensitivity, based on the logic that if it is under crop production, it is indeed suitable for it, irrespective of its land capability rating.

The screening tool sensitivity categories in terms of land capability are based upon the Department of Agriculture's updated and refined, country-wide land capability mapping, released in 2016. The data is generated by GIS modelling. Land capability is defined as the combination of soil, climate and terrain suitability factors for supporting rain fed agricultural production. It is an indication of what level and type of agricultural production can sustainably be achieved on any land, based on its soil, climate and terrain. The higher land capability values ( $\geq 8$  to 15) are likely to be suitable as arable land for crop production, while lower values are only likely to be suitable as non-arable grazing land.

A map of the proposed development area overlaid on the screening tool sensitivity is given in Figure 2. The classified land capability of the site is predominantly 8, but varies from 7 to 9. The small-scale differences in the modelled land capability across the project area are not very accurate or significant at this scale and are more a function of how the data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. The site can therefore be considered to have a modelled land capability of 8, which translates to a medium agricultural sensitivity. Soil capability is determined in the land capability data largely by an average soil capability value attributed to each land type. However, there are a range of soil capabilities within each land type, which the land capability data is unable to take account of and map. On the ground, the soils (and therefore the land capability) vary in a fairly complex pattern across the landscape, which is not reflected at the scale of the land capability data. The most reliable indication of soil cropping potential (soil capability) is historical land use. The suitable versus the unsuitable soils have been identified over time through trial and error. In an agricultural environment like the one being assessed, all the suitable soils are generally cropped and therefore have a real land capability of  $\geq 8$ . Uncropped soils can fairly reliably be considered to have limitations that make them unsuitable for crop production with the result that their real land capability is less than 8.

The classification of parts of the site as high agricultural sensitivity (red in Figure 2) is because that land is classified as cropland in the data set used by the screening tool. However, that data set is outdated and not always accurate. The field-verified and updated indication of which lands should be classified as croplands is shown in Figures 2 and 3. The other lands coloured red in Figure 2 are no longer or have never been used as cropland. Instead, they are used for grassland grazing that is burnt or mowed from time to time, so can appear on satellite images as cropland and that is why it is classified as cropland in the data set. These lands should therefore not be classified as cropland or allocated high sensitivity because of it.

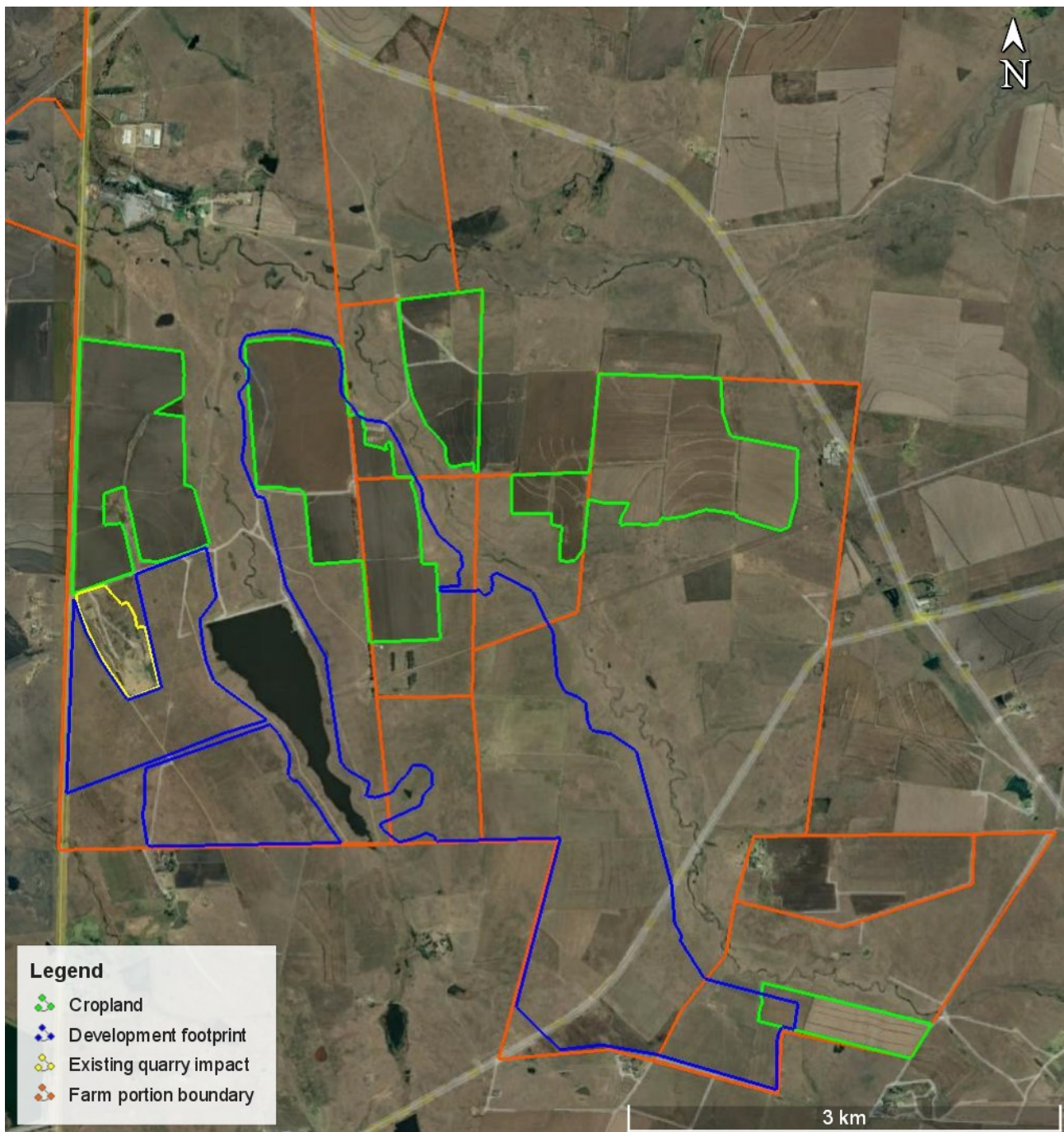


**Figure 2.** The proposed development footprint (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (yellow = medium; red = high). The field-verified and updated indication of which lands, within the cadastral project boundary, should be classified as croplands are shown in green outline.

This site sensitivity verification verifies those parts of the site that are indicated as cropland in Figures 2 and 3 as being of high agricultural sensitivity and the rest of the site as being of medium agricultural sensitivity with a land capability value of less than 8.

## 8 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

A satellite image map of the proposed footprint of the facility is shown in Figure 3 and photographs of site conditions are shown in Figures 4 to 7.



**Figure 3.** Satellite image map of the proposed footprint of the facility.

## 8.1 Soils

The entire site falls within one land type (see table of soil data in Appendix 4). The geology is dolerite as well as sandstone, grit and shale of the Vryheid formation of the Ecca group. The soils are predominantly high clay content, dark coloured vertic and melanic soils, underlain by rock in upland positions and clay in bottomland positions. Soil forms are Arcadia, Rensburg, Valsrivier, Swartland, Mayo and Milkwood. The agricultural potential of the soils is limited variously by the very high clay content, shallow depth and drainage limitations.



## 8.2 Terrain and slope

The site is situated on hilly terrain at an altitude of between 1,610 and 1,650 metres and slopes up to about 7%.



**Figure 4.** Typical site conditions.



**Figure 5.** Typical site conditions. The dam is visible in the background.





**Figure 6.** Typical soil conditions where depth is limited by underlying rock.



**Figure 7.** Typical bottom-land soil conditions where depth is limited by underlying clay and drainage is limited.



### **8.3 Available water sources**

There is one fairly large farm dam on the site. There is no irrigation anywhere on the farms, but the farmer is intending to establish irrigation using the water from the dam.

### **8.4 Vegetation**

Natural vegetation of the site is Soweto Highveld Grassland, which has been disturbed by agricultural activities.

### **8.5 Agro-climatic information**

The site has a summer rainfall with a mean annual rainfall of approximately 648 mm and a mean annual evaporation of approximately 1,290 mm (Schulze, 2009).

### **8.6 Land use and development on and surrounding the site**

The site is located in a grain farming agricultural region, but the soils vary in their suitability for crop production. Because of the favourable climate and the potentially high grain yields, farmers in the area, and particularly large scale farmers such as one of the farmers on whose land the site is located, utilise all suitable soil for grain production. Only soil that is not suitable for grain production is used for cattle grazing. Limitations that render the soil unsuitable for grain production are depth limitations due to rock or dense clay in the subsoil, and the limited drainage associated with the dense, poorly drained clay layers in the subsoil. The grazing lands are *rooigras* (*Themeda triandra*) grasslands. Grass fields are burned or mowed from time to time.

Most of the farm portions on which the solar site is located, form only a small part of a much bigger farming operation that utilises many different farms with a total cropland of approximately 6,000 hectares and cattle grazing of around 7,000 to 8,000 hectares.

There is a quarry in close proximity to the solar site (see Figure 3).

### **8.7 Agricultural potential**

Because of the favourable climate, grain yields are high. Average maize yield on the suitable soils on the farm is 8.5 tons per hectare. The long-term grazing capacity of the farm is also high at 5 hectares per large stock unit.

## **8.8 Agricultural productivity**

The development footprint, as shown in Figures 2 and 3, is 845 hectares in extent. Of that, approximately 150 hectares is cropland and the rest, 694 hectares, is grazing land. At a maize yield of 8.5 tons per hectare, the cropland has a productivity of 1,284 tons of maize per annum and at a carrying capacity of 5 hectares per large stock unit, the grazing land has a productivity of 139 head of cattle.

## **8.9 Agricultural employment**

Twenty-five agricultural labourers are employed in the total cattle farming operation that extends over multiple farms and an area of between 7,000 and 8,000 hectares.

## **8.10 Existing impacts on the site**

There is an existing quarry impact on the site (see Figure 3).

# **9 ASSESSMENT OF AGRICULTURAL IMPACT**

## **9.1 What constitutes an agricultural impact?**

An agricultural impact is a temporary or permanent change to the future production potential of land. The significance of the agricultural impact is directly proportional to the extent of the change in production potential. A decrease in future production potential is a negative impact and an increase is a positive impact.

## **9.2 The significance of agricultural impact and the factors that determine it**

The purpose of the agricultural component in the environmental assessment process is to ensure that South Africa balances the need for development against the need to ensure the conservation of the natural agricultural resources, including land, required for agricultural production and national food security.

When the agricultural impact of a development involves the permanent or long-term non-agricultural use of potential agricultural land, as it does in this case, the focus and defining question of the agricultural impact assessment is:

Does the loss of future agricultural production potential that will result from this development, justify keeping the land solely for potential agricultural production and therefore not approving the development?

If the loss is small, then it is unlikely to justify non approval. If the loss is big, then it is likely to justify it.

The extent of the loss is a direct function of two things, firstly the amount of land that will be lost and secondly, the production potential of the land that will be lost. The land's production potential must be evaluated on a scale of land capability (which equates to production potential) that is applicable across the country, because the need is to conserve the higher potential land in the country, not the lower potential land. If the land capability is below a certain threshold then its loss as agricultural production land may be justified, depending on the importance and value of the proposed non-agricultural land use that will replace it. That threshold is determined by the scarcity of arable crop production land in South Africa and the relative abundance of land that is only good enough to be used for grazing. If land is of sufficient land capability to support viable and sustainable crop production then it is considered to be above the threshold for being conserved as agricultural production land. If land is not of sufficient land capability to support viable and sustainable crop production, then it is considered to be below the threshold and its loss as agricultural production land may be justified. When the replacing land use is something that has high national importance and benefit, such as renewable energy development, the use of agricultural land that is below the threshold is considered to be justified.

It is also important to note that renewable energy facilities have both positive and negative affects on the production potential of land (see Section 9.3) and so it is the net sum of these positive and negative affects that determines the extent of the change in future production potential.

Another aspect to consider is the scale at which the significance of the agricultural impact is assessed. The change in production potential of part of a farm will be more significant at the scale of that farm, than at larger scales. This assessment considers a regional and national scale to be the most appropriate one for assessing the significance of the loss of agricultural production potential because, as has been discussed above, the purpose is to ensure the conservation of agricultural land required for national food security.

It should be noted that, in assessing agricultural impact, the exact nature and layout of the different infrastructure within a solar energy facility has absolutely no bearing on the significance of agricultural impacts. All that is of relevance is simply the total footprint of the facility that excludes agricultural land use or impacts agricultural land, referred to as the agricultural footprint.

### **9.3 Impact identification and discussion**

There is ultimately only ever a single agricultural impact of a development and that is a change to the future agricultural production potential of the land. This impact occurs by way of different mechanisms some of which lead to a decrease in production potential and some of which lead to



an increase. It is the net sum of positive and negative effects that determines the overall agricultural impact.

Two direct mechanisms have been identified that lead to decreased agricultural potential by:

1. **occupation of land** - Agricultural land directly occupied by the development infrastructure (approximately 150 hectares of cropland and 694 hectares of grazing land) will become restricted for agricultural use, with consequent potential loss of agricultural productivity for the duration of the project lifetime.
2. **soil erosion and degradation** – Erosion can occur as a result of the alteration of the land surface run-off characteristics, predominantly through the establishment of hard surface areas including roads, and through the disturbance of existing contour bank systems that control erosion. Soil erosion is completely preventable. The storm water management that will be an inherent part of the engineering on site and standard, best practice erosion control measures recommended and included in the EMPr, are likely to be effective in preventing soil erosion. Loss of topsoil can result from poor topsoil management during construction related excavations.

One indirect mechanism has been identified that leads to increased agricultural potential through:

1. **increased financial security for farming operations** - Reliable and predictable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.

Considering what is detailed in Section 9.2 above, the loss of approximately 150 hectares of cropland will result in a significant impact. The extent to which any of the other two mechanisms is likely to actually affect levels of agricultural production is, however small.

#### **9.4 Cumulative impacts**

The cumulative impact of a development is the impact that development will have when its impact is added to the incremental impacts of other past, present or reasonably foreseeable future activities that will affect the same environment. It is important to note that the cumulative impact assessment for a particular project, like what is being done here, is not the same as an assessment of the impact of all surrounding projects. The cumulative assessment for this project is an assessment only of the impacts associated with this project, but seen in the context of all surrounding impacts. It is concerned with this project's contribution to the overall impact, within the context of the overall impact, but it is not simply the overall impact itself.

The most important concept related to a cumulative impact is that of an acceptable level of change to an environment. A cumulative impact only becomes relevant when the impact of the proposed development will lead directly to the sum of impacts of all developments causing an acceptable level of change to be exceeded in the surrounding area. If the impact of the development being assessed does not cause that level to be exceeded, then the cumulative impact associated with that development is not significant.

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. The defining question for assessing the cumulative agricultural impact is this:

What loss of future agricultural production potential is acceptable in the area, and will the loss associated with the proposed development, when considered in the context of all past, present or reasonably foreseeable future impacts, cause that level in the area to be exceeded?

DEFF requires compliance with a specified methodology for the assessment of cumulative impacts. This is positive in that it ensures engagement with the important issue of cumulative impacts. However, the required compliance has some limitations and can, in the opinion of the author, result in an over-focus on methodological compliance, while missing the more important task of effectively answering the above defining question.

DFFE compliance for this project requires considering all renewable energy project applications within a 30 km radius. According to the DFFE database, there is only one approved renewable energy project within a 30 km radius, namely the 66 MW Tutuka Photovoltaic (PV) Energy Facility, DFFE reference number 14/12/16/3/3/2/754 (please refer to Appendix 3).

In quantifying the cumulative impact, the area of land taken out of agricultural use because of this one project plus the one being assessed (total generation capacity of 366 MW) will amount to a total of approximately 915 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 0.32% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land that is only suitable for grazing. However, if it includes a significant area of cropland, it is no longer acceptable.

As discussed above, the risk of a loss of agricultural potential by soil degradation is low and can effectively be mitigated for renewable energy developments. If the risk for each individual development is low, then the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is therefore acceptable in terms of cumulative impact, and it is therefore recommended that it be approved, provided that the recommendation that all cropland is excluded from the footprint of the development (see mitigation section below) is implemented.

### **9.5 Impacts of the no-go alternative**

The no-go alternative considers impacts that will occur to the agricultural environment in the absence of the proposed development. There are no agricultural impacts of the no-go alternative.

The development offers an alternative income source to agriculture, but it restricts agricultural use of the site. Therefore, the negative agricultural impact of the development is more significant than that of the no-go alternative, and so, purely from an agricultural impact perspective, the no-go alternative is the preferred alternative between the development and the no-go because it has less agricultural impact. However, the no-go option would prevent the proposed development from contributing positive agricultural impacts to the farm as well as contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa.

### **9.6 Alternative development footprints and comparative assessment of alternatives**

The agricultural protocol requires identification of any alternative development footprints within the preferred site which would be of “medium” or “low” sensitivity for agricultural resources as identified by the screening tool and verified through the site sensitivity verification.

It is recommended in the mitigation measures below that all cropland is excluded from the footprint of the development. Under this condition, the whole agricultural footprint is on land that is verified as being of medium agricultural sensitivity.

Two alternative locations are proposed for the Vhvhili on-site substation. Alternative 1 is not on cropland but alternative 2 is. Alternative 1 is therefore the preferred alternative from an agricultural impact point of view because it results in no loss of cropland and therefore has less agricultural impact. Alternative 2 is not supported as it is not consistent with the recommendations in this report that development should be excluded from cropland.

### **9.7 Long term project benefits versus agricultural benefits**

The development is likely to generate a greater per hectare income for the farming enterprises than the existing agriculture will earn. Furthermore, the income has the advantages of being reliable and predictable and will therefore increase financial security for the affected farms.

The development will also generate additional income and employment in the local economy. In addition, it will contribute to the country's need for energy generation, particularly renewable energy that has lower environmental and agricultural impact on a national scale than existing, coal powered energy generation. The renewable energy complex also aims to beneficially utilise existing infrastructure by connecting into the Sasol plant. In supplying generated energy to the hydrogen and ammonia plant associated with the Sasol plant, the project is indirectly stimulating the green hydrogen economy and in particular hydrogen-specific skills and market participation in green hydrogen and ammonia fuel products, both of which have large-scale potential in international and local markets. This in turn therefore supports the indirect diversification of the local economy and assists in maintaining existing ammonia supply chains, and promoting future hydrogen supply chains.

### **9.8 Additional environmental impacts**

There are no additional environmental impacts of the proposed development that are relevant to agriculture.

### **9.9 Micro-siting to minimise fragmentation and disturbance of agricultural activities**

The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. As long as the agricultural footprint avoids all areas used for crop production, which it is recommended to do, the exact position of the footprint and all infrastructure within it will not make any material difference to agricultural impacts and disturbance.

### **9.10 Allowable development limits**

The agricultural protocol stipulates allowable development limits for renewable energy developments of > 20 MW. Allowable development limits refer to the area of a particular agricultural sensitivity category that can be directly impacted (i.e. taken up by the physical footprint) by a renewable energy development. The agricultural footprint is defined in the protocol as the area that is directly occupied by all infrastructures, including roads, hard standing areas, buildings, substations etc., that are associated with the renewable energy facility during its operational phase, and that result in the exclusion of that land from potential cultivation or grazing. It excludes all areas that were already occupied by roads and other infrastructure prior to the establishment of the energy facility but includes the surface area required for expanding existing infrastructure (e.g. widening existing roads). It excludes the corridor underneath overhead power lines but includes the pylon footprints. It therefore represents the total land that is actually excluded from agricultural use as a result of the renewable energy facility (the agricultural footprint).

For a solar energy facility, the footprint is considered to be the total area inside the security fence of the facility.

The allowable development limit on land of less than high agricultural sensitivity, with a land capability of less than 8, as this site has been verified to be (excluding the croplands that are recommended to be excluded), is 2.5 ha per MW. This would allow a 300 MW facility to occupy 750 hectares. This facility will occupy less than 750 hectares, but the generating capacity of the facility would need to be finalised in order to determine compliance with the allowable development limits contained in the agricultural protocol. It is also noted that new PV panel technologies are capable of generating approximately 2 MW/ha.

### **9.11 The 10% rule**

The so-called 10% rule that has been used by DALRRD is not considered to be useful or constructive for assessing the agricultural approval of this project. In this agricultural environment, the rule is likely to simply hinder solar energy development without serving any benefit to agriculture. The argument against using the rule is detailed below.

In order to limit the potential threat that solar energy development in rural areas could pose to agricultural production and to the agricultural economy of those rural areas, DALRRD created the so-called 10% rule to inform the decision of whether a solar energy development on agricultural land should be approved or not. This rule states that a solar energy facility may not utilise more than 10% of the surface area of a farm. Its aim was to ensure that each farm unit remained predominantly agricultural rather than certain farms abandoning agricultural production in favour of renewable energy generation.

The rule was established when solar energy development was new and unknown. However, it is now evident that solar energy development is less of a threat to agricultural production and the agricultural economy than it was initially feared that it might be. Solar energy development has demonstrated benefits for agriculture and has potential to be integrated into the rural agricultural economy. It is a source of much needed income into rural areas. The 10% rule is now considered unnecessary and impractical. It is likely to simply hinder solar energy development without serving any benefit to agriculture. It is far more constructive and effective to focus on integrating renewable energy with agricultural production in a way that provides benefits to agriculture and focuses on minimising loss of future agricultural production potential. This can be done by using only the production potential of land as the deciding factor for solar energy approval.

The problem with the 10% rule and only utilising up to 10% of each farm, is that it forces solar facilities to be spread across the landscape in a way that is impractical and financially non-viable and creates a much larger environmental footprint in the landscape. Furthermore, it does not



actually make any difference to the loss of agricultural production potential or to the impact on the agricultural economy of the area.

It is important to recognise that there is no real need to limit the amount of land occupied by solar energy facilities. Solar energy will never occupy more than a tiny proportion of the land, anyway. The total extent of South Africa's intended solar development for the foreseeable future was calculated to only occupy 0.4% of the surface area of the 8 original renewable energy development zones (REDZ). This was if all the country's solar development was located only in those 8 REDZ, which it is not. An additional 2 REDZ have been proclaimed since then and much of the country's solar development is occurring outside the REDZ. This means that for the foreseeable future, solar energy will only ever occupy much less than 0.4% of land in an area. If it will only ever occupy such a small proportion of the land, anyway, it cannot replace agriculture in the rural economy and it serves no purpose to limit solar facilities to 10% of each farm. From an agricultural production and food security point of view there is only a need to preserve scarce arable land for crop production and therefore to limit solar development to land that is of insufficient land capability to support viable crop production.

Early solar development in the country was located predominantly in arid, low potential agricultural environments with large farm sizes, such as the Northern Cape. In such environments the 10% rule is achievable, even if not desirable. However, because solar development has now used up the available grid capacity in the Northern Cape, it needs to move to more intensively farmed areas in the North West, Free State and Mpumalanga provinces. Farms are much smaller in these areas and 10% of a farm is often an unfeasibly small area for solar development. In such agricultural environments, some soils are suitable for crop production and others are not. The important thing in these environments is that land that has potential for viable crop production is not sacrificed for solar development. The focus in terms of locating solar facilities should be to avoid land that has potential for viable crop production, and thereby minimise the loss of agricultural production potential. As long as that is done, it does not matter what percentage of an individual farm is used. The 10% rule is unnecessary. In this scenario, solar energy development is integrated with agricultural production. It will not replace agriculture from the land and therefore does not pose a threat to agricultural production or to the agricultural economy of rural areas.

### **9.12 Mitigation measures**

In order to mitigate the loss of valuable agricultural cropland, it is recommended that all cropland is excluded from the footprint of the development. If cropland is excluded from the proposed footprint it leaves approximately 700 hectares of available land for the development, which is sufficient with new technology to deliver approximately 300 MW.

Mitigation measures to prevent soil degradation are all inherent in the project design and / or are standard, best-practice for construction sites.

- A system of storm water management, which will prevent erosion, will be an inherent part of the engineering on site. As part of this system, the integrity of the existing contour bank systems of erosion control on croplands, where they occur on steeper slopes, must be kept intact. Any occurrences of erosion must be attended to immediately and the integrity of the erosion control system at that point must be amended to prevent further erosion from occurring there.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30 cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it is at the surface. Topsoil should only be stripped in areas that are excavated. Across the majority of the site, including construction lay down areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.

### **9.13 Impact assessment**

An Agricultural Agro-Ecosystem Specialist Assessment is required by the protocol to identify the extent of the impact of the proposed development on agricultural resources. The assessment of the extent of the impact is summarised in Table 2.

As discussed in Section 9.1, the consequence of an impact is a direct function of the degree to which that impact will affect current or potential future agricultural production.

Agricultural potential loss by land occupation occurs only on the site and for the lifetime of the development. Its consequence is considered substantial for cropland and moderate for land that is of limited land capability and is not suitable for crop production. The irreplaceability is considered high for cropland and low for non-arable land. The probability of this impact is very likely. Its reversibility is considered high, because after decommissioning the land can be returned to agricultural land use.

Agricultural potential loss by degradation occurs only on the site and only during the construction and decommissioning phases. Its consequence is considered slight because of the limited land capability and because the soil is not particularly susceptible to degradation. Irreplaceability is considered low because of the limited land capability as well. The probability of this impact is unlikely because of the low susceptibility. Its reversibility is considered moderate, because if soil is degraded there is some potential for rehabilitation.

Agricultural potential enhancement through increased financial security for farming operations occurs across the farming operation and during the operational phase. Its consequence is considered slight because increased farm investment is only likely to slightly increase farm productivity. Some financial improvement to farming operations is likely as a result of the additional revenue. Reversibility is considered high because the additional revenue will stop when the operation ceases. Irreplaceability is considered moderate because the additional revenue may not be easy to replace after the operation ceases, although once a renewable energy facility is established, it may well be recommissioned for continued operation.

*Table 2: Rating of significance of potential impacts to agriculture.*

Impact	Impact Criteria	Significance and Ranking (Pre-Mitigation)	Potential mitigation measures	Significance and Ranking (Post Mitigation)	Confidence Level
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#### Construction phase

Agricultural potential loss by land occupation	Status	Negative	Moderate (3)	Avoid all cropland	Low (4)	High
	Spatial Extent	Site Specific				
	Duration	Long-term				
	Consequence	Substantial				
	Probability	Very likely				
	Reversibility	High				
	Irreplaceability	Moderate				
Agricultural potential loss by soil degradation	Status	Negative	Very low (5)	Maintain vegetation and facilitate re-vegetation . Strip, stockpile and re-spread topsoil.	Very low (5)	High
	Spatial Extent	Site Specific				
	Duration	Long-term				
	Consequence	Slight				
	Probability	Unlikely				
	Reversibility	Moderate				
	Irreplaceability	Low				

#### Operational phase

Agricultural potential enhancement through increased financial security for farming operations	Status	Positive	Very low (5)	None possible	Very low (5)	High
	Spatial Extent	Local				
	Duration	Long-term				
	Consequence	Slight				
	Probability	Likely				
	Reversibility	High				
	Irreplaceability	Moderate				

#### Decommissioning phase

Agricultural potential loss by soil degradation	Status	Negative	Very low (5)	Maintain vegetation and facilitate	Very low (5)	High
	Spatial Extent	Site Specific				
	Duration	Long-term				

	<b>Consequence</b>	Slight		re-vegetation Strip, stockpile and re-spread topsoil.		
	<b>Probability</b>	Unlikely				
	<b>Reversibility</b>	Moderate				
	<b>Irreplaceability</b>	Low				

#### 9.14 Impacts on agricultural production and employment

The agricultural protocol requires an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development. The development will result in the loss of productivity of 139 head of cattle from the farm. Because of the large size of the total farm operation, this loss is unlikely to have any impact on agricultural employment, although one or two farm workers may lose their employment as a result of the reduced farmland.

### 10 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The environmental management programme inputs for the protection of soil resources are presented in the tables below for each phase of the development.

*Table 3: Management plan for the planning and design phase*

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Design an effective system of stormwater run-off control, where it is required - that is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water	Ensure that the storm water run-off control is included in the engineering design.	Once-off during the design phase.	Holder of the EA

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		from all accumulation points and it must prevent any potential down slope erosion.			

*Table 4: Management plan for the construction phase*

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilise disturbed soil against erosion.	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	Every 4 months during the construction phase	Environmental Control Officer (ECO)
Topsoil loss	That topsoil loss is minimised	If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled	Record GPS positions of all significant occurrences (that is an area of greater than 25 square metres) of below-surface soil disturbance (e.g., excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)



Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		topsoil must be evenly spread over the entire disturbed surface.	the entire disturbed area.		

*Table 5: Management plan for the operational phase*

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That denuded areas are re-vegetated to stabilise soil against erosion	Facilitate re-vegetation of denuded areas throughout the site	Undertake a periodic site inspection to record the progress of all areas that require re-vegetation.	Bi-annually	Facility Environmental Manager

*Table 6: Management plan for the decommissioning phase*

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilise disturbed soil against erosion.	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all areas that require re-vegetation.	Every 4 months during the decommissioning phase, and then every 6 months after completion of decommissioning, until final sign-off is achieved.	Environmental Control Officer (ECO)
Topsoil loss	That topsoil loss is minimised	If an activity will mechanically disturb the soil below surface in	Record GPS positions of all significant occurrences	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	(that is an area of greater than 25 square metres) of below-surface soil disturbance (e.g., excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.		

## 11 CONCLUSIONS

Despite the screening tool showing some high agricultural sensitivity, the development site (excluding those parts of it that are not recommended by this assessment for development) was verified as being of medium agricultural sensitivity. The soils are predominantly high clay content, dark coloured vertic and melanic soils, underlain by rock in upland positions and clay in bottomland positions. Soil forms are Arcadia, Rensburg, Valsrivier, Swartland, Mayo and Milkwood. The soils across the investigated area vary in their suitability for crop production.

Because of the favourable climate and the potentially high grain yields, farmers in the area utilise all suitable soil for crop production. Only soil that is not suitable for crop production is used for cattle grazing. Limitations that render the soil unsuitable for crop production are depth limitations due to rock or dense clay in the subsoil, and the limited drainage associated with the dense, poorly drained clay layers in the subsoil.

In order to mitigate the loss of valuable agricultural cropland, it is recommended that all cropland is excluded from the footprint of the development.

Two potential negative, direct agricultural impacts have been identified as loss of agricultural potential by occupation of land and loss of agricultural potential by soil degradation. The loss by

occupation will translate to a loss of 139 head of cattle. One positive, indirect agricultural impact has been identified as enhanced agricultural potential through increased financial security for farming operations.

Mitigation measures to prevent soil degradation are all inherent in the project design and / or are standard, best-practice for construction sites.

The conclusion of this assessment is that the proposed development will not have an unacceptable negative impact on the agricultural production capability of the site, providing all cropland is avoided by the footprint of the development. This is substantiated by the facts that the facility will only occupy land that is of limited land capability and is not suitable for crop production; the amount of agricultural land loss is within the allowable development limits prescribed by the agricultural protocol; it offers improved financial security, as well as wider, societal benefits; it poses a low risk in terms of causing soil degradation; and the loss by occupation is not permanent and land will become available again after the activity ceases.

The proposed development is therefore acceptable from an agricultural impact point of view, and it is recommended that it be approved.

The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is subject to the condition that that all cropland as identified in Figures 2 and 3, is excluded from the footprint of the development.

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## **APPENDIX 1: SPECIALIST CURRICULUM VITAE**

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Please refer to Appendix A in Part B of the EIA Report





## environmental affairs

Department:  
Environmental Affairs  
REPUBLIC OF SOUTH AFRICA

### APPENDIX 2: DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

#### PROJECT TITLE

**THE PROPOSED VHUHILI SOLAR ENERGY FACILITY NEAR SECUNDA IN  
MPUMALANGA PROVINCE**

#### Kindly note the following:

- This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
- This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at <https://www.environment.gov.za/documents/forms>.
- A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
- All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
- All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

#### Departmental Details

**Postal address:** Department of Environmental Affairs, Attention: Chief Director: Integrated Environmental Authorisations, Private Bag X447, Pretoria, 0001

**Physical address:** Department of Environmental Affairs, Attention: Chief Director: Integrated Environmental Authorisations, Environment House, 473 Steve Biko Road, Arcadia

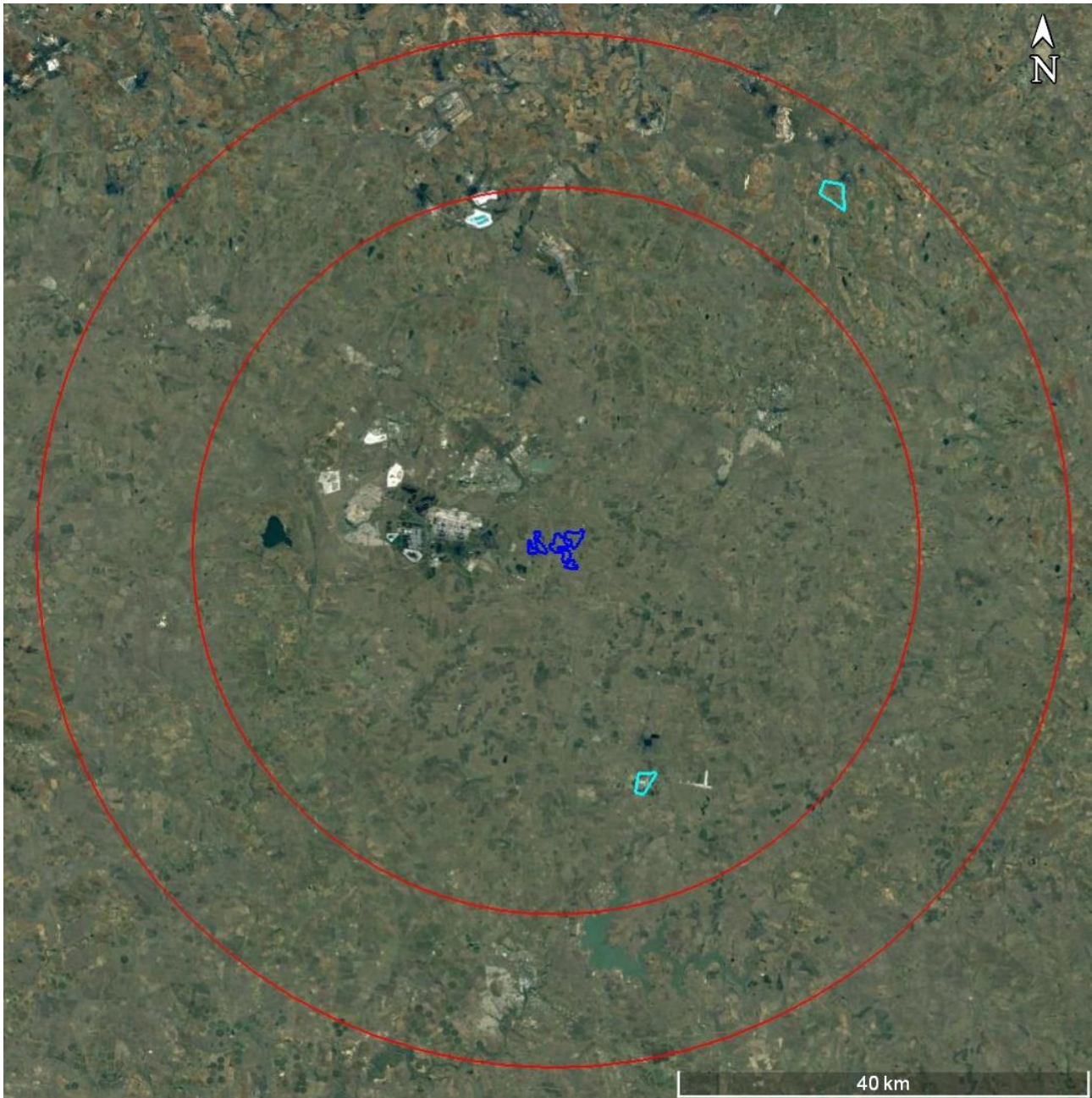
Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:  
Email: [EIAAdmin@environment.gov.za](mailto:EIAAdmin@environment.gov.za)

## **SPECIALIST DECLARATION**

Please refer to Appendix B in Part B of the EIA Report

### APPENDIX 3: PROJECTS INCLUDED IN CUMULATIVE ASSESSMENT

**Figure 8.** 35 km and 50 km radius around the site showing all renewable energy projects in light blue outline.



#### APPENDIX 4: SOIL DATA

Table of land type soil data

Land type	Soil series (forms)	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Ea17	Ar	300 - 900	45 - 70		so	57
Ea17	Rg	600 - 1000	45 - 70		gc	16
Ea17	Va	300 - 450	25 - 35	40 - 60	gc,vp	7
Ea17	Sw	200 - 450	25 - 35	40 - 60	lc	6
Ea17	My / Mw	150 - 500	30 - 50	20 - 30	so,R	5
Ea17	Bo	900 > 1200	35 - 50	35 - 50	gc,so	3
Ea17	Av	500 - 900	25 - 30	30 - 40	sp	2
Ea17	We	300 - 450	25 - 30	40 - 50	sp	2
Ea17	Ms / Gs	100 - 250	20 - 30		R,so	2
Ea17	R					2
Ea17	S					1



# ENVIRONMENTAL IMPACT ASSESSMENT REPORT

EIA Report for the proposed  
development of the Vhuvhili Solar  
Photovoltaic (PV) Facility near Secunda in  
the Mpumalanga Province



## CHAPTER 7:

# Terrestrial Biodiversity

# ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF THE VHUVHILI SOLAR ENERGY FACILITY LOCATED NEAR SECUNDA, MPUMALANGA

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## TERRESTRIAL BIODIVERSITY AND SPECIES: SPECIALIST ASSESSMENT

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### Draft 3



<i>Report prepared for:</i> CSIR – Environmental Management Services SMART PLACES: Sustainable Ecosystems P O Box 320 Stellenbosch, 7599 South Africa	<i>Report prepared by:</i> Ekotrust cc 7 St George Street Lionviham, Somerset West, 7130 South Africa
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9 November 2022



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# EXECUTIVE SUMMARY

## Background

Vhuvhili Solar RF (Pty) Ltd proposes to develop the Vhuvhili Solar Energy Facility (SEF) (up to 300 MW) and its associated infrastructure near Secunda in Mpumalanga.

This report has been prepared in terms of the Environmental Impact Assessment (EIA) Regulations, 2014, as amended, under the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended (NEMA) and the gazetted *Procedures for the assessment and minimum criteria for reporting on identified environmental themes* (Government Gazette 43110, No. 320, 20 March 2020 and Government Gazette 43855, No. 1150, 30 October 2020) (NEMA 2020a, 2020b). Note that these protocols replace the requirements of Appendix 6 of the NEMA EIA Regulations, 2014, as amended. The approach, methodology and regulatory framework is explained in Chapters 2 and 3 of the report.

## Location, topography, climate, geology and soils

The Vhuvhili SEF site covers an area of approximately 3115 ha and is located east of Secunda on the farms Grootvlei 293 IS, Vlakspruit 292 IS, Grootvlei 584 IS and Poverty Acres 585 IS in the Mpumalanga province. The site is characterised by grassland on gently undulating plains. Altitude ranges from about 1600 m a.s.l. in the west along the Klipspruit to approximately 1653 m a.s.l. in the east and 1660 m a.s.l. in the northeast of the site. The site is drained from southeast to northwest by the Klipspruit and its tributaries. Most of the site is underlain by sandstone, shale and coal beds (Pv) of the Vryheid Formation, Ecca Group. The northern and southern parts are partly covered by dolerite (Jd) with alluvium occurring along the drainage lines. The Ea Land Type occurs on undifferentiated soils and consists of one or more vertic, melanic, red structured diagnostic horizons.

The mean annual rainfall as measured at Secunda is 693 mm with the rainy season predominantly from October to March when about 86% of the annual rainfall occurs. The mean annual temperature at Secunda is 15.8°C with the extreme maximum and minimum temperatures 33.0°C and -4.3°C respectively.

## Vegetation and flora

The Vhuvhili SEF site falls in the Grassland Biome and more specifically in the Mesic Highveld Grassland Bioregion. It is located in the Soweto Highveld Grassland (Gm8) national vegetation type which has a “Vulnerable” conservation status because almost half of it has been transformed mostly by cultivation, plantations, mining and urbanisation. Overall, the vegetation on the Vhuvhili SEF site is structurally a grassland. Based on species composition, seven habitats (plant communities) were distinguished, described and mapped for the Vhuvhili SEF site. A further four units were also distinguished, i.e. croplands, infrastructure, disturbed areas and dams. The site does not fall within any Centre of Endemism.

During the field surveys, 290 plant species were recorded on the Vhuvhili SEF site and two additional sites in the area that were surveyed (hereafter referred to as the three sites). Combined, the checklist generated by the NewPosa database for the region, the red-list for Mpumalanga (Lötter 2015) and the list for the current field study yielded 396 species for the region of which 30 are protected species according to the Mpumalanga Nature Conservation Act (MNCA) (1998).

Twelve of the 30 Mpumalanga protected plant species (Schedule 11) were recorded during the site survey. Another five species are on the Mpumalanga Red list (Lötter 2015) although not included in the MNCA (1998) list for Mpumalanga. None of the seven Species of Conservation Concern (SCC) listed for the region were recorded on the Vhuvhili SEF site although *Gladiolus robertsoniae* was noted at the Impumelelo site. No threatened or protected

species (ToPS listed) under the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (NEMBA) is listed for the Vhuvhili SEF site and none were found at the site. Thirteen (13) CITES Appendix II species are listed for the region including mostly (10) species of the Orchidaceae. *Aloe ecklonis* was the only CITES species recorded on site. No nationally protected tree species is listed for the site and none were recorded during the site visit. No endemic species are listed for the Soweto Highveld Grassland Vegetation Type.

Forty-seven alien plant species were recorded on the three Enertrag sites of which 12 are currently declared alien invasive species and 35 naturalised alien species (Appendix B). Another four naturalised alien species are listed by NewPosa for the region.

## Fauna

The site falls within the distribution range of 52 terrestrial mammal species. Three IUCN Threatened and seven Near Threatened mammal species were listed for the environs of the Vhuvhili SEF site. Mammals that have been sighted include the Near Threatened Serval *Leptailurus serval*, Southern African hedgehog *Atelerix frontalis* and the Southern African vlei rat *Otomys auratus*. The following Schedule 2 mammal species were recorded on the Vhuvhili SEF site (MNCA 1998):

<i>Raphicerus campestris</i>	steenbok
<i>Atelerix frontalis</i>	hedgehog

The following threatened or protected mammal species (ToPS) have been recorded for the Vhuvhili SEF site:

<i>Leptailurus serval</i>	serval
<i>Atelerix frontalis</i>	Southern African hedgehog

The following CITES listed mammal species was recorded on the Vhuvhili SEF site:

<i>Leptailurus serval</i>	serval
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Thirty-two (32) reptile species are listed for the region. *Smaug giganteus*, the giant girdled lizard, has a Vulnerable IUCN status and is classified as Endangered in the NEMBA (2007c) ToPS list. Although the species was listed on the ADU database for the region, it was however not highlighted by the Screening Tool and is not listed in the MTPA database for the region. Furthermore, according to Bates *et al.* (2014), the distribution of the giant girdled lizard does not include the site. Provincially protected reptile species include 15 Schedule 2 Protected reptiles and 17 Schedule 5 reptiles. Two CITES listed species were recorded for the region:

<i>Smaug giganteus</i>	Giant girdled lizard (Ouvolk)
<i>Cordylus vittifer</i>	Common girdled lizard

The only reptile that the landowners reported for the Vhuvhili SEF site, is the Rinkhals, *Hemachatus haemachatus*.

The Screening Tool listed *Lepidochrysops procera* (Lepidoptera), the Maquassie Musk Shrew *Crocidura maquassiensis* and spotted-necked otter *Hydrictis maculicollis* as SCCs for the site (avifauna excluded) (see Animal Species Theme below).

## Screening tool

### Plant Species Theme

The screening tool rated the sensitivity of the Plant Species Theme as Medium and three species were highlighted as being of concern: Sensitive species 1252; Sensitive species 691 and *Pachycarpus suaveolens*. None of the SCC

highlighted by the screening tool were recorded on site and our background study indicated that most of site had a **low** sensitivity.

### Animal Species Theme

The screening tool rated the sensitivity of the Animal Species Theme as High. Animal species (excluding avifauna) highlighted by the screening tool for the site covered by all affected farms included the Makwassie Musk Shrew (*Crocidura maquassiensis*) and the spotted-necked otter (*Hydricotis maculicollis*). However, the spotted-necked otter is not listed by the screening tool for the focus areas 1 & 2 in all probability due to lack of suitable wetland habitat. Both species were not listed in the ADU mammal species list while *Crocidura maquassiensis* was not listed in the MNCA (1998) lists for the Mpumalanga province. Neither of them were recorded on site during the survey although they may occur in the region.

The Screening Tool listed *Lepidochrysops procera* (Lepidoptera) as a SCC for the site. However, it was not listed in the Animal Demography Unit (ADU) database, the MNCA (1998) provincial species lists or the NEMBA (2007c) ToPS lists. *Lepidochrysops procera* was not recorded on site and is unlikely to occur there because its host plant (*Ocimum obovatum*) was not present on site. What the screening tool did not highlight was the possible presence of the giant girdled lizard, a species with a Vulnerable IUCN status. However, the species was not recorded on site.

Overall, the sensitivity of the animal species theme (avifaunal component excluded) is rated as **medium**. If the suggested mitigation measures are followed the animal SCC should not be negatively affected by the development.

### Relative Terrestrial Biodiversity Theme

The screening tool rated the sensitivity of the Relative Terrestrial Biodiversity Theme as Very High based on the presence of Vulnerable ecosystems, Critical Biodiversity Areas (CBAs) and National Protected Area Expansion Strategy (NPAES). Our background study confirmed that the Soweto Highveld Grassland vegetation type on site is listed as Vulnerable. However, we could not find support that the study area is located in an area earmarked for NPAES (NPAES 2011 being the only 'approved' database available on the BGIS.SANBI website). It is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA).

Our background study indicated the presence of CBAs on site. However, our habitat sensitivity analysis rated large areas delineated as CBA as being of low sensitivity because they are degraded and under cropland/abandoned cropland and would thus not qualify as CBA. Nevertheless, solar panels should preferably not be located within the area demarcated as CBA. River or wetland Freshwater Ecosystem Priority Areas (FEPAs) were not flagged by the screening tool as reasons for the very high sensitivity.

If the same 4-tiered scale were to be applied to the Terrestrial Biodiversity Theme, as in the case of the other themes, we would downgrade it to **Medium**.

### Conservation

The Vhuvhili SEF site is not located in a protected area and does not form part of the NPAES. It is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA). The presence of CBAs (CBA optimal or CBA2) is indicated across a large section of the Vhuvhili SEF site, mostly in Habitats 4 & 5 (natural and disturbed grassland – low sensitivity rating in current survey) and on the rocky grassland habitat (Habitat 3 – medium sensitivity rating) in the southeast of the site. *It should be noted that the criteria used in delineating CBAs from the criteria used in the assessment of habitat sensitivity in this report, where the emphasis is mainly on the botanical component* (see Chapter 10).

Large portions of the site are demarked as either 'Heavily modified' or 'Moderately modified – old lands'. These MBSP categories, do not have equivalent categories in the SANBI CBA classification system and must be assumed to

be degraded to such an extent that they cannot qualify as Ecological Support Areas (ESAs) or Other Natural Areas (ONAs).

No ESAs are located within the proposed Vhuvhili SEF site although an ESA is outside the northwestern boundary of the Vhuvhili SEF site. A small ONA is located on the northeastern boundary of the Vhuvhili SEF site. The site does not fall in a Strategic Water Source Area (SWSA). There are no Local or Landscape Corridors demarcated within the Vhuvhili SEF site (MBSP 2014; biodiversityadvisor.sanbi.org) and the development will thus not impact on them.

The screening tool made no mention of river or wetland FEPAs for Vhuvhili. The entire Vhuvhili SEF site is contained in an Upstream Management Area river FEPA. However, the area mapped as river FEPA did not emerge as being highly sensitive in the current assessment and the sensitivity model that was applied, classified only the drainage lines on site as being of high sensitivity with most of the area classified as low sensitivity and a few spots of medium sensitivity. Several wetland FEPA categories are present in the Vhuvhili SEF site, with most of the seeps and channelled valley-bottom wetlands captured in the CBA delineation.

## Sensitivity

The Site Sensitivity Verification Report is given in Appendix D. A habitat sensitivity model was applied to the data for each of the seven habitats (plant communities) on site. Overall, the wetlands were classified as highly sensitive (Habitat 7), the rocky grasslands (Habitats 1 & 3) were of medium sensitivity and the remainder classified as low sensitivity. The current proposed layout for the PV trackers avoid the medium and high sensitivity habitats (Habitats 1, 3 & 7) (Figures 5 & 19). Along the watercourses, buffers are applicable to the development. A buffer zone of 32 m is usually applied to drainage lines, but the aquatic specialist's may apply wider buffer zones along these habitats.

**We recommend that the buffer specifications of the aquatic specialist are followed for all drainage lines/channelled valley bottom wetlands and seeps.**

## Environmental Impact Assessment

The direct, indirect and cumulative impacts of the proposed development on the Terrestrial Biodiversity and Species were assessed based on the knowledge gained during the site visit and literature review. Each of the impacts is briefly described in Chapters 12 & 13 in terms of the nature; proposed mitigation measures; and the significance of the impact without and with the mitigation measures applied. The methodology follows the guidelines provided by the CSIR.

The key issues are that the site falls within a "Vulnerable" national vegetation type; the wetland habitat is rated as highly sensitive; and that part of the site has been identified as CBAs. Infrastructure positioning should avoid the wetland habitats, where these have been found to be highly sensitive in the current assessment. The presence of CBAs in the landscape should be considered in the layout of the infrastructure, where possible.

### *Potential impacts identified during construction, operational and decommissioning phases*

- The clearing of natural vegetation
- The loss of threatened, protected, CITES listed and/or endemic plants/animals
- Loss of faunal habitat
- Direct faunal mortalities due to construction and increased traffic
- Increased dust deposition
- Increased human activity, noise and light levels
- Establishment of alien vegetation
- Increased water run-off and erosion
- Changes in animal behaviour



### Cumulative impacts

- Vegetation loss and habitat destruction
- Compromising integrity of CBAs, ESAs and NPAES
- Reduced ability to meet conservation obligations and targets
- Loss of landscape connectivity and disruption of broad-scale ecological processes

The impacts, mitigation measures, management objectives and actions as well as monitoring are discussed in Chapter 13 and also in the specialist inputs to the Environmental Management Programme (see Chapter 15).

### Legislative and permit requirements

The most important permit requirement is the permit that needs to be obtained for the removal of plant species protected in Mpumalanga (MTPA). Legislative requirements also relate to the combatting of alien invasive species. Other aspects are summarised in Chapter 14, e.g. NEMBA (ToPS listed species) and CITES listed species.

### Final specialist statement and authorisation recommendation

Our findings related to the Terrestrial Ecology and Species are the following:

Provided the positioning of the PV trackers (solar arrays) are amended to avoid sensitive habitats, CBAs (where possible) and Highveld Wetlands, the resulting low sensitivity rating and low impact significance for many of the habitats mean the project could go ahead, provided all mitigation measures and management actions proposed to conserve protected fauna and flora on the site, are taken into consideration. **We thus recommend authorisation of the project provided all mitigation measures are implemented.**

A brief summary of the most important considerations is provided below:

#### **Vegetation and flora:**

- **Vegetation types:** The Soweto Highveld Grassland vegetation type is listed as “Vulnerable” and consequently the layout of the solar infrastructure should give preference to the habitats on site where past disturbance has occurred e.g. disturbed areas or abandoned cropland.
- **Threatened plant species:** No IUCN threatened or red-listed plant species were encountered during the field survey.
- **Protected plant species:** One CITES listed species *Aloe ecklonis* occurs on site. No ToPS species or protected tree species were recorded on site. A number of Mpumalanga protected species were recorded on site, but none with a threatened IUCN status.
- **Habitats:** Four of the seven habitats on site had a low sensitivity rating with two habitats rated as of medium sensitivity (rocky sheets and rocky outcrops). The wetland habitat (Habitat 7) had a high sensitivity.
- **Overall sensitivity of plant species theme based on the status of the habitats (plant communities):** Rated as **low** – provided the infrastructure is positioned in habitats of low sensitivity and that CBAs are avoided where possible. However, the Soweto Highveld Grassland has a Vulnerable threat status and to minimise the impact on the vegetation a ground cover should be maintained beneath the solar arrays.

#### **Fauna (avifaunal component excluded):**

- **Threatened animal species:** The key faunal issue is the presence of three Near Threatened mammal species on site (the serval *Leptailurus serval*; Southern African hedgehog *Atelerix frontalis* and the Southern African vlei rat *Otomys auratus*), but none of these species were highlighted by the Screening Tool. The giant girdled lizard (*Smaug giganteus*), a reptile with a Vulnerable IUCN status has been listed for the region (ADU database) but was not recorded on the Vhuvhili SEF site. This species was however not highlighted by the Screening Tool and is not listed in the MTPA database for the region. Furthermore, according to Bates *et al.* (2014), the distribution of the giant girdled lizard does not include the Vhuvhili SEF site.
- The species that were highlighted by the Screening tool, viz. the spotted-necked otter (*Hydricitis maculicollis*) and the Maquassie musk shrew (*Crocidura maquassiensis*) were not encountered on site and

are not listed on the ADU database for the region. The insect species *Lepidochrysops procera* flagged by the Screening Tool, was not encountered on site and its host plant was also not recorded on site.

- **Overall sensitivity of animal theme (avifaunal component excluded):** This is rated as **medium**. If the suggested mitigation measures are followed the animal SCC should not be negatively affected.

#### **Conservation:**

- **Protected Areas:** The study area is not located in a protected area.
- **National Protected Areas Expansion Strategy (NPAES):** The development will not interfere with the protected areas expansion strategy according to the NPAES spatial data of 2010. The most recent version of NPAES, has not yet been gazetted. It is also not earmarked in the 5-year plan of the Mpumalanga PAES (data supplied by M. Lötter, MTPA).
- **Critical Biodiversity Areas (CBAs):** According to the current layout, some PV trackers are located in the CBA area.
- **Ecological Support Areas (ESAs):** These are no ESAs within the boundary of the Vhuvhili SEF site.
- **Freshwater Ecosystem Priority Area (FEPA):** Although the entire site is classified as an upstream management area, the site assessment of the vegetation and the application of a sensitivity model rated most of the river FEPA area as being of low to medium sensitivity, with only the drainage lines having a high sensitivity. The wetland FEPAs were largely incorporated into the delineation of the CBAs (see above bullet).

#### **Ecological processes, function and drivers:**

- Overall, it is unlikely that the development will contribute to the disruption of broad-scale ecological processes such as dispersal, migration or the ability of fauna to respond to fluctuations in climate or other conditions.
- The disturbance caused by the construction of the SEF will inevitably create conditions favourable for invasion by alien species.
- Fire is an important driver of vegetation dynamics in the Grassland Biome and can occur when the fuel load is high. To avoid damage to the infrastructure, fire will have to be suppressed. If the grass layer is regularly mowed/brush cut, it should prevent grasses from becoming moribund in the absence of fire.

#### **Significance of environmental impacts:**

Overall, the significance of the environmental impacts was rated as low to medium. In summary:

- Since the development footprint is relatively large, the loss of habitat within the Soweto Highveld Grassland vegetation type could be substantial. However, our impact assessment was based on the assumptions (i) that a vegetative groundlayer would be retained or where it was destroyed during construction that it will be rehabilitated and allowed to recover; and (ii) that the development footprint will be largely restricted to the heavily and moderately modified portions of the site. Regardless of the the height of the solar panels, the impact on the environment should be minimal if the ground layer is retained.
- **From an ecological point of view**, large portions of the site have been heavily modified (compare CBA map) and are not prime examples of the Soweto Highveld Grassland. If the development is thus contained within the heavily modified areas it would not affect the status of the vegetation type since these modified area were already considered in the allocation of a vulnerable status.
- Most of the habitats covered by the proposed infrastructure were rated as having a low sensitivity with a small section having a medium sensitivity. The wetland habitat (Habitat 7) was rated as highly sensitive in the current assessment but is avoided by the proposed layout of the infrastructure.
- None of the SCC highlighted by the screening tool were encountered on site, thus the impact on populations of threatened or protected species will be negligible if all mitigation measures are applied.

- Depending on the type of fencing to be erected at some of the infrastructure, the SEF will contribute minimally to obstruction of animal movement.

### Key environmental mitigation and management actions proposed

- Ensure that the placing of infrastructure takes the sensitivity mapping of the ecological assessment into account to avoid and reduce impacts on species and habitats of conservation concern.
- Demarcate all infrastructure sites clearly to avoid unnecessary clearance of the vegetation.
- Avoid or minimise impacts that could potentially affect animal behaviour.
- Trenches should not be left open for long periods of time. Trenches should be inspected regularly for the presence of trapped animals.
- Construction crew, in particular the drivers, should undergo environmental training (induction) to increase their awareness of environmental concerns.
- Proper waste management procedures should be in place to avoid waste lying around and to remove all waste material from the site.
- Speed limits should be strictly adhered to.
- Dust control measures should be implemented.
- Permits have to be obtained for the removal of Mpumalanga protected species.
- Implement a monitoring program for the early detection of alien invasive plant species.
- Employ a control program to combat declared alien invasive plant species.

### Preferred infrastructure locations:

The boundary of the focus areas 1 & 2 in the maps indicates the location of solar arrays:

PV trackers (solar arrays):

- The layout avoided all areas of medium and high sensitivity identified in the current assessment, as well as Habitat 1 in the south (Figures 5 & 18).
- Some parts of the layout fall in a CBA2 (or CBA optimal) and may need to be reconsidered (Figure 16).

Vhuvhili on-site substations: The Vhuvhili on-site substation Hub A-B (Alternative 1) falls in an area demarcated as CBA2 (Figure 16). The location of the on-site substation hub C-D is therefore a more suitable option although substation C falls in a seep according to the mapped Highveld Wetlands (Figure 17). Nevertheless, both the substation hub locations (A-B and C-D) are acceptable in terms of our habitat sensitivity findings and avoids the medium and highly sensitive wetlands habitat (Figure 19; also consult the report by the aquatic specialist).

Laydown area: The laydown site falls within the mapped Highveld Wetlands (seep) and a CBA2 (Figure 16). However, the site location is acceptable in terms of our habitat sensitivity findings (Figure 19).

# SPECIALIST DECLARATION

Please refer to Appendix B in Part B of the EIA Report

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# ACRONYMS

AIS	Alien Invasive species
BA	Basic Assessment
BAR	Basic Assessment Report
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CSIR	Council for Scientific and Industrial Research
DFFE	Department of Forestry, Fisheries and the Environment
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIAr	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FEPAs	Freshwater Ecosystem Priority Areas
IUCN	International Union for the Conservation of Nature
I&APs	Interested and Affected Parties
GIS	Geographical Information System
MBSP	Mpumalanga Biodiversity Sector Plan
MNCA	Mpumalanga Nature Conservation Act
MTPA	Mpumalanga Tourism & Parks Agency
GIS	Geographical Information System
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NPAES	National Protected Area Expansion Strategy
ONA	Other Natural Areas
PA	Protected Area
SEA	Strategic Environmental Assessment
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
ToPS	Threatened and Protected Species
ToR	Terms of Reference
SEF	Solar Energy Facility
WEF	Wind Energy Facility

# GLOSSARY

Alien invasive species	Any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health.
Alternative	A possible course of action, in place of another, that would meet the same purpose and need (of the proposal). Alternatives can refer to any of the following, but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials.
Alluvium	Unconsolidated material deposited by flowing water
Biodiversity	The variability among living organisms from all sources including, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part. It includes diversity within species, between species and of ecosystems.
Category 1a Listed Invasive Species	Species listed by notice in terms of section 70(1)(a) of the act, as a species that must be combatted or eradicated. Landowners are obliged to take immediate steps to control Category 1a species in compliance with sections 75(1), (2) and (3) of the Act. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must combat or eradicate the listed invasive species in accordance with such a programme.
Category 1b Listed Invasive Species	Species listed by notice in terms of section 70(1)(a) of the act, as species that must be controlled. If an Invasive Species Management Programme has been developed in terms of section 75(4) of the Act, a person must control the listed invasive species in accordance with such a programme.
Category 2 Listed Invasive Species	Species listed by notice in terms of section 70(1)(a) of the Act as species that require a permit to carry out a restricted activity specified in the Notice or an area specified in the permit, as the case may be. Permit-holders must ensure that specimens of the species do not spread outside the area specified in the Notice or permit.
Category 3 Listed Invasive Species	A species listed by notice in terms of section 70(1)(a) of the act, as species that are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the Act, as specified in the Notice. However, a Category 3 Listed Invasive Species that occurs in riparian areas must be considered to be a Category 1b Listed Invasive Species and must be managed according to regulation 3.
Critical Biodiversity Areas	Areas required to meet biodiversity targets for ecosystems, species or ecological processes. CBAs are regarded as areas of high biodiversity and ecological value and need to be kept in a natural or near-natural state, with no further loss of habitat or species.
Critically Endangered species	Indigenous species facing an extremely high risk of extinction in the wild in the immediate future.
Development	The building, erection, construction or establishment of a facility, structure or infrastructure, including associated earthworks or borrow pits, that is necessary for the undertaking of a listed or specified activity.
Development footprint	Any evidence of physical alteration as a result of the undertaking of any activity.
Ecological Support Areas	These are not essential for meeting biodiversity targets, but play an important role in supporting the functioning of Protected Areas or CBAs and are often vital for delivering ecosystem services. ESAs must be maintained in at least a functional and often natural state, but some limited habitat loss may be acceptable.
Endangered species	Indigenous species facing a high risk of extinction in the wild in the near future, although they are not yet Critically Endangered species.
Habitat	A place where a species or ecological community occurs naturally.
Indigenous vegetation	Vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.
Indigenous	A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
Introduced	In relation to a species, means the introduction by humans, whether deliberately or accidentally, of a species to a place outside the natural range or natural dispersal potential of that species;
Linear activity	An activity that is arranged in or extending along one or more properties and which affects the environment or any aspect of the environment along the course of the activity, and includes railways, roads, canals, channels, funiculars, pipelines, conveyor belts, cableways, power lines, fences, runways, aircraft landing strips, firebreaks and telecommunication lines.
Mitigate	The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.
"No-Go" option	The "no-go" development alternative option assumes the site remains in its current state, i.e. there is no development in the proposed project area.
Schedules 1 – 4: Specially protected game, Protected game, Ordinary game and protected wild animals	Any species of wild animal specified in Schedule 1, 2, 3 & 4 of the Act (MNCA 1998).
Schedule 5: Wild animals	Provisions of Section 33 apply (MNCA 1998): No person shall import into the province, keep, possess, sell, purchase, donate or receive as a donation or convey a Schedule 5 live wild animal without a permit.
Schedule 6: Exotic animals	Provisions of Section 34 apply (MNCA 1998): No person shall keep, possess, sell, donate or receive as a donation or convey a Schedule 6 live exotic animal without a permit.
Schedule 7: Invertebrates	Provisions of Section 35(1) apply (MNCA 1998): No person shall collect, catch, kill, keep, purchase, sell, donate or receive as a donation, convey, import or export a Schedule 7 invertebrate without a permit.
Schedule 8: Problem Animal	An animal declared to be a problem animal listed in Schedule 8 of the Act (MNCA 1998).

Schedules 11 & 12: Protected plants and specially protected plants	Any species of flora specified in Schedules 11 and 12 of the Act (MNCA 1998).
Schedule 13: Invader weeds and plants	Any species of flora specified in Schedule 13 of the Act (MNCA 1998). No person shall possess, sell, purchase, donate or receive as a donation, convey, import or cultivate a Schedule 13 declared invader weed or plant without a permit.
Vulnerable species	Indigenous species facing a high risk of extinction in the wild in the medium-term future, although they are not Critically Endangered species or an Endangered species.
Watercourse	Includes (a) a river or spring; (b) a natural channel in which water flows regularly or intermittently; (c) a wetland, pan, lake or dam into which, or from which, water flows; and a reference to a watercourse includes, where relevant, its bed and banks.
Wetland	Land that is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

# GENERAL INFORMATION

**Study site:** Vhuvhili Solar Energy Facility: Farms or farm portions of Grootvlei 293 IS, Vlakspuit 292 IS, Grootvlei 584 IS and Poverty Acres 585 IS

**Client:** ENERTRAG South Africa (Pty) Ltd

**Approximate size of property (all affected farms):** 3115 ha

**Environmental Assessment Practitioner (EAP):**

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**Terrestrial Biodiversity and Species Assessment by:**

This specialist assessment was undertaken by Dr Noel van Rooyen and Prof. Gretel van Rooyen of Ekotrust cc. The *curriculum vitae* of the specialists are included in Appendix F of this assessment.

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# TERMS OF REFERENCE

The Scope of Work for the terrestrial biodiversity and ecology specialist study includes the following tasks:

- Compilation of a specialist study in adherence to:
  - o the gazetted '*Protocol for the Specialist Assessment and Minimum Report Content Requirements of Environmental Impacts on Terrestrial Biodiversity*' (GG 43110 / GN R320, 20 March 2020). Note that this protocol replaces the requirements of Appendix 6 of the 2014 NEMA EIA Regulations, as amended;
  - o any additional relevant legislation and guidelines that may be deemed necessary.
- The assessment should be based on existing information, national and provincial databases, SANBI mapping, professional experience and field work conducted.
- Undertake a site inspection to identify the site sensitivities, and verify them in terms of the National Web-Based Screening Tool (<https://screening.environment.gov.za/>).
- Liaise with the South African National Biodiversity Institute (SANBI) to obtain information on sensitive species flagged in the National Web-Based Screening Tool (where species names are obscured / only numbered).
- Describe the terrestrial ecological features of the project area, with focus on features that are potentially impacted by the proposed project. The description should include the major habitat forms within the study site, giving due consideration to terrestrial ecology (flora and fauna), Species of Conservation Concern (SCC) or Protected Species.
- If applicable, specify development set-backs/buffers, and provide clear reasons for these recommendations.
- Map the sensitive ecological features within the proposed project area, showing any "no-go" areas (i.e. "very high" sensitivity).
- Provide input on the preferred infrastructure locations following the sensitivity analysis.
- Provide sensitive features spatial data in a useable GIS format (.kmz /.shp).
- Provide an assessment of direct, indirect and cumulative impacts associated with the proposed SEF, with and without mitigation.
- Address relevant concerns/comments raised by Interested and Affected Parties and Stakeholders, including the Competent Authority, during Public Participation Processes.
- Identify relevant legislative requirements and permits that may be required.
- Recommend mitigation measures, best practice management actions, monitoring requirements, and rehabilitation guidelines for all identified impacts to be included in the Environmental Management Programme (EMPr).
- Update the draft specialist study report after Environmental Assessment Practitioner (EAP) and client review (before public release) and after public review for submission to the Competent Authority for decision-making.
- Address any queries from the Competent Authority during the decision-making phase.

# STATEMENTS, LIMITATIONS, ASSUMPTIONS AND UNCERTAINTIES

The following assumptions, limitations or uncertainties are listed regarding the evaluation of the impacts of the proposed Vhuvhili project on the terrestrial biodiversity and ecology:

- The area has been moderately collected in the past and the list of plant species that could potentially occur on site as obtained from the NewPosa database, is thus considered to provide a fair representation of the flora on site.
- Rare and threatened plant and animal species are generally uncommon and/or localised and the once-off survey may fail to locate such species. Information on rare and threatened plant and animal species was supplemented by data provided by Mpumalanga Tourism and Parks Agency (MTPA) (M. Lötter) on localities of such species at farm level.
- Rare plant species usually occur in specialised and localised habitats, thus special attention was given to these habitats.
- The site visit was undertaken in December 2021 after the region had received good rains, thus the botanical assessment was conducted under favourable conditions.
- No aerial census, road census or trapping (either camera trapping or by way of Sherman traps) was conducted for fauna, since these methods generally provide an underrepresentation of the full faunal diversity within the limited timeframe available. Faunal lists were sourced from literature and the website of the Animal Demography Unit of the University of Cape Town.



# 1. INTRODUCTION

Vhuvhili Solar RF (Pty) Ltd proposes to develop the Vhuvhili Solar Energy Facility (SEF) (up to 300 MW) and its associated infrastructure near Secunda in the Mpumalanga province. Site access will be from the west.

The proposed Vhuvhili Solar Energy Facility (SEF) and associated infrastructure include the following components:

- Solar PV panels and tracker height of up to 6 m.
- Internal cabling between project components connected to a 22V/132 kV transformer.
- A 33/132kV on-site substation and Battery Energy Storage System (BESS) hub to facilitate grid connection covering approximately 10 ha. The on-site substation will feed electricity generated by the proposed Vhuvhili SEF into the switching station at the Mukondeleli Wind Energy Facility (WEF). The on-site substation will accommodate 1 x 132 kV incoming feeder bay, 1x 132 kV outgoing feeder bay and a motorised isolator with protection and metering.
- A 132 kV Overhead powerline to connect the on-site substation at the proposed Vhuvhili SEF to the switching station at the proposed Mukondeleli WEF is subject of a separate EIA process currently being undertaken by ENERTRAG South Africa (Pty) Ltd (hereinafter referred to as “ENERTRAG” or “the Project Proponent/Developer”).
- Construction laydown area.
- Construction area and batching plant.
- Medium voltage cabling connecting the solar infrastructure will be laid underground.
- Battery Energy Storage System (BESS) area covering approximately 2 ha. The BESS will comprise several utility scale battery modules within shipping containers or an applicable housing structure on a concrete foundation with a capacity of up to 300MW/1200MWh. Internal access roads will be up to 10 m wide, including turning circle/bypass areas of up to 20 m. The roads and cables will be positioned within a 20 m corridor.

A Scoping and Environmental Impact Assessment (S&EIA) process is required for the proposed development of the Vhuvhili SEF. As required in Part A of the Government Gazette 43110, GN 320 (20 March 2020), a site sensitivity verification as well as a full ecological survey of the site was undertaken in order to confirm the current land use and environmental sensitivity of the proposed project area.

This report presents the Specialist Terrestrial Biodiversity and Species Impact Assessment Report of the proposed Vhuvhili SEF project. The scope, purpose and objectives of the report have essentially been summarised in the ToR.

## 2. APPROACH AND METHODOLOGY

### 2.1 Approach

The study commenced as a desktop study, followed by field-based surveys in December 2021. October to March is the main rainy season when about 86% of the annual rainfall occurs.

The focus of the site visit was:

- to undertake a site sensitivity verification in order to confirm the current land use and environmental sensitivity as identified in the screening tool; and
- to conduct surveys (fauna and flora) of the Vhuvhili SEF site to identify sensitive habitats, to classify the vegetation into habitats (or plant communities), compile species lists and to search for Species of Conservation Concern (SCC). According to SANBI's (SANBI 2020) definition of SCC, these are species that have a high conservation importance in terms of preserving South Africa's high floristic and faunal diversity and include not only threatened species, but also those classified as Extinct in the Wild (EW), Regionally Extinct (RE), Near Threatened (NT), Critically Rare, Rare, Declining, Data Deficient - Insufficient Information (DDD) and Data Deficient – Taxonomic (DDT) ([www.redlist.SANBI.org](http://www.redlist.SANBI.org)).

Hard copy and digital information from spatial databases, such as BGIS of the South African Biodiversity Institute (SANBI) for maps of Critical Biodiversity Areas, Protected Areas, Nationally Protected Area Expansion Strategy (NPAES), Freshwater Ecosystem Priority Areas (FEPA); the geological survey maps (2628 East Rand); land type maps (2628 East Rand); topocadastral maps (2629CA SECUNDA and 2629CB BAANBREKER 1:50 000 maps); vegetation types of SANBI (2006 – 2018); NewPosa database of SANBI; and databases of the Animal Demography Unit, University of Cape Town, as well as literature were sourced to provide information on the environment and biodiversity of the study area.

Satellite images (Google Earth) were used to stratify the area into relatively homogeneous terrain/vegetation units. The vegetation survey consisted of visiting the mapped units and systematically recording plant species on site, and estimating their canopy cover. A total of 26 sample plots were surveyed on the Vhuvhili SEF site. However, a further 54 sample plots were surveyed on the Mukondeleli and Impumelelo sites in the nearby region and the total of 80 sample plots were used to compile a differential table (Appendix A) to identify the habitats (or plant communities) for the region. Physical habitat features were also noted. During the site visit, digital photographs were taken and representative photographs of the different habitats are included in the report. The site was also surveyed for rare, threatened and/or endemic plant species during the site visit.

The animal site survey was limited to day-time visual assessments on site. Animal species presence on site was mainly attained by means of direct or indirect sighting methods (animals, spoor, burrows, scats, sounds), whilst traversing the site by vehicle or on foot. Red-listed species are generally uncommon and/or localised and the survey may have been insufficient to record their presence at or near the proposed development. Furthermore, the owners of the participating farms were consulted regarding sightings of especially mammals species on the properties. Please note the avifauna was assessed in the avifaunal specialist assessment and is not part of the current report.

### 2.2 Vegetation and flora

The plant species data were summarised in a phytosociological table (Appendix A) and seven habitats (or plant communities) and a further four habitats were identified, described and mapped. The term species is used here in a general sense to denote species, subspecies and varieties. The checklist of plant species in Appendix B was compiled

from the NewPosa database of the South African National Biodiversity Institute ([newposa.sanbi.org](http://newposa.sanbi.org)) and supplemented by lists of rare species of the Mpumalanga Tourism & Parks Agency and own observations during the vegetation surveys. The IUCN status, conservation and protected status of all plant species provided in Appendix B were determined from available literature and Acts, e.g. NewPosa database ([newposa.sanbi.org](http://newposa.sanbi.org)), and Red list database ([redlist.sanbi.org](http://redlist.sanbi.org)) of the South African National Biodiversity Institute; NEM:BA (2007c) (ToPS list); NFA (2021), CITES (2021) and the MNCA (1998).

## 2.3 Fauna

Species lists (the term species is used here in a general sense to denote species, subspecies and varieties) of the faunal component were sourced from the Animal Demography Unit, University of Cape Town website ([www.adu.uct.ac.za](http://www.adu.uct.ac.za)) and consulting of other available databases and/or relevant literature, e.g. Leeming (2003), Skinner and Chimimba (2005), Alexander and Marais (2007), Mecenero *et al.* (2013), Bates *et al.* (2014), Child *et al.* (2016), MNCA (1998) lists and DEA (2016a) to determine the diversity, conservation status and distribution of relevant faunal species (Appendix C). These species lists were supplemented by own observations and observations from the landowners.

## 2.4 Sensitivity assessment

Based on a number of criteria, i.e. the environmental features, vegetation and the species encountered in the on-site survey, a sensitivity assessment of each habitat was done (Chapter 10). Sensitive features are presented spatially in GIS format (provided as a separate .kmz file).

## 2.5 Sources of information

### **Vegetation:**

- Vegetation types occurring in the area were obtained from Mucina & Rutherford (2006) and the revised national vegetation map produced by SANBI in 2018 (SANBI 2006-2018).
- Conservation status of the vegetation types was obtained from Mucina & Rutherford (2006) and the National List of Threatened Ecosystems (NEMA 2011, Skowno *et al.* 2019).
- Information on species endemic to a national vegetation type was obtained from Mucina & Rutherford (2006);
- The Vhuvhili SEF site does not occur in any Centre of Endemism (Van Wyk & Smith 2001).
- A plant species checklist of the immediate region around the site (2628DB, 2629CA & 2629CB grids) was obtained from the NewPosa database of the South African National Biodiversity Institute (SANBI) (Appendix B) (website accessed November 2021).
- The IUCN Red List Categories of the plant species were extracted from the Threatened Species Programme (Red List of South African plants; website accessed November 2021) as well as the NewPosa database of the South African National Biodiversity Institute (SANBI) (website accessed November 2021).
- The MNCA (1998) was consulted to establish provincially specially protected and protected status of plant species including the rare plant species at and near the Vhuvhili SEF site (data provided by M. Lötter, MTPA).
- The National Protected tree list (NFA 2021) was consulted.
- The wetland component is reported on separately (see aquatic specialist report).

### **Fauna**

- Lists of mammals, reptiles, frogs, butterflies (Lepidoptera), spiders and scorpions were extracted from the Animal Demography Unit, University of Cape Town website (<http://vmus.adu.org.za>; accessed November

2020) and supplemented by information gathered in Skinner and Chimimba (2005) for mammals; Bates *et al.* (2014) for reptiles; and Mecenero *et al.* (2013) for butterflies (Appendix C).

- The IUCN Red List Categories for the animal species were extracted from Child *et al.* (2016) for mammals; Bates *et al.* (2014) for reptiles; and Mecenero *et al.* (2013) for butterflies. No IUCN Categories are however available for spiders and scorpions.
- Data provided by M. Lötter, MTPA were consulted to establish provincially specially protected and protected status of animal species.
- The avifauna component is reported on separately (see avifaunal specialist report).

#### **Other**

- The Mpumalanga Biodiversity Sector Plan (MBSP) was consulted for maps indicating CBAs and ESAs in the region of the Vhuvhili SEF site.
- The National Protected Areas Expansion Strategy (NPAES 2010) was consulted for possible inclusion of the site into a protected area in future (biodiversityadvisor.sanbi.org; accessed October 2021).
- Data supplied by M. Lötter, MTPA for the Mpumalanga PAES were consulted.
- NFEPA database (2011) was consulted for inclusion of the site in a Freshwater Ecosystem Priority Area and MPHG Wetlands database (2014) was consulted for wetlands on site (biodiversityadvisor.sanbi.org; accessed October 2021).

#### **Regulatory framework**

- Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA 1998, when applying for Environmental Authorisation were published in the Government Gazette 43110, No 320, 20 March 2020 (NEMA 2020).

## 3. REGULATORY FRAMEWORK

### 3.1 Introduction

The White Paper on the conservation and sustainable use of South Africa's biodiversity and the NEMA specifies that due care must be taken to conserve and avoid negative impacts on biodiversity and that the sustainable, equitable and efficient use of biological resources must be promoted. Various acts provide control over natural resources in terms of their conservation, the use of biological resources and avoidance of negative impacts on biodiversity. Some international conventions are also relevant to sustainable development.

### 3.2 Natural resources

Terrestrial and other ecosystems and their associated species are widely used for commercial, semi-commercial and subsistence purposes through both formal and informal markets. While some of this use is well managed and/or sustainable, much is thought to be unsustainable. "Use" in this case refers to direct use, such as collecting, harvesting, hunting and fishing for human consumption and production, as well as more indirect use such as ecotourism and wildlife ranching.

### 3.3 Convention on Biological Diversity (CBD)

South Africa is a signatory to the United Nations Convention on Biological Diversity (CBD), which was ratified in 1995. The CBD requires signatory states to implement the objectives of the Convention, which are the conservation of biodiversity; the sustainable use of biological resources; and the fair and equitable sharing of benefits arising from the use of genetic resources. According to Article 14 (a) of the CBD, each Contracting Party, as far as possible and as appropriate, must introduce appropriate procedures, such as environmental impact assessments of its proposed projects that are likely to have significant adverse effects on biological diversity, to avoid or minimize these effects and, where appropriate, to allow for public participation in such procedures.

### 3.4 National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA)

NEMA is the framework environmental management legislation, enacted as part of the government's mandate to ensure every person's constitutional right to an environment that is not harmful to his or her health or well-being. It is administered by the Department of Forestry, Fisheries and the Environment (DFFE), but several functions have been delegated to the provincial environment departments. One of the purposes of NEMA is to provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment. The Act further aims to provide for institutions that will promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state and to provide for the administration and enforcement of other environmental management laws.

The EIA Regulations Listing Notices of 2010 were repealed in 2014 and amended regulations and listings were published in 2014 and 2017 under the National Environmental Management Act (NEMA 2014, 2017). Listing Notice 1 (GRN No. 327), Listing Notice 2 (GRN No 325) and Listing Notice 3 (GRN No 324) of the 2017 Regulations list activities that may require Environmental Authorisation prior to commencement of an activity and identify competent authorities in terms of sections 24(2) and 24D of the Act.

Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA 1998, when applying for Environmental Authorisation were published in the Government Gazette 43110, No 320, 20 March 2020 and Government Gazette 43855, No. 1150, 30 October 2020).

### 3.5 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEM:BA)

As the principal national act regulating biodiversity protection, NEM:BA, which is administered by DFFE, is concerned with the management and conservation of biological diversity, as well as the use of indigenous biological resources in a sustainable manner. The term 'biodiversity', according to the CBD, refers to the variability among living organisms from all sources including, *inter alia* terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity in genes, species and ecosystems.

#### **Threatened ecosystems**

Section 53 of NEM:BA lists the threatened status of ecosystems, i.e. Critically Endangered ecosystems, Endangered ecosystems, and Vulnerable ecosystems. The list of threatened ecosystems was published in 2011 (NEM:BA 2011). The recent 2018 National Biodiversity Assessment (Skowno *et al.* 2018) includes the updated extent and status of threatened ecosystems, although not yet formally adopted under the NEM:BA.

#### **Threatened or Protected Species (ToPS) Regulations**

Section 56 of NEM:BA makes provision for the declaration of species which are of such high conservation value, national importance or are considered threatened that they need protection, i.e. Critically Endangered species, Endangered species and Vulnerable species. Lists of species that are threatened or protected, and associated activities that are prohibited and/or exempted from restriction were published in 2007 (NEMBA 2007c). Any proposed development involving one or more threatened or protected species and/or prohibited/restricted activities will require a permit in term of these Threatened or Protected Species (ToPS) Regulations.

#### **Alien and Invasive Species (AIS) Regulations**

Chapter 5 of NEM:BA provides for the protection of biodiversity from alien and invasive species. The act defines alien species and provides lists of invasive species in regulations. The AIS lists were published in Government Gazette No. 43726 of 18 September 2020 (NEM:BA 2020a). The AIS Regulations, in terms of Section 97(1) of NEM:BA, was subsequently published in Government Gazette No. 43735 of 25 September 2020 (NEM:BA 2020b).

In terms of the aforementioned legislation, the following categories of declared alien and invasive plants are recognised in South Africa (see Glossary for explanations):

1. Category 1a Listed Invasive Species
2. Category 1b Listed Invasive Species
3. Category 2 Listed Invasive Species
4. Category 3 Listed Invasive Species



### 3.6 The National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM:PAA)

NEM:PAA provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas; and for matters in connection therewith.

### 3.7 National Forests Act (Act No. 84 of 1998) (NFA)

The NFA makes provision for the declaration of for example specially protected areas, forest nature reserves, forest wilderness areas and protected woodlands. The latest list of declared protected tree species in terms of the NFA was published in 2021 (NFA 2021). In terms of section 15(1) of this act, no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. The competent authority responsible for considering and issuing the license will be the national DFFE.

### 3.8 Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) (CARA)

The objectives of the CARA are to provide for the conservation of the natural agricultural resources by the maintenance of the production potential of the land; by combating and preventing erosion and weakening or destruction of the water resources; and by protecting natural vegetation and combating weeds and invader plants. In order to achieve the objectives, certain control measures are prescribed to which land users must comply. The activities mentioned relate to:

- the cultivation of virgin soil;
- the irrigation of land;
- the prevention or control of waterlogging or salinisation of land;
- the utilisation and protection of vleis, marshes and water courses;
- the regulation of the flow pattern of run-off water;
- the utilisation and protection of vegetation; and
- the restoration or reclamation of eroded land.

### 3.9 Convention on the International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is an international agreement to which countries adhere voluntarily. The aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The species covered by CITES are listed in three appendices reflecting the degree of protection that the species needs. Appendix I includes species that are threatened with extinction and trade in these species is permitted only in exceptional circumstances. Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. Appendix III lists species that are protected in at least one country that has asked other CITES parties for assistance in controlling the trade (Website: [www.cites.org](http://www.cites.org), accessed October 2020).

## 4. STUDY AREA

### 4.1 Location

The Vhuvhili SEF site covers an area of approximately 3115 ha and is located east of Secunda on the farms Grootvlei 293 IS, Vlakspruit 292 IS, Grootvlei 584 IS and Poverty Acres 585 IS (Figures 1 & 2). The area falls within the Gert Sibande District Municipality and the Govan Mbeki Local Municipality in the Mpumalanga province. The central part of the site is located at 26° 33' 10.3" S; 29° 15' 38.5" E.

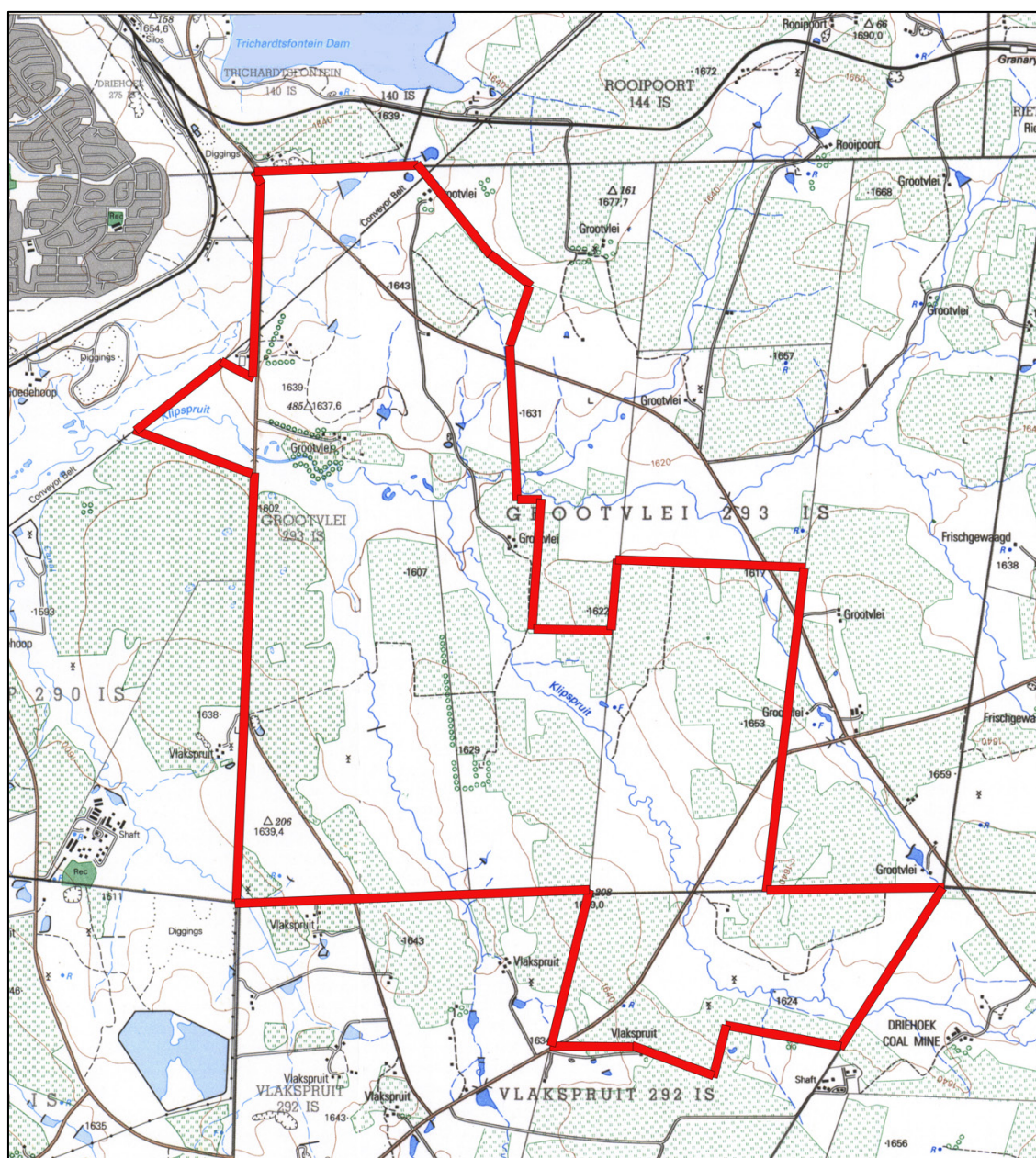


Figure 1: Topocadastral map of the Vhuvhili SEF site covering all affected farms (2629CA Secunda 1996; 2629CB Baanbreker 1996).





Figure 2: Google image of the Vhuvhili SEF site covering all affected farms.

## 4.2 Terrain morphology and drainage

The site is characterised by grassland on gently undulating plains. The altitude ranges from about 1600 m a.s.l. in the west along the Klipspruit up to approximately 1653 m a.s.l. in the east and 1660 m a.s.l. in the northeast of the site (Figure 1). The site is drained from southeast to northwest by the Klipspruit and its tributaries.

## 4.3 Climate

### 4.3.1 Regional climate (Mucina & Rutherford 2006)

The site falls in a strongly seasonal summer-rainfall, cool-temperate region, with very dry winters. The mean annual precipitation of the Soweto Highveld Grassland is 662 mm with a peak in rainfall from November to January. The annual precipitation coefficient of variation is 27%. Mean annual potential evaporation is 2060 mm, while the mean annual soil moisture stress is 75%. Mean annual temperature is 14.8°C and frost is frequent in winter with a mean of 41 days frost per annum.

### 4.3.2 Rainfall

The mean annual rainfall in the region ranges from 667 mm at the farm Zandfontein to 738 mm at the farm Driefontein, both close to Secunda (Table 1). The mean annual rainfall as measured at Secunda is 693 mm (Table 2, Figure 3). The total annual rainfall at Secunda during dry and wet years respectively may range from 558 mm to 965 mm, indicating a moderate variation in the annual rainfall. The rainy season at Secunda is predominantly from October to March when about 86% of the annual rainfall occurs. December and January are the wettest months and the driest period is from May to August, when less than 15 mm of rain per month is recorded. Maximum rainfall measured over a 24-hour period at Secunda was 82 mm, recorded in November. The highest monthly rainfall

recorded was 241 mm, also measured in November.

Table 1: Rainfall at some weather stations in the general environs of the Vhuvhili SEF site (Weather Bureau 1998)

Month	Mean Annual Rainfall (mm)				
	Secunda	Zandfontein	Driefontein	Bethal	Standerton
Jan	114	125	121	146	122
Feb	93	97	100	75	87
Mar	64	84	80	61	66
Apr	35	34	44	48	44
May	8	24	21	14	12
June	14	6	7	7	9
July	2	12	9	6	7
Aug	8	5	10	13	12
Sep	33	24	27	28	29
Oct	82	62	71	78	86
Nov	104	100	116	129	117
Dec	136	116	118	106	104
Year	693	667	738	711	695

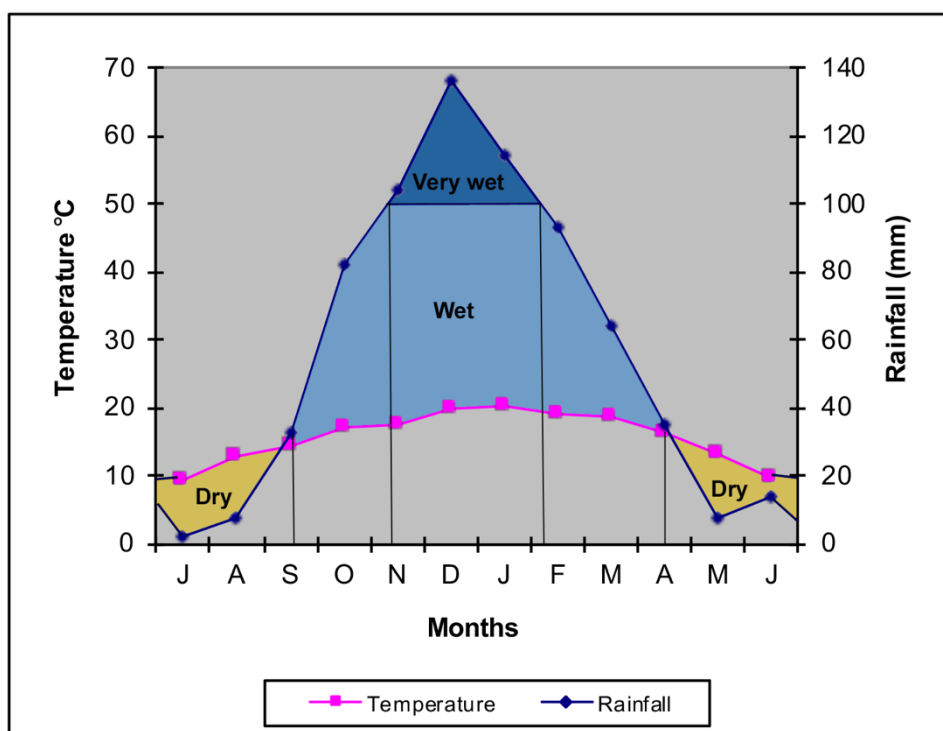


Figure 3: Climate diagram for the Secunda region. Months on x-axis are from July to June. When the rainfall curve is below the temperature curve it indicates a dry period and when the monthly rainfall is higher than 100 mm it indicates a very wet period.

Table 2: Maximum rainfall (mm) in 24 hours, highest maximum and lowest monthly minimum rainfall at Secunda: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

Month	Rainfall (mm)			
	Mean per month	24 h max	Max per month	Min per month
Jan	114	66	168	50
Feb	93	69	142	41
Mar	64	55	121	31
Apr	35	56	119	2
May	8	12	18	0
June	14	41	75	0
July	2	6	13	0
Aug	8	24	24	0
Sep	33	26	107	0
Oct	82	59	146	0
Nov	104	82	241	0
Dec	136	76	200	89
Year	693	82	965	558

### 4.3.3 Temperature

The mean annual temperature for Secunda is 15.8°C (Table 3) with the extreme maximum and minimum temperatures 33.0°C and -4.3°C respectively. The mean daily maximum for January is 27.2°C and for July it is 18.1°C, whereas the mean daily minimum for January is 13.5°C and for July it is 0.9°C. Frost may occur anytime from April to October.

Table 3: Temperature data (°C) for the Secunda region: 26° 30' S; 29° 11' E; 1628 m (Weather Bureau 1998)

	Temperature (°C)												Year
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	
Max	27.2	25.9	25.2	23.0	20.8	17.3	18.1	21.5	22.3	24.3	23.8	26.0	27.2
*Ext. Max	33.0	32.5	30.0	30.6	25.5	25.3	25.3	27.0	31.0	32.0	31.0	31.5	33.0
Min	13.5	12.9	12.0	9.8	5.9	2.3	0.9	4.1	6.9	10.0	11.1	13.6	0.9
*Ext. Min	10.1	10.5	7.1	4.2	2.0	-2.6	-4.3	-1.5	1.1	4.3	6.3	8.8	-4.3
Mean	20.4	19.3	18.6	16.3	13.4	9.8	9.5	12.8	14.6	17.1	17.5	19.9	15.8

Max = mean daily maximum temperature for the month

\*Ext. Max = extreme maximum temperature recorded per month

Min = mean daily minimum temperature for the month

\*Ext. Min = extreme minimum temperature recorded per month

Mean = mean monthly temperature for each month and for the year

### 4.3.4 Cloudiness and relative air humidity

At Bethal weather station, located about 25 km east of Secunda, the cloud cover at 14:00 is the highest from November to January (5.1 – 5.3 eights) and the lowest in June, July and August (1.5 – 1.9 eights) (Table 4). The highest mean relative air humidity (%) at 08:00 occurs during the late summer and autumn months (February to April; 83 – 84%) and the lowest relative air humidity at 14:00 (31%) occurs in early spring (August) (Weather Bureau 1998).

Table 4: Cloud cover at 14:00 and percentage relative air humidity at 08:00 and 14:00 at Bethal: 26° 27' S; 29° 29' E; 1663 m (Weather Bureau 1998)

	Cloud (0-8)	Relative air humidity %	
	14:00	08:00	14:00
Jan	5.2	80	51
Feb	4.9	83	48
Mar	4.9	83	44
Apr	4.1	84	41
May	2.4	80	34
June	1.6	81	34
July	1.5	79	33
Aug	1.9	75	31
Sept	3.1	74	33
Oct	4.6	75	41
Nov	5.3	77	49
Dec	5.1	77	48
Year	3.7	80	41

## 4.4 Geology

The geology of the site is depicted in the 1:250 000 geological map 2626 East Rand (1986) (Figure 4). Most of the site is underlain by sandstone, shale and coal beds (Pv) of the Vryheid Formation, Ecga Group. The northern and southern parts are partly covered by dolerite (Jd) with alluvium occurring along the drainage lines.

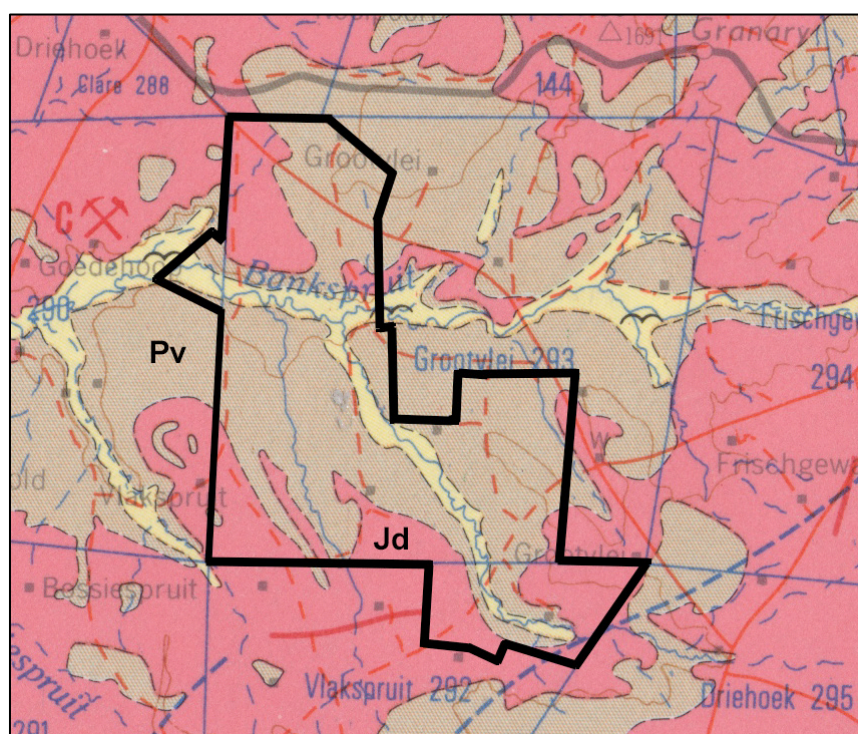


Figure 4. Geology of the Vhuvhili SEF site covering all affected farms (2628 East Rand Geological Survey 1986).

Legend:

- Jd = Dolerite
- Pv = Sandstone, shale and coal beds (Vryheid Formation, Ecga Group)
- Yellow = Alluvium



## 4.5 Land types

Land types denote areas that display a marked degree of uniformity with respect to terrain form, soil pattern and climate. A terrain unit within a land type is any part of the land surface with homogeneous form and slope. The site is covered by the Ea 17e Land Type (2628 East Rand Land Type Series 1979). The Ea Land Type occurs on undifferentiated soils and consists of one or more of vertic, melanic, red structured diagnostic horizons.

## 5. VEGETATION

### 5.1 Introduction

The site falls in the Grassland Biome and more specifically in the Mesic Highveld Grassland Bioregion. The site does not fall within any Centre of Endemism according to Van Wyk and Smith (2001).

### 5.2 Broad-scale vegetation types

#### *Soweto Highveld Grassland (Gm 8)*

The Vhuvhili SEF site is located within the Soweto Highveld Grassland (Gm8) vegetation type (SANBI 2006-2018). This vegetation type covers 14 513 km<sup>2</sup> of Mpumalanga and Gauteng (and to a very small extent also in the neighbouring Free State and North-West provinces) and occurs at an altitude ranging from 1420 m to 1760 m above sea level (Mucina & Rutherford 2006).

The landscape is gently to moderately undulating on the Highveld plateau, supporting dense tufted grassland dominated by *Themeda triandra*. Other common grass species include *Elionurus muticus*, *Eragrostis racemosa*, *Heteropogon contortus* and *Tristachya leucothrix*. In undisturbed places, scattered wetlands, narrow stream alluvia, pans and occasional ridges interrupt the grassland cover. Frost and frequent grass fires during winter play an important role in limiting the occurrence of trees and shrubs in the region.

The most prominent grass species include *Andropogon appendiculatus*, *Brachiaria serrata*, *Cymbopogon pospischilii*, *Cynodon dactylon*, *Elionurus muticus*, *Eragrostis capensis*, *Eragrostis chloromelas*, *Eragrostis curvula*, *Eragrostis plana*, *Heteropogon contortus*, *Setaria sphacelata*, *Themeda triandra* and *Tristachya leucothrix*. The forb layer is characterised by *Hermannia depressa*, *Acalypha angustata*, *Berkheya setifera*, *Dicoma anomala*, *Haplocarpha scaposa*, *Helichrysum nudifolium*, *Helichrysum rugulosum*, *Justicia anagalloides*, *Selago densiflora*, *Senecio coronatus*, *Hilliardiella elaeagnoides* and *Wahlenbergia undulata*.

Although the conservation status of this vegetation type was listed as “Endangered” by Mucina & Rutherford (2006) it is listed as “Vulnerable” by NEMA (2011) and the National Biodiversity Assessment (Skowno *et al.* 2018). Very few statutorily conserved areas occur in this vegetation type and almost half of it has been transformed, mostly by cultivation, plantations, mining and urbanisation.

### 5.3 Description of habitats (plant communities)

During the field survey, 26 sampling sites were surveyed at the proposed Vhuvhili SEF site. However, a further 54 sample plots were surveyed on two sites in the nearby region and the total of 80 sample plots were used to improve the identification and description of habitat types in the area. Based on species composition, seven habitats (plant communities) were distinguished, described and mapped on the Vhuvhili SEF site (Figure 5). A further four units were also distinguished, i.e. croplands, infrastructure, disturbed areas and dams.

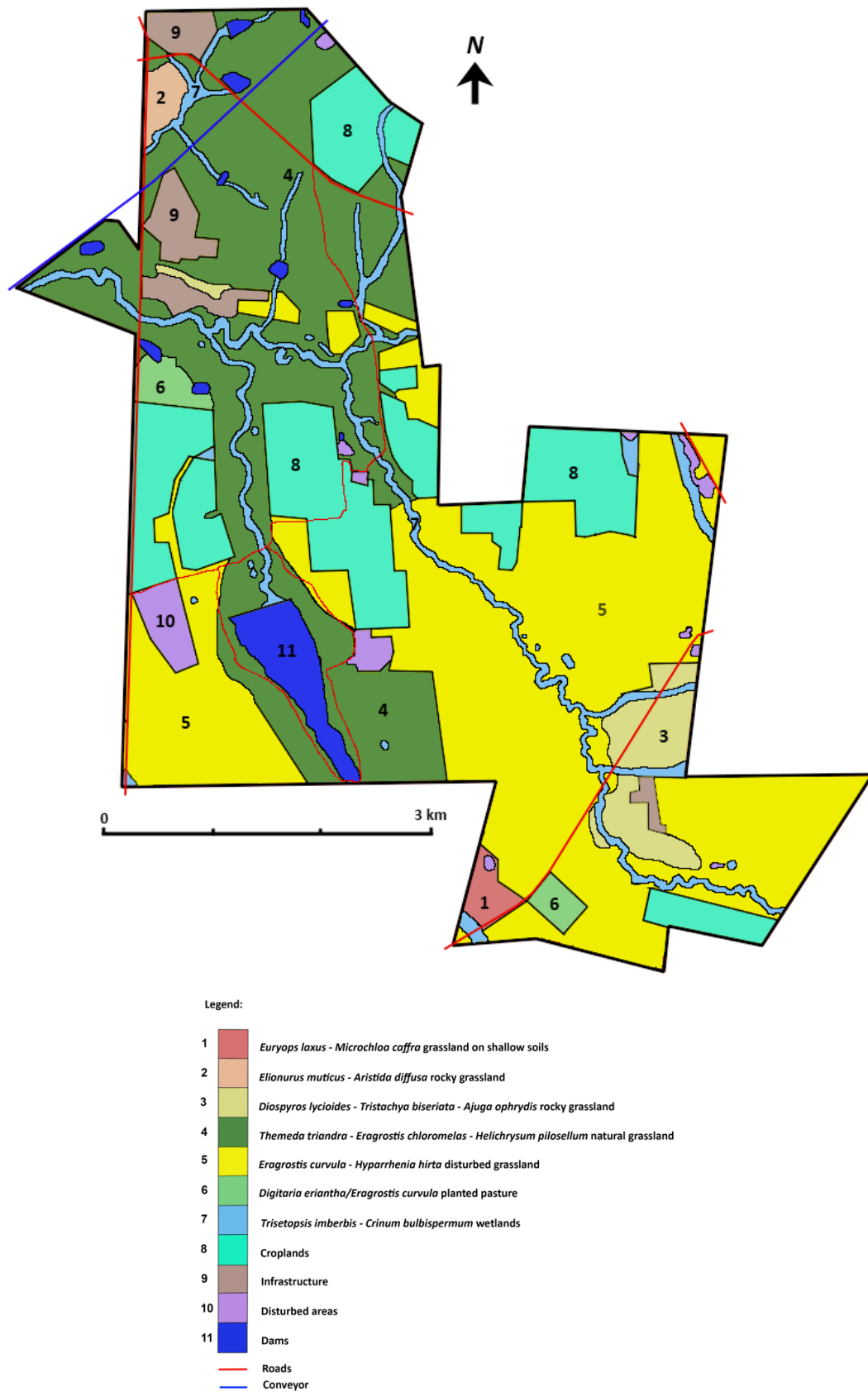


Figure 5. Vegetation map of the Vhuvhili SEF site covering all affected farms.

## List of habitats (plant communities) and other units:

1. *Euryops laxus* - *Microchloa caffra* grassland on shallow soils
  2. *Elionurus muticus* - *Aristida diffusa* rocky grassland
  3. *Diospyros lycioides* - *Tristachya biseriata* - *Ajuga ophrydis* rocky grassland
  4. *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland
  5. *Eragrostis curvula* - *Hyparrhenia hirta* disturbed grassland
  6. *Digitaria eriantha*/*Eragrostis curvula* planted pasture
  7. *Trisetopsis imberbis* - *Crinum bulbispermum* wetlands
    - 7a. *Trisetopsis imberbis* - *Leersia hexandra* wetlands
    - 7b. *Andropogon appendiculatus* - *Cyperus longus* wetlands
    - 7c. *Typha capensis* - *Phragmites australis* wetlands
  8. Cropland
  9. Infrastructure
  10. Disturbed areas
  11. Dams
- 
1. *Euryops laxus* - *Microchloa caffra* grassland on shallow soils

This rocky grassland occurs in a small area on the plains in the southern parts of the Vhuvhili SEF site (Figures 5 & 6). It occurs on shallow soils on rocky sheets. Surface rocks and gravel cover less than 10% of the area. The shallow, dark-brown, clayey soils are derived from dolerite. This habitat forms patches within the surrounding grassland and becomes waterlogged during the rainy season.



Figure 6: Community 1: *Euryops laxus* - *Microchloa caffra* grassland on shallow soils on the southern plains of the Vhuvhili site.

The diagnostic species of this habitat (community) include *Euryops laxus*, *Microchloa caffra*, *Dipcadi ciliare*, *Panicum repens*, *Jamesbrittenia stricta*, *Colchicum striatum*, *Huernia hystrix* and *Oropetium capense* (species group 1, Appendix A).

- The grass layer is well-developed and covers approximately 78% of the area. The dominant grass species include *Eragrostis plana*, *Eragrostis chloromelas*, *Themeda triandra* and *Eragrostis curvula*. Other common

grass species include *Microchloa caffra*, *Panicum repens*, *Tragus berteronianus*, *Oropetium capense*, *Aristida diffusa* and *Setaria incrassata*.

- Herbaceous species have a mean canopy cover of approximately 15%. The most common species include *Euryops laxus*, *Jamesbrittenia stricta*, *Hermannia* cf. *coccocarpa*, *Tulbaghia acutiloba*, *Geigeria burkei*, *Monsonia angustifolia*, *Hibiscus trionum* and the sedges *Cyperus rupestris*, *Cyperus semitrifidus* and *Cyperus capensis*.
- The prominent succulent species include *Euphorbia clavarioides*, *Huernia hystrix* and *Crassula* cf. *setulosa*.
- The most prominent geophytes include *Dipcadi ciliare*, *Colchicum striatum*, *Gladiolus robertsoniae* and *Ledebouria* cf. *minima*.
- The following alien invasive plant species was recorded in this community: *Solanum elaeagnifolium*.

Threatened (red listed) and/or protected species recorded in plant community 1:

IUCN list:	<i>Gladiolus robertsoniae</i> *
NEM:BA (ToPS):	None
NFA:	None
MNCA:	<i>Gladiolus robertsoniae</i> *, <i>Crinum bulbispermum</i> *, <i>Huernia hystrix</i> *
CITES:	<i>Euphorbia clavarioides</i> *
Endemic species:	None

\*In community 1, but not recorded on Vhuvhili

## 2. *Elionurus muticus* - *Aristida diffusa* rocky grassland

This rocky grassland covers a small area in the northwest of the Vhuvhili SEF site (Figures 5 & 7). Surface rocks and gravel cover <10% of the area. The shallow to intermediate deep, dark-brown, clayey soils are derived from dolerite.



Figure 7: Community 2: *Elionurus muticus* - *Aristida diffusa* rocky grassland in the northwest of the Vhuvhili SEF site.

The diagnostic species of this habitat (community) include *Melinis repens* and *Kohautia amatymbica* (species group 2, Appendix A).

- Shrubs cover on average 1% of the area and the most prominent species are *Diospyros lycioides* and *Searsia rigida*.
- Dwarf shrubs cover less than 1% of the habitat and include *Erythrina zeyheri* and *Felicia muricata*.



- The grass layer is well-developed and covers approximately 93% of the area. The dominant grass species include *Elionurus muticus*, *Eragrostis chloromelas*, *Themeda triandra* and *Aristida diffusa*. Other grass species include *Eragrostis racemosa*, *Eragrostis capensis*, *Eragrostis curvula*, *Brachiaria serrata*, *Melinis repens* and *Cymbopogon pospischilii*.
- Herbaceous species have a mean canopy cover of approximately 6%. The most common species include *Dianthus mooiensis*, *Hermannia depressa*, *Hilliardiella elaeagnoides*, *Berkheya radula*, *Berkheya setifera*, *Helichrysum rugulosum*, *Haplocarpha scaposa* and *Conyza podocephala*.
- Prominent succulent species include *Euphorbia clavarioides* and *Aloe transvaalensis*.
- The most common geophytes include *Hypoxis rigidula*, *Boophone disticha* and *Dipcadi viride*.
- The following alien invasive plant species was recorded in this community: *Solanum elaeagnifolium*.

Threatened (red listed) and/or protected species recorded in plant community 2:

IUCN list:	None
NEM:BA (ToPS):	None
NFA:	None
MNCA:	<i>Aloe transvaalensis</i> *, <i>Boophone disticha</i>
CITES:	<i>Euphorbia clavarioides</i> *, <i>Aloe transvaalensis</i> *
Endemic species:	None

\*In community 2, but not recorded on Vhuvhili

### 3. *Diospyros lycioides* - *Tristachya biseriata* - *Ajuga ophrydis* rocky grassland

This rocky grassland occurs on the plains and gentle footslopes in the southeastern parts of the Vhuvhili SEF site (Figures 5 & 8). Surface rocks and gravel cover less than 10% of the area. The shallow to intermediate deep, dark-brown, clayey soils are derived from dolerite or sandstone and shale.



Figure 8: Community 3: *Diospyros lycioides* - *Tristachya biseriata* - *Ajuga ophrydis* rocky grassland on the plains and gentle footslopes in the southeastern parts of the Vhuvhili SEF site.

The diagnostic species of this habitat (community) include *Diospyros lycioides*, *Ajuga ophrydis*, *Tephrosia capensis*, *Acalypha angustata*, *Tristachya biseriata* and *Erythrina zeyheri* (species group 4, Appendix A).

- Shrubs cover on average 3% of the area and the most prominent species are *Diospyros lycioides*, *Searsia magalismontana* and *Searsia rigida*.



- Dwarf shrubs cover 2% of the habitat and include *Artemisia afra*, *Erythrina zeyheri*, *Ziziphus zeyheriana*, *Asparagus cooperi* and *Athrixia elata*.
- The grass layer is well-developed and covers approximately 81% of the area. The dominant grass species include *Eragrostis chloromelas*, *Themeda triandra*, *Setaria incrassata*, *Setaria nigrirostris*, *Brachiaria serrata* and *Setaria sphacelata*. Other grass species include *Tristachya biseriata*, *Hyparrhenia hirta*, *Eragrostis curvula* and *Cynodon dactylon*.
- Herbaceous species have a mean canopy cover of approximately 11%. The most common species include *Ajuga ophrydis*, *Tephrosia capensis*, *Acalypha angustata*, *Senecio othonniflorus*, *Dianthus mooiensis*, *Scabiosa columbaria*, *Helichrysum rugulosum*, *Berkheya setifera*, *Berkheya radula*, *Haplocarpha scaposa*, *Ipomoea crassipes*, *Commelina africana*, *Cyanotis speciosa*, *Asclepias stellifera* and *Hermannia erodioides*.
- The only succulent species recorded was *Aloe ecklonis*.
- The most common geophytes include *Eucomis autumnalis*, *Ledebouria graminifolia*, *Ledebouria cooperi*, *Gladiolus crassifolius*, *Pelargonium alchemilloides* and *Hypoxis rigidula*.
- The following alien invasive species were recorded: *Opuntia ficus-indica* and *Solanum elaeagnifolium*.

Threatened (red listed) and/or protected species recorded in plant community 3:

IUCN list:	None
NEM:BA (ToPS):	None
NFA:	None
MNCA:	<i>Aloe ecklonis</i> , <i>Eucomis autumnalis</i> , <i>Gladiolus crassifolius</i> , <i>Gladiolus dalenii</i> *
Mpumalanga Rare species list:	<i>Hypoxis hemerocallidea</i>
CITES:	<i>Aloe ecklonis</i>
Endemic species:	None

\*In community 3, but not recorded on the Vhuvhili SEF site

#### 4. *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland

This natural grassland occurs on the plains and gentle footslopes and covers most of the central and northern parts of the Vhuvhili SEF site (Figures 5 & 9). Surface rocks and gravel are absent and the deep, dark-brown, clayey soils are derived predominantly from sandstone and shale.



Figure 9: Community 4: *Themeda triandra* - *Eragrostis chloromelas* - *Helichrysum pilosellum* natural grassland in the central section of the Vhuvhili SEF site.

There is no diagnostic species group that differentiates this community. However, the presence of species groups 6, 7 & 8 and the absence of species groups 1 – 5 differentiates this community (Appendix A).

- The grass layer is well-developed and covers approximately 88% of the area. The dominant grass species include *Themeda triandra*, *Eragrostis chloromelas*, *Setaria incrassata*, *Elionurus muticus* and *Brachiaria serrata*. Other common grass species include *Eragrostis curvula*, *Eragrostis planiculmis*, *Hyparrhenia hirta*, *Setaria nigrirostris*, *Eragrostis plana*, *Lolium perenne* and *Cynodon dactylon*.
- Herbaceous species have a mean canopy cover of approximately 8%. The most common species include *Helichrysum pilosellum*, *Gazania krebsiana*, *Scabiosa columbaria*, *Indigofera hedyantha*, *Berkheya radula*, *Berkheya setifera*, *Helichrysum rugulosum*, *Ipomoea crassipes*, *Asclepias stellifera*, *Jamesbrittenia aurantiaca*, *Oenothera rosea*, *Oenothera tetraptera*, *Senecio inaequidens*, *Conyza podocephala*, *Senecio erubescens*, *Hermannia erodioides*, *Pseudognaphalium luteo-album* and *Convolvulus sagittatus*.
- The succulent species recorded in this habitat were *Aloe transvaalensis* and *Euphorbia clavarioides*.
- The most common geophytes include *Hypoxis rigidula*, *Hypoxis acuminata*, *Hypoxis hemerocallidea*, *Pelargonium minimum* and *Ledebouria cf. revoluta*.
- Sedges include *Bulbostylis humilis*, *Cyperus esculentus*, *Kyllinga erecta* and *Abildgaardia ovata*.
- The following alien invasive plant species were recorded in this community: *Cirsium vulgare*, *Verbena bonariensis*, *Verbena brasiliensis*, *Solanum elaeagnifolium*, *Cuscuta campestris* and *Datura ferox*.

Threatened (red listed) and/or protected species recorded in plant community 4:

IUCN list:	None
NEM:BA (ToPS):	None
NFA:	None
MNCA:	<i>Aloe ecklonis</i> *, <i>Aloe transvaalensis</i> *, <i>Gladiolus crassifolius</i> *, <i>Gladiolus dalenii</i> *
Mpumalanga Rare species list:	<i>Hypoxis hemerocallidea</i> *
CITES:	<i>Euphorbia clavarioides</i> *, <i>Aloe transvaalensis</i> *, <i>Aloe ecklonis</i> *
Endemic species:	None

\*In community 4, but not recorded on the Vhuvhili SEF site

#### 5. *Eragrostis curvula* - *Hyparrhenia hirta* disturbed grassland

This mixture of degraded natural grassland and old abandoned croplands cover most of the southern half of the Vhuvhili SEF site. It is found on the plains, footslopes and midslopes of the undulating countryside (Figures 5 & 10). Surface rocks and gravel are absent and the deep, dark-brown, clayey soils are derived predominantly from sandstone and shale.

There is no diagnostic species group that differentiates this community. However, the presence of species groups 9, 10 & 11 and the absence of species groups 1 – 8 differentiates this community (Appendix A).

- Dwarf shrubs cover less than 1% of the habitat and include *Seriphium plumosum*.
- The grass layer is well-developed and covers approximately 83% of the area. The dominant grass species include *Eragrostis curvula*, *Hyparrhenia hirta*, *Themeda triandra*, *Setaria incrassata*, *Eragrostis plana*, *Eragrostis chloromelas* and *Paspalum dilatatum*. Other common grass species include *Setaria nigrirostris*, *Setaria sphacelata*, *Cynodon dactylon*, *Hyparrhenia tamba*, *Elionurus muticus*, *Brachiaria serrata*, *Aristida bipartita* and *Eragrostis planiculmis*.
- Herbaceous species have a mean canopy cover of approximately 14%. The most common species include *Senecio erubescens*, *Oenothera tetraptera*, *Hermannia erodioides*, *Solanum elaeagnifolium*, *Pseudognaphalium luteo-album*, *Schkuhria pinnata*, *Ranunculus multifidus*, *Senecio inaequidens*, *Oenothera rosea*, *Asclepias stellifera*, *Asclepias cf. gibba*, *Berkheya setifera*, *Berkheya radula*, *Helichrysum rugulosum*, *Helichrysum aureo-nitens*, *Leobordea divaricata* and *Scabiosa columbaria*.