ELANDSFONTEIN PV CLUSTER

SITE SELECTION MATRIX

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1. Introduction

The proposed Elandsfontein PV Cluster consists of 2 x 100 MW solar PV facilities, located approximately 5 km north-west of the town of Lichtenburg in the North West Province. The development area falls within the jurisdiction of the Ditsobotla Local Municipality within the Ngaka Modiri Molema District Municipality.

The property earmarked for the proposed projects (Portion 7 of Farm Elandsfontein 34) covers a combined area of approximately 1 928 ha.

Figure 1: Elandsfontein PV Cluster Locality Map

2. Property Selection

The identification of the above mentioned property for the development of the Elandsfontein PV cluster was based on the following location characteristics.

2.1. Proximity to towns with a need for socio-economic upliftment

The proposed cluster is situated approximately 5 km north-west of the town of Lichtenburg in the North West Province within the jurisdiction of the Ditsobotla Local Municipality (DLM).

The DLM Integrated Development Plan IDP identifies a number of key challenges facing the Municipality, including poverty, high levels of unemployment and skills shortages.

Due to the close proximity to Lichtenburg town, local labour and service providers would be easy to source, which fits in well with the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) economic development criteria for socio-economic upliftment.

In this regard the development has the potential to support private sector investment and create employment and skills development opportunities.

2.2. Solar Irradiation

The economic viability of a solar PV facility is directly dependent on the annual solar irradiation at the site. From a regional site selection perspective, this region is considered to be preferred for solar energy development by virtue of its annual solar irradiation values. The GHI for the area derived from the World Bank Group's Global Solar Atlas is approximately 2 143 kWh/m^2/annum.

The irradiation level is an important factor in a highly competitive bidding environment under REIPPPP; the economic viability of a project is a critical success factor.

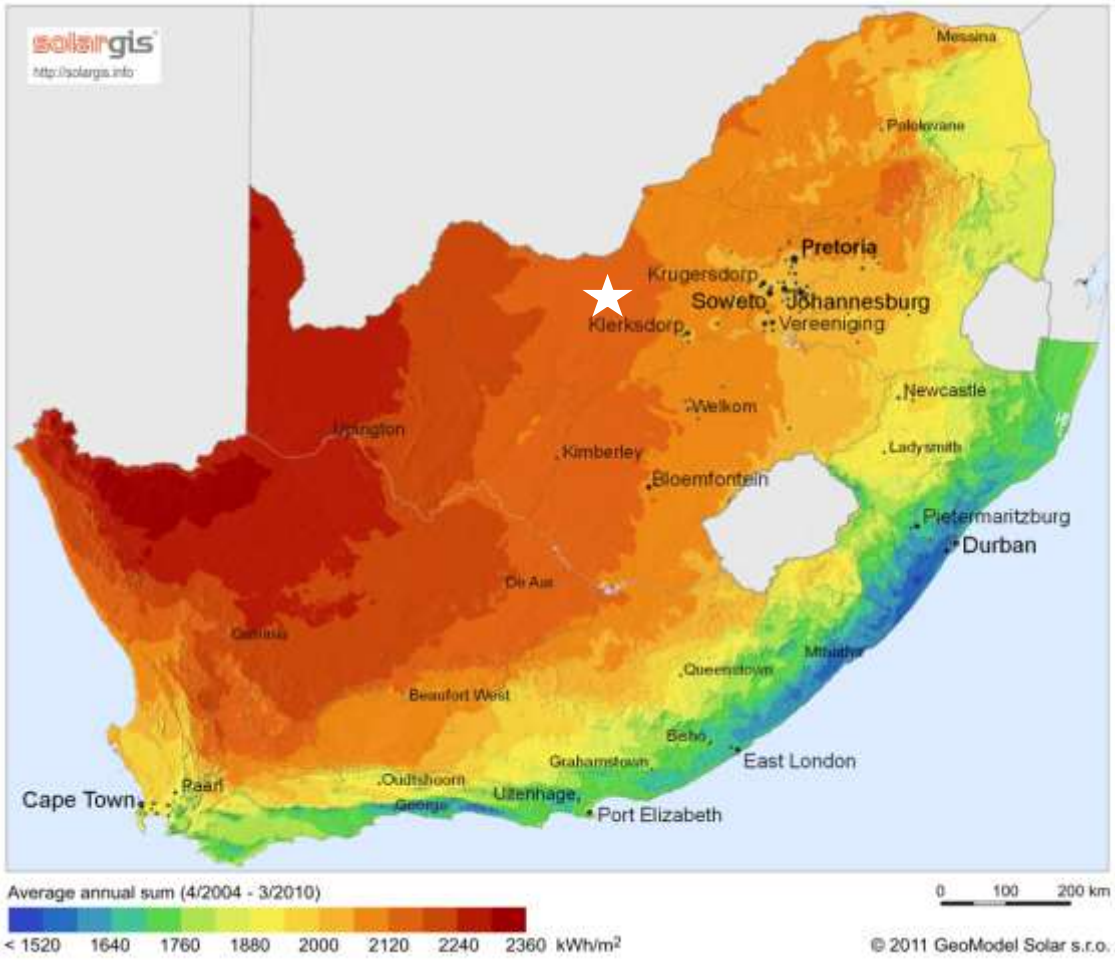

Figure 2: Global Horizontal Irradiation of Elandsfontein PV Cluster (© 2019 The World Bank, Source: Global Solar Atlas 2.0, solar resource data: Solargis)

2.3. Access to grid

Strategic Grid Location

Ease of access into the Eskom electricity grid is vital to the viability of a solar PV facility. Projects which are in close proximity to a connection point and/or demand centre are favourable, and reduce the losses associated with power transmission. In addition, Eskom's '2040 Transmission Network Study' has drawn on various scenarios to determine the grid's development requirements, as well as to identify critical power corridors for future strategic development.

The national power corridors consisting of five transmission power corridors of 100 km in width have been gazetted by the Department of Environmental Affairs (DEA) following the outcome of the strategic environmental assessment (SEA) which aimed to identify environmentally acceptable routes over which long-term environmental impact assessment (EIA) approvals can be secured. The Elandsfontein cluster falls into the Northern corridor (refer to Figure 3).

Figure 3: Eskom "Critical Power" Corridors. The Elandsfontein Cluster is located within the North corridor as shown by the white arrow

Elandsfontein Grid Connection

The Elandsfontein PV Cluster intends to connect to the National Grid via the Watershed Main Transmission Substation (MTS) (approximately 5.5 km east of the facility), as illustrated in purple in Figure 4 below.

Figure 4: Elandsfontein Grid Corridor to Watershed MTS (approximately 5.5 km)

The grid connection corridor is located within a Strategic Transmission Corridor ("the Northern Corridor"), earmarked for the development of grid connection infrastructure. Although the grid connection infrastructure associated with this grid solution is being assessed as part of a separate Environmental Application, the infrastructure components are included below for reference:

- A new Collector Substation/Switching Station of up to 1.25 ha in extent, including:
  - Construction of a new platform with earth mat and civil works;
  - New feeder bay/s and busbar/s (up to 132 kV) complete with protection equipment.
- A double-circuit overhead powerline of up to 132 kV between the Elandsfontein Collector Substation/Switching Station and the existing Watershed MTS, complete with structures, foundations, conductor, fibre layout, insulation, and assemblies;
- Works within the Watershed MTS high voltage (HV) yard:
  - Establish new feeder bay/s (up to 132 kV), inclusive of line bays, busbars, bussection and protection equipment.
  - Provision to install a new transformer (up to 275/132 kV), if required.

Watershed Grid Connection

The Watershed MTS forms part of the North West supply area, and more specifically, the Carletonville local area.

With the exception of Mookodi and Pluto, the North West supply area has transformation capacity at all the substations, and furthermore, has available transfer capacity at all the substations.

Watershed MTS statistics

- Supply Area: North West
- Local Area: Carletonville
- Transformer Voltage: 275/132 kV and 275/88 kV
- Transformers installed: 1 x 250 MVA 275/132 kV and 2 x 315 MVA 275/88 kV
- Upgrade status: Per the latest Eskom Transmission Development Plan (TDP) 2021 – 2030, a new 250 MVA 275/132 kV transformer is currently being installed at Watershed MTS, with expected year of commissioning being 2021.
- REIPPPP Generation allocation to date: 75 MW
- Load at Watershed MTS: 98 MW
- Transformer Limit: 860 MW (without additional transformer)
- Substation Limit: 1,040 MW
- Local Area Limit: 2,580 MW
- Supply Area Limit: 4051 MW

Figure 5: Connection to the existing Watershed MTS (Google Earth image)

2.4. Current Land Use

The study area is primarily used for cattle grazing with some camps having been cultivated in the past. These disused agricultural fields have been completely cleared of all surface rocks.

A series of existing powerlines traverse the project area and are accessible through the various small gravel roads that are found throughout the study area. Most of these farm roads are overgrown.

2.5. Proximity to access road for transportation of material and components

The development area can be accessed via the R503 existing regional road. As material and components would need to be transported to the project site during the construction phase of the project, the accessibility of the site was a key factor in determining the viability of the project, particularly taking transportation costs (direct and indirect) into consideration and the impact of this on project economics and therefore the ability to submit a competitive bid under the Department of Energy's (DoE) REIPPPP.

2.6. Landowner support

The selection of a site where the landowner is supportive of the development of renewable energy is essential for ensuring the success of the project. The support from the landowner for the development to be undertaken on the affected property has been solidified by the provision of the consent for the project to proceed on the property through the signing of a land lease agreement with the developer.

3. Need and desirability of the Development at the preferred site location

Taking the above into consideration, in conjunction with other large-scale solar PV projects that have been authorised within the vicinity of the project site, the development of the Elandsfontein PV cluster is considered to be desirable and will ultimately contribute to, and further develop the successful power generation activities already being undertaken within the area.