TerraAfrica

SOIL. AGRICULTURE. ENVIRONMENT.

Comparative Assessment of Soil and Agricultural Potential Impacts of the Zen WEF layouts

Submitted by TerraAfrica Consult cc
Mariné Pienaar
(MSc. Environmental Science)
(SACNASP Agricultural Scientist)

November 2019

Declaration of the Specialist

Details of practitioner

Report author: M Pienaar
Contact number: 082 828 3587
Email address: mpienaar@terraafrica.co.za
Physical address: Farm Strydpoort, Ottosdal, 2610

Declaration of Independence

I, Mariné Pienaar, hereby declare that TerraAfrica Consult, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

I further declare that I was responsible for collecting data and compiling this report. All assumptions, assessments and recommendations are made in good faith and are considered to be correct to the best of my knowledge and the information available at this stage.

TerraAfrica Consult cc represented by M Pienaar
November 2019

Table of Contents

List of Figures

1. Introduction

Savannah Environmental (Pty) Ltd appointed Terra Africa Consult to assess the new layout of the Zen Wind Farm project and to determine how the layout and specification changes will alter affect the impact the soil, land use, land capability and agricultural potential of the receiving environment. The initial Zen Wind Farm was granted Environmental Authorisation (EA) on 03 November 2016 by the Department of Environmental Affairs (DEA) (DEA ref: 14/12/16/3/3/2/322). Since the EA was granted, there have been improvement in wind turbine technology and the new technology is now considered to ensure the project is technically and economically viable.

This report will provide background information on the previous Soil, Land Capability and Agricultural Potential Assessment conducted for the initial Zen Wind Farm layout (that was authorised), evaluate the layout changes and provide a comparative assessment of the impacts of the new layout as opposed to that of the initial layout.

2. Project locality

The Zen Wind Energy Facility (Zen WEF) is located in the Western Cape Province, approximately 7km south of Saron and 10km north west of Gouda in the Drakenstein Local Municipality within the greater Cape Winelands District Municipality. The area assessed (approximately 3 542 ha) previously included the following farm portions:

- Portion 1 of the farm Bonne Esperance 83,
- Portion 2 of the farm Bonne Esperance 83,
- Portion 9 of the farm 88,
- Remainder of Portion 4 of the farm Kleinbergrivier 1,
- Remainder of the farm Moolenaars Drift 85, and
- Remainder of Portion 1 of the farm Moolenaars Drift 85.

3. Proposed amendments

Following the advancements on wind turbine technology, the application for the amendment to the existing EA will include the following changes:

- Reduction in the number of turbines from 46 to 27;
- Increase rated power of turbines from 3 MW to up to 6 MW per WTG
- Increase rotor diameter from 122 m to up to 165 m;
- Increase hub height from 110 m to up to 140 m;
- Increase in the overall capacity of the wind energy facility from 140 MW to up to 147 MW;

- Potential increase to dimensions of the crane pad and laydown area (storage area per turbine);
- Increase in the concrete foundation from 20m x 20m x 4m to 25m x 25m x 6m;
- Update of the layout; and
- Change the holder of the EA.

The proposed amendments will increase the efficiency of the facility and consequently the economic competitiveness of the project. The proposed amendments in themselves are not listed activities and do not trigger any new listed activity and no additional properties will be affected by the amendments as the amendments are within the original authorised development footprint.

4. Aim and scope of works

Although the proposed amendments to the Zen WEF are not listed activities and also do not trigger any new listed activities, it is important to address any possible impacts that layout changes may have on soil properties and the associated agricultural potential of the land as a precautionary measure.

In order to comparatively assess the anticipated impacts of the new layout to that of the authorised Zen WEF layout, the following scope of works are followed:

- All historical data associated with the project and pertaining to soil, land capability, land use and agriculture, were reviewed
- Both the old and the new project layouts of the Zen WEF were superimposed on the land capability raster data released by Department of Agriculture, Forestry and Fisheries (DAFF) in 2017. Since it was only released after EA was granted in 2016, the previous report could not make use of this data source.
- The anticipated impacts of the new project layout are discussed in comparison to the impacts associated with the initial project layout.

5. Results

5.1 Soil and land capability properties following the previous report

The Agricultural Potential Survey: Proposed Ventusa Wind Energy Facility, Gouda, Western Cape Province was by compiled and published by J.H. van der Waals of Terra Soil Science on 8th January 2012. On 10 October 2013, his professional comment on the initial report was also published in response to the comment and non-agreement of the National Department of Agricultural, Forestry and Fisheries to the proposed project. The initial report provided geo-referenced maps and detailed description of the soil properties and associated agricultural potential of the receiving properties (as listed in Section 2 above). The baseline properties can be summarised as follow:

- The largest portion of the development area is dominated by shallow, rocky soils and shallow duplex soils. The duplex soils include the Swartland, Escourt, Sterkspruit and Valsrivier forms while the shallow, rocky soils (that can also be referred to as Lithic soils) include the Glenrosa and Mispah forms.
- The stream channel and floodplain of the Klein Berg Rivier is dominated by alluvial sands ranging from recently deposited alluvial soils (Dundee form) to more mature profiles of the Oakleaf form. The dune areas may consist of either the Namib form or the Fernwood form (depending on the classification criteria used).
- According to Van der Waals (2012), the soil properties of the area plays a lesser part in its agricultural potential and that rainfall quantity and frequency plays a more definitive role in the crop production potential of the soil. This report states that wheat yields can be 2,5 tons per ha or higher in years with good rainfall and that the eastern portion (with its westerly aspect) of the site has higher yield potential than the western side.
- Following this report (Van der Waals, 2012), soil erosion is the highest risk and expected impact associated with the project infrastructure on the receiving soil environment and signs of soil erosion within the development area were already present during times of the survey (photographic evidence provided in the Van Der Waals report (2012) in Figure 17, pg 15).
- Areas with high sensitivity to the proposed development were demarcated using a combination of criteria that includes slope, drainage features and the presence of irrigation infrastructure.
- The report concluded that the Zen WEF be authorised and proposed as mitigation measures the management of soil erosion as well as the placement of infrastructure on the eastern portion of the site instead of the western portion.

5.2 Land capability classification

The newly released National Land Capability Evaluation Raster Data Layer was obtained from the Department of Agriculture, Forestry and Fisheries (DAFF) to determine the land capability classes of the Zen WEF development area and surrounding area. The new data was developed by DAFF to address the shortcomings of the 2002 national land capability data set. The new data was developed using a spatial evaluation modelling approach (DAFF, 2017).

Figure 1 and **Figure 2** shows that both project layouts falls on land with a varying degree of land capabilities ranging from Low-Very Low (Class 4) to Moderate-High (Class 10). Higher land capability classes are associated with the middle and south-western parts of the proposed project areas. Following the land capability analysis, the two project layouts are located on land with a similar range of land capabilities. The slightly wider range of land capabilities associated with the initial project layout, is due to the fact that it was spread over a larger area.

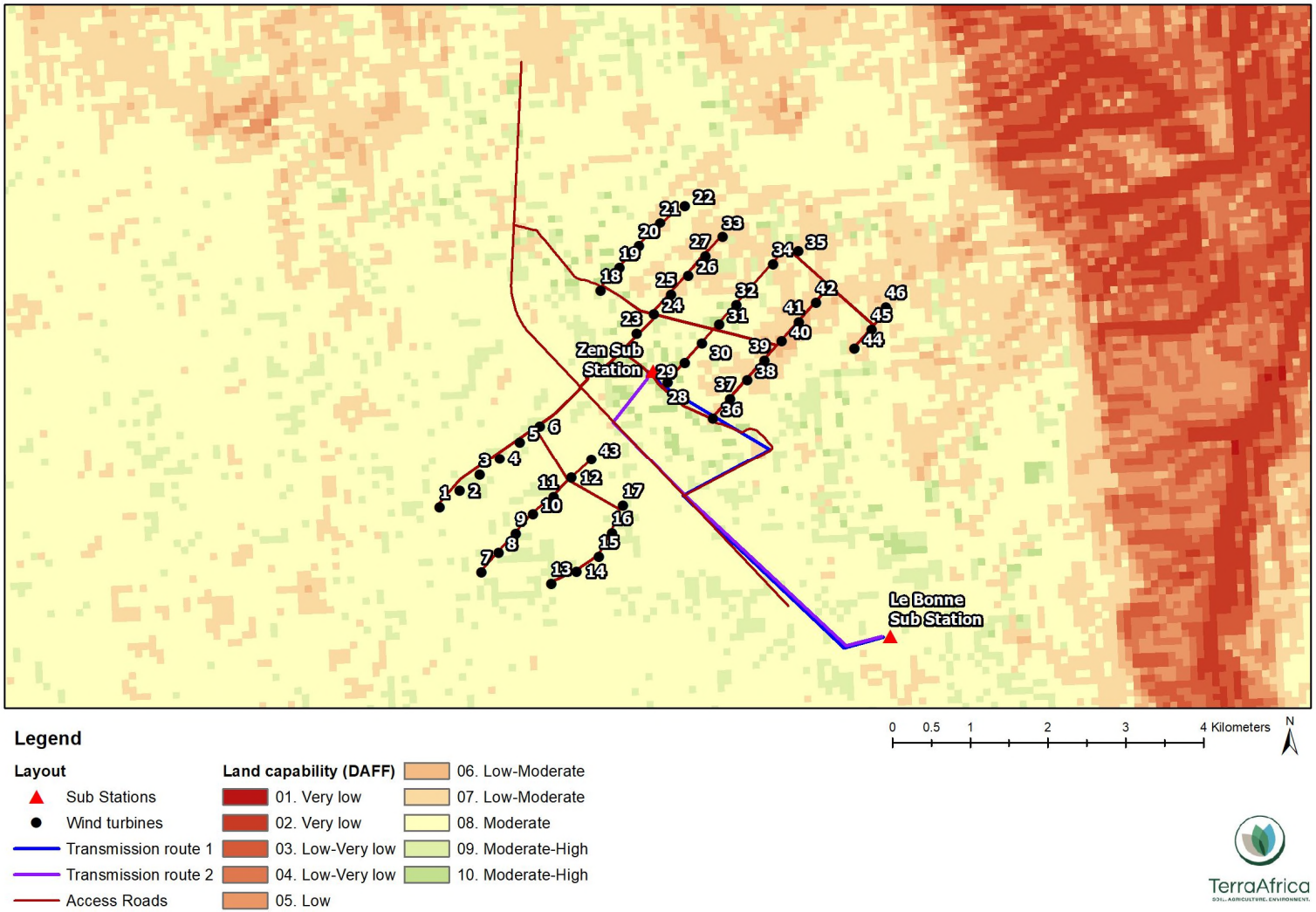

Figure 1 Zen WEF project infrastructure layout (initial, as per EA) superimposed on DAFF land capability raster data (data source: DAFF, 2017)

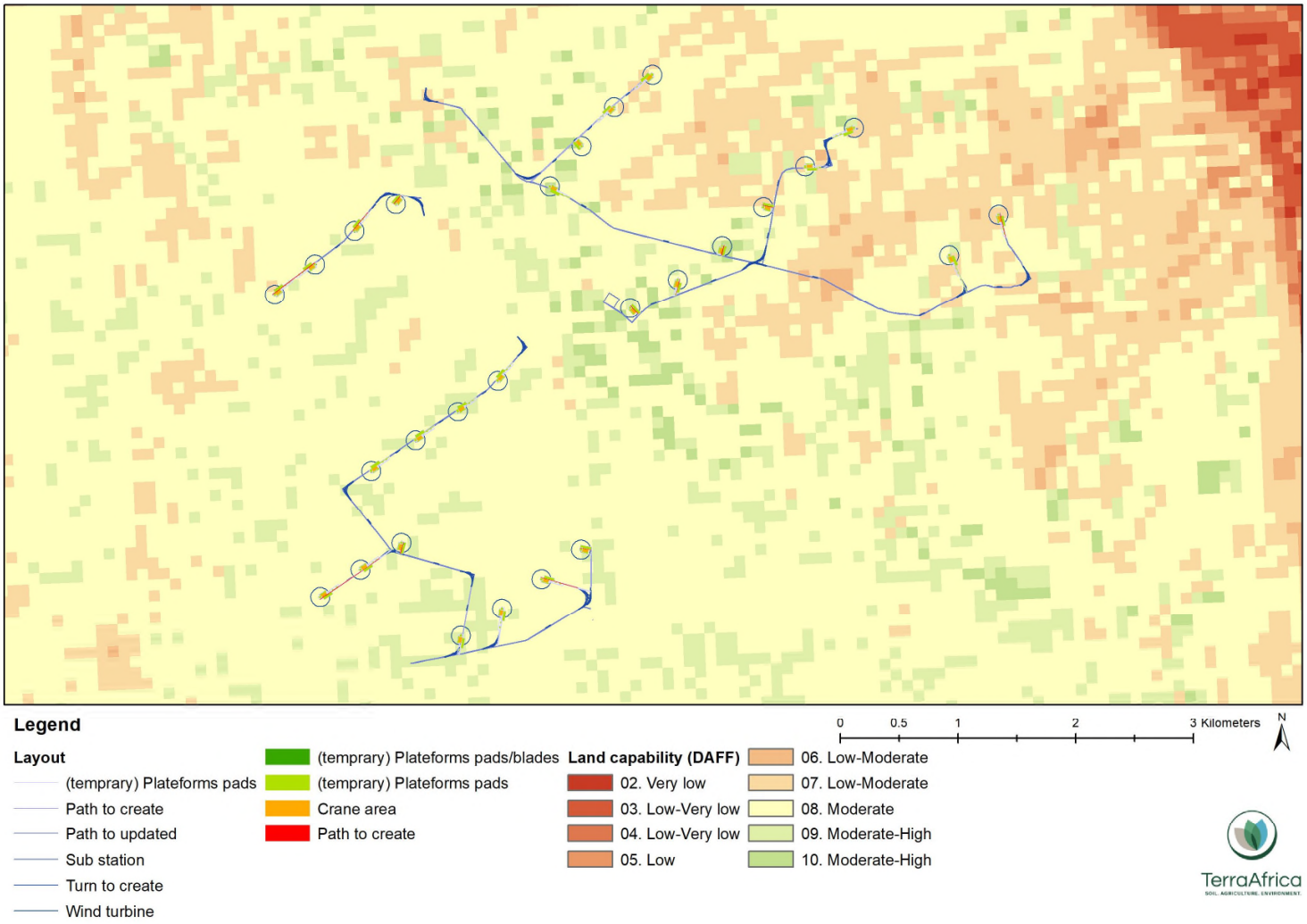

Figure 2 Zen WEF project infrastructure (new proposed layout) superimposed on DAFF land capability raster data (data source: DAFF 2017)

6. Comparative assessment of impacts

The main impact of the proposed Zen WEF is associated with the physical disturbance and occupation of the soil surface where the infrastructure will be erected. In addition to the turbines, the road access to the turbines for the purpose of construction and maintenance further contributes to the impacts on soil and the related agricultural production potential. The revised project infrastructure layout has resulted in a decrease of the areas to be impacted upon. Below is a summary of the changes in areas of high and medium land capability:

- The crane and foundation areas have been reduced from 7,40ha to 6,00ha
- New access road areas have been reduced from 6,80ha to 1,56ha
- Areas where road upgrades are required have been reduced from 5,64ha to 4,27 ha

In addition, the crane and foundation areas that are planned in areas of ha sensitivity, has been reduced from 5,47ha to 3,13ha.

Apart from the reduction in areas impacted upon, the new project layout aimed to position the turbines as far as possible along existing roads in order to avoid crop fields as far as possible. This is an important design measure to ensure that crop field tillage can continue uninterrupted as far as possible.

The revised project layout has reduced impacts on soil and agriculture when compared to the initial design that was authorised.

7. Special note on the management of soil erosion

While the initial report indicated that soil management should focus on erosion prevention, the causes of soil erosion was perhaps not emphasised. The development area is prone to soil erosion as a result of the combination of steep slopes as well as the presence of duplex soil forms. These soil forms have abrupt textural differences between the A-horizon (topsoil) and the B1-horizon (subsoil). In addition, the subsoil is high in salts (calcium, magnesium and sodium) and the presence of high levels of magnesium and sodium further contributes to the erosion risk through its impact on the soil structure.

It is therefore crucial that construction of the turbines take this into consideration and that soil removal be conducted carefully, separating the slightly structured to apedal topsoil from the structured subsoil. Once soil is returned, it should be returned in the same sequence as it was excavated from the in situ profiles. In addition, the use of geo-textiles on site will be beneficial to prevent the erosion from the soil stockpiles during construction. In order to ensure that it is part of the overall site management, it must be included in the EMPr.

8. Conclusion and reasoned opinion

Taking all the above sections into consideration, the revised layout of the Zen WEF project will result in smaller impacts on the receiving soil environment and its associated agricultural potential. The reduced number of turbines, shorter areas of access roads required as well as the new placement of the turbines will result in higher likelihood of the agricultural production in the area continuing with very limited disturbance. It is therefore my professional opinion that the revised project layout be authorised, pertaining that soil management to prevent erosion is practiced diligently and that erosion management is included in the EMPr.