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SITE SENSITIVITY VERIFICATION AND AGRICULTURAL AGRO-ECOSYSTEM SPECIALIST ASSESSMENT FOR THE PROPOSED HUGO WIND ENERGY FACILITY NEAR DE DOORNS IN WESTERN CAPE PROVINCE

Report by
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EXECUTIVE SUMMARY

South Africa urgently needs electricity generation, and renewable energy offers good potential for that, but requires land. Inevitably agriculturally zoned land will need to be used for much of the renewable energy generation that the country requires. However, to ensure food security, energy facilities should not result in a loss of crop production.

The overall conclusion of this assessment is that the proposed development offers a valuable opportunity for integrating renewable energy with agricultural production in a way that provides benefits to agriculture but leads to minimal loss of future agricultural production potential.

The site is classified as ranging from low to high agricultural sensitivity by the screening tool. This site sensitivity verification verifies those parts of the site that are indicated as cropland in this assessment as being of high agricultural sensitivity, and the rest of the site as being of low to medium agricultural sensitivity.

The site is in an area where there is little crop production. Cropping potential is limited by a combination of climate and soil constraints. The climate is classified as arid and therefore limiting to rain-fed cropping. The dominant soils are shallow soils on underlying weathered bedrock of the Glenrosa, Hutton, Swartland, and Mispah soil forms. There is a high proportion of rock outcrops. The soils are limited in their agricultural potential by shallow depths, rockiness, and low water holding capacity and are unsuitable for crop production as a result, except in some lower-lying areas where accumulation leads to deeper soils, and limited cropping is practised.

An agricultural impact is a change to the future agricultural production potential of land. This is primarily caused by the exclusion of agriculture from the footprint of a development. In the case of wind farms, the amount of land excluded from agriculture is so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has. Furthermore, wind farms have both positive and negative effects on the production potential of land, and it is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The positive effects are:

1. increased financial security for farming
2. improved security against stock theft and other crime
3. an improved road network, with associated storm water handling system

Due to the facts that the proposed development is predominantly on grazing land, that it will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as

acceptable.

Its acceptability is further substantiated by the following points:

1. The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
2. In addition, the proposed development will contribute to the country's urgent need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.
3. All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country. Furthermore, a reduction in coal power saves water resources and therefore potentially makes more water available for irrigated agriculture.

From an agricultural impact point of view, it is recommended that the proposed development be approved.

1 INTRODUCTION

Environmental and change of land use authorisation is being sought for the Hugo Wind Energy Facility near De Doorns in Western Cape Province (see location in Figure 1). In terms of the National Environmental Management Act (Act No 107 of 1998 - NEMA), an application for environmental authorisation requires an agricultural assessment. In this case, because the assessed area includes high agricultural sensitivity land (see Section 7), the level of agricultural assessment required by the agricultural protocol is an Agricultural Agro-Ecosystem Specialist Assessment.

The purpose of an agricultural assessment is to answer the question:

> **Will the proposed development cause a significant reduction in agricultural production potential, and most importantly, will it result in a loss of arable land?**

Section 9 of this report unpacks this question, particularly with respect to what constitutes a significant reduction. To answer the above question, it is necessary to determine the existing agricultural production potential of the land that will be impacted, and specifically whether it is viable arable land or not. This is done in Section 8 of this report. Section 8, 9, and the conclusion of this report directly address the above question and therefore contain the essence of the agricultural impact assessment.

As is shown in Section 9, this assessed development will not result in a significant loss of viable arable land and therefore poses minimal threat to agricultural production potential.

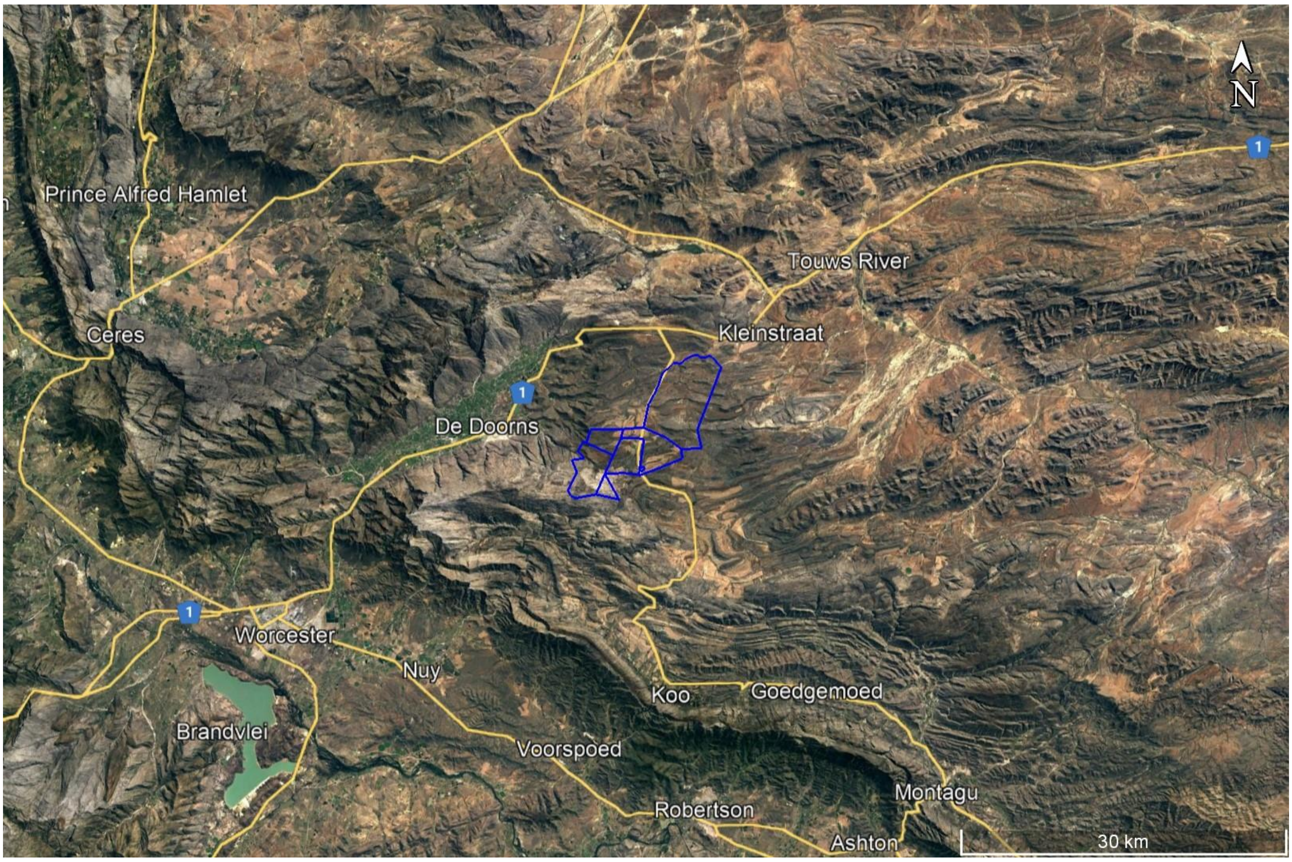

Figure 1. *Locality map of the cadastral boundary of the proposed energy facility (blue outline) to the east of the town of De Doorns.*

2 PROJECT DESCRIPTION

The proposed facility will consist of the standard infrastructure of a wind energy facility including, turbines with foundations; crane pads per turbine; cabling; battery energy storage system (BESS); auxiliary buildings; access and internal roads; on-site IPP substation; and temporary construction laydown areas.

What is relevant for agricultural impact in a wind energy facility layout is the extent of the total agricultural footprint – that is the very small and widely distributed footprint of land from which agriculture is actually excluded. The largest components of this footprint are the crane pads and the roads. The identification of individual components within this footprint is irrelevant to agricultural impact because all components have the same impact, namely occupation of agricultural land. Therefore, it is simply the location of the total footprint that matters. The agricultural footprint of the facility will be shown and assessed in the EIA phase.

3 TERMS OF REFERENCE

The terms of reference for this study are to fulfill 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 terms of reference for an Agricultural Agro-Ecosystem Specialist 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 3**)
2. The assessment must be undertaken on the preferred site and within the proposed development footprint. (**Figures 2 and 3**)
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 9.1**);
    2. whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site (**Section 12**), 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 (**Section 8**);
    2. Where applicable, the vegetation composition, available water sources as well as agro-climatic information (**Section 8**);
    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**);
    4. The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure (**Section 8**);
    5. Existing impacts on the site, located on a map where relevant (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc **Section 8**).
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 9.1**);
2. Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure (**Section 9.1**);
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 9.3**).

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**);
    4. A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant (**Section 4**);
    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 9.1**);
    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 11.4**);
    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 11.5**);
    9. Information on the current agricultural activities being undertaken on adjacent land parcels (**Section 8**);
    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 (**Section 9.3**);
    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 11.1**);
    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 12**);

13. Any conditions to which this statement is subjected (**Section 12**);
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 11.3**);
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 11.3**):
    a. where relevant, reasons why the proposed development footprint is required to exceed the limit; (not applicable)
    b. where relevant, reasons why this exceedance will be in the national interest; (not applicable) and
    c. where relevant, reasons why there are no alternative options available including evidence of alternatives considered; (not applicable) and
18. a map showing the renewable energy facilities within a 50km radius of the proposed development (**will be provided in EIA phase**)

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 climate, soil, and agricultural potential data for the site (see references). The aim of the on-site assessment was to:

1. ground-truth cropland status and consequent agricultural sensitivity;
2. ground truth the land type soil data and achieve an understanding of the general range and distribution patterns of different soil conditions across the site;
3. gain an understanding of overall agricultural production potential across the site.

The site investigation was conducted on 24 October 2023. An interview was also conducted with the farmer for information on farming practices on the site. Soils were assessed based on the investigation of existing soil exposures in combination with 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 a wind farm assessment. For this purpose, only an understanding of the general range and distribution patterns of different soil conditions across the site is required. A more detailed soil survey would be extremely time consuming and impractical to conduct, given the very large assessment area, and would not provide any additional data that would add value to the assessment of the agricultural impact of a wind farm.

This is because a wind farm extends over a very large surface area. The layout design of a wind farm is complex and there are multiple interacting factors that determine the turbine locations that will ensure the viability of the wind farm. Each turbine influences the amount of wind that the other turbines receive. Therefore, the location of one turbine cannot simply be shifted without requiring other turbines to be shifted as well, to retain the viability of all the turbines. To shift turbines to account for variation in soil conditions would be extremely complex and would require a level of soil mapping detail across the whole wind farm area that would be practically impossible to achieve.

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 spring season has no bearing on its results. The level of agricultural assessment is considered entirely adequate for an understanding of on-site agricultural production potential for the purposes of this assessment.

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

The development requires approval from the National Department of Agriculture, Land Reform and Rural Development (DALRRD) because it is on agriculturally zoned land. This approval is separate to the Environmental Authorisation. 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. 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 agricultural assessment report will serve that purpose.

The second approval is a consent for long-term lease required in terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA). SALA approval is not required if the lease is over the entire farm portion. If DALRRD approval for the development has already been obtained in the form of the No Objection letter, then SALA approval is likely to be readily forthcoming. SALA approval 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 construction of 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 Department of Agriculture, Land Reform and Rural Development (DALRRD)). The construction and operation of the facility will therefore not require consent from the Department of Agriculture, Land Reform and Rural Development in terms of this provision of CARA.

7 SITE SENSITIVITY VERIFICATION

A specialist agricultural assessment is required to verify the agricultural sensitivity of the development site as per the sensitivity categories used by the web-based environmental screening tool of the Department of Forestry, Fisheries and the Environment (DFFE). However, such an exercise is of very limited value once the agricultural assessment, which supersedes any screening tool result, has been done. What is of importance to this assessment, rather than the site sensitivity verification, is its assessment of the cropping potential (see Section 8) and its assessment of the impact significance (see Section 9).

The screening tool classifies agricultural sensitivity according to two independent criteria, from two independent data sets, both of which may be indicators of the land’s agricultural production potential but are limited in that the first is outdated and the second relies on fairly course data. The two criteria are:

1. whether the land is classified as cropland or not on the field crop boundary data set, and
2. its land capability rating on the land capability data set

All classified cropland is, by definition, either high or very high sensitivity. Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain-fed agricultural production. It is rated by the Department of Agriculture's updated and refined, country-wide land capability mapping (DAFF, 2017). The higher land capability values (≥8 to 15) are likely to indicate suitability as arable land for crop production, while lower values (<8) are only likely to be suitable as non-arable grazing land. The direct relationship between land capability rating and the screening tool's agricultural sensitivity is shown in Table 1.

Table 1. Relationship between land capability and agricultural sensitivity as given by the screening tool.

Land capability value	Agricultural sensitivity
1 - 5	low
6 - 8	medium
9 - 10	high
11 - 15	very high

The agricultural sensitivity of the site, as classified by the screening tool, is shown in Figure 2.

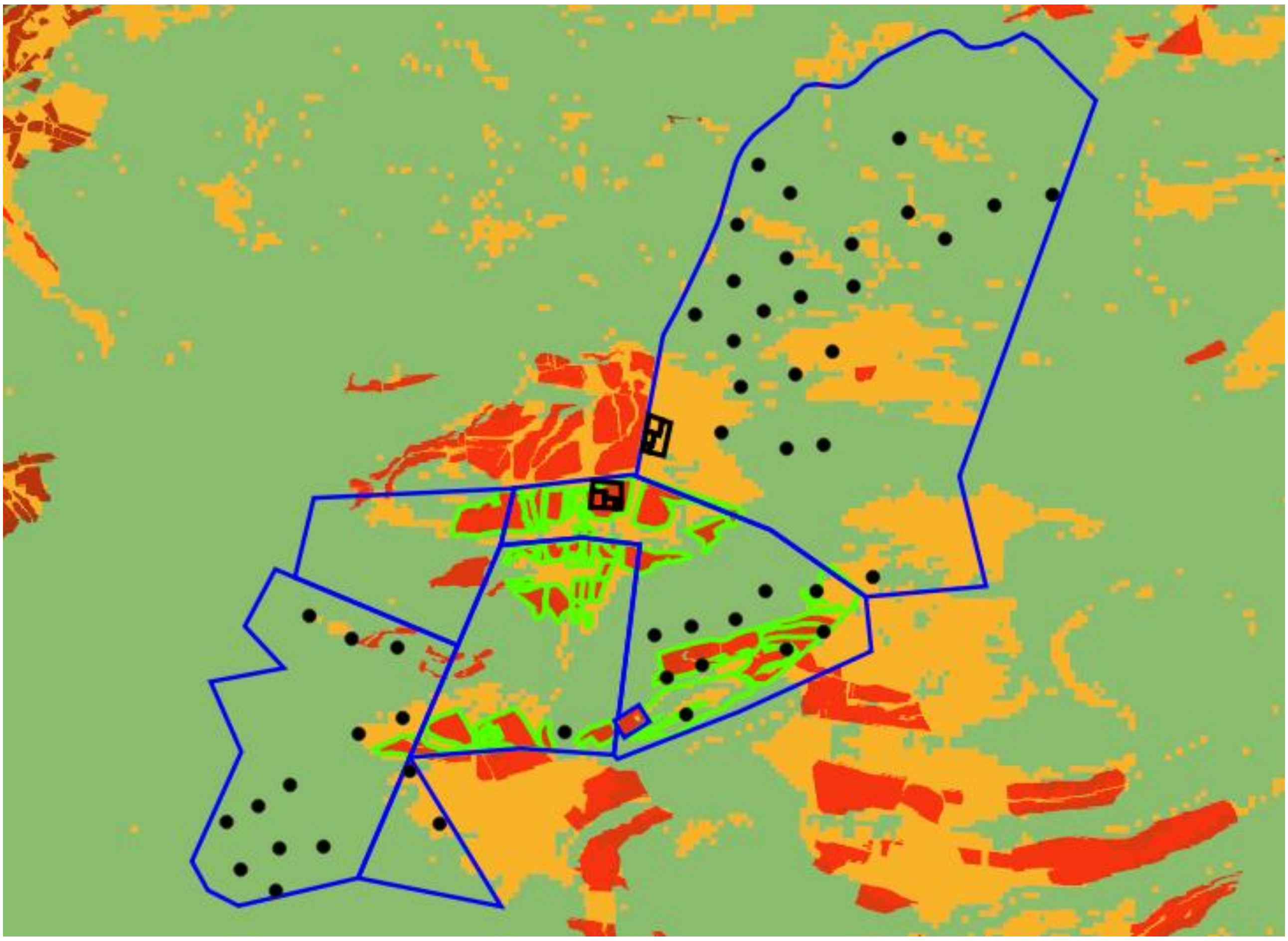

Figure 2. *The assessed area (dark blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high; dark red = very high). The field-verified and updated indication of croplands are shown in bright green outline. The alternative locations for the substation hub are shown in black outline (preferred to the south, alternative to the north).*

The screening tool classifies the assessed area as ranging from low to high agricultural sensitivity. The high sensitivity classification is due to some land being classified as cropland by the screening tool.

The data set used by the screening tool to classify cropland is outdated. The field-verified and updated indication of croplands are shown in Figures 2 and 3.

The classified land capability of the proposed site for development varies from 1 to 7. The variation is largely a function of terrain and rockiness. The land capability of the less mountainous areas is generally 6 to 7. However, 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.

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. The rest of the site is verified as being of medium and low agricultural sensitivity. Low and medium agricultural sensitivity is appropriate in terms of the site's climate, terrain and soils (see following section).

8 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The purpose of this section of an agricultural assessment report is to present the baseline information that controls the agricultural production potential of the site so that an assessment of that potential can be made. Agricultural production potential, and particularly cropping potential, is one of three factors that determines the significance of an agricultural impact, together with size of footprint and duration of impact (see Section 9).

All the important parameters that control the agricultural production potential of the site are given in Table 2. The land type soil data are given in Appendix 5. A satellite image map of the development site is given in Figure 3 and photographs of site conditions are shown in Figures 4 to 6.

The site falls within an area that is classified as a Protected Agricultural Area. A Protected Agricultural Area is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. Within Protected Agricultural Areas, the protection, particularly of arable land, is considered a priority for the protection of food security in South Africa. However, there may be much variation within a Protected Agricultural Area and all land within it is not necessarily of sufficient agricultural potential to be suitable for crop production, due to site-specific terrain, soil, and other constraints. All land within a Protected Agricultural Area is therefore not necessarily worthy of prioritised protection as agricultural production land.

There are no existing impacts on the site that are relevant to agricultural impact.

Table 2: Parameters that control and/or describe the agricultural production potential of the site.

	Parameter	Value
Climate	Köppen-Geiger climate description (Beck *et al*, 2018)	Arid, desert, cold
	Mean Annual Rainfall (mm) (Schulze, 2009)	291
	Reference Crop Evaporation Annual Total (mm) (Schulze, 2009)	1014
	Climate capability classification (out of 9) (DAFF, 2017)	4 (low-moderate)
Terrain	Terrain type	Karoo plateau and hills
	Terrain morphological unit	Varied
	Slope gradients (%)	0-20
	Altitude (m)	1100
	Terrain capability classification (out of 9) (DAFF, 2017)	Between 3 (low) and 7 (high)
Soil	Geology (DAFF, 2002)	Mainly sandstone, shale, siltstone, and mudstone of the Bokkeveld Group and quartzitic and feldspathic sandstone of the Skurweberg and Rietvlei Formations, Table Mountain Group.
	Land type (DAFF, 2002)	Ib74, Ib426, Ic123, Fc719, Fc720, Fc721, Fc722
	Description of the soils	Predominantly very shallow to deep, light to heavy textured soils on underlying rock.
	Dominant soil forms	R, Gs, Hu, Sw
	Soil capability classification (out of 9) (DAFF, 2017)	Between 2 (low-very low) and 5 (moderate)
	Soil limitations	Limited soil depth
Land use	Agricultural land use in the surrounding area	Dry land crop production, grazing
	Agricultural land use on the site	Dry land crop production, grazing
General	Long-term grazing capacity (ha/LSU) (DAFF, 2018)	72 (moderate-low)
	Land capability classification (out of 15) (DAFF, 2017))	Between 1 (very low) and 7 (low-moderate)
	Within Protected Agricultural Area (DALRRD, 2020)	Yes

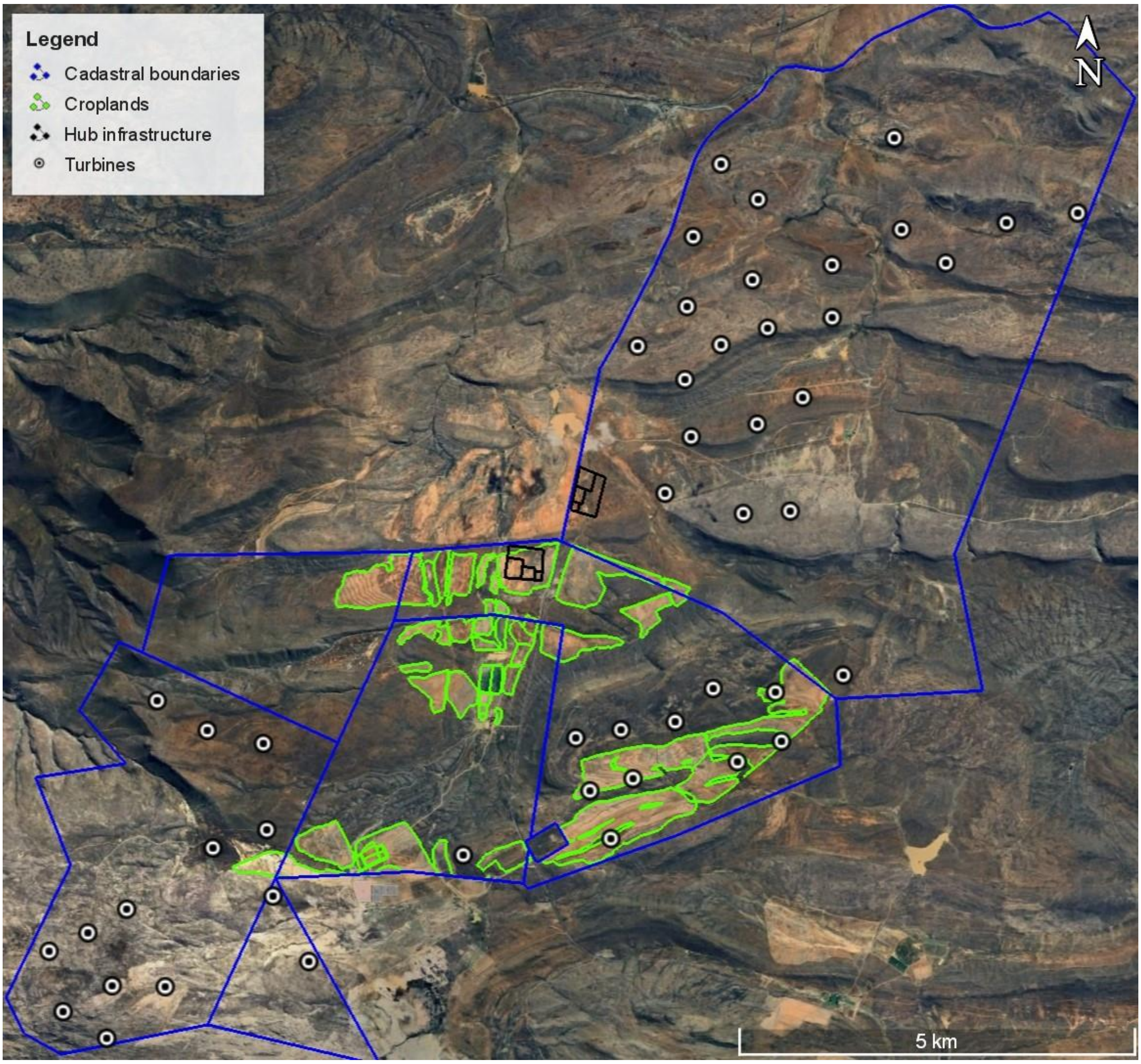

Figure 3. *Satellite image map of the assessed area. Preferred hub infrastructure is to the south, the alternative is to the north.*

The agricultural protocol requires the current productivity of the land based on detailed production figures and it requires the current employment figures. This detail is entirely irrelevant to the assessment of the agricultural impact, given that the expected losses in production and employment will be zero (see Section 9.1). It is therefore unnecessary to include this detail.

Figure 4. *Typical site conditions.*

Figure 5. *View of rocky soils which are unsuitable for crop production.*

Figure 6. *Profile of typical soil conditions.*

8.1 Assessment of the agricultural production potential

This assessment of the agricultural production potential of the site is based on an integration of the different parameters in Table 2 above and the on-site investigation.

The site is in an area where there is little crop production. Cropping potential is limited by a combination of climate and soil constraints. The climate is classified as arid and therefore limiting to rain-fed cropping. The dominant soils are shallow soils on underlying weathered bedrock of the Glenrosa, Hutton, Swartland, and Mispah soil forms. There is a high proportion of rock outcrops. The soils are limited in their agricultural potential by shallow depths, rockiness, and low water holding capacity and are unsuitable for crop production as a result, except in some lower-lying areas where accumulation leads to deeper soils, and limited cropping is practised.

9 ASSESSMENT OF AGRICULTURAL IMPACT

9.1 Impact identification and assessment

An agricultural impact is a change to the future agricultural production potential of land. In most developments, this is primarily caused by the exclusion of agriculture from the footprint of the development. Soil erosion and degradation may also contribute to loss of agricultural production potential. The significance of the impact is a direct function of the following three factors:

1. the size of the footprint of land from which agriculture will be excluded (or the footprint that will have its potential decreased)
2. the baseline production potential (particularly cropping potential) of that land
3. the length of time for which agriculture will be excluded (or for which potential will be decreased).

In the case of wind farms, the first factor, size of footprint, is so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has, and regardless of the duration of the impact. This is because the required spacing between turbines means that the amount of land excluded from agricultural use is extremely small in relation to the surface area over which a wind farm is distributed. Wind farm infrastructure (including all associated infrastructure and roads) typically occupies less than 2% of the surface area, according to the typical surface area requirements of wind farms in South Africa (DEA, 2015). Most wind energy facilities, for which I have recently done assessments, occupy less than 1% of the surface area. All agricultural activities can continue unaffectedly on all parts of the farmland other than this small footprint, from which agriculture is excluded, and the actual loss of production potential is therefore insignificant.

A study done to measure the impact of existing wind farms on agricultural production potential (Lanz, 2018) is highly informative of the extent of the agricultural impact that is likely for this proposed development. Although the study was done in a different agricultural environment, it is similar in terms of being a highly productive and intensively farmed environment with cultivation. There is no reason that the results obtained in that study would not be applicable to the area in this assessment. The overall conclusion of the study was that, although wind farms have been established within an area of cultivated farmland that supports intensive and productive farming, it is highly unlikely that this has caused a reduction in agricultural production. Small amounts of production land have been lost, but the consequence of this for agricultural production has been negligible. It is likely that the positive financial impacts of wind farming have outweighed the negative impacts, and that wind farming has benefited agriculture and agricultural production in the area.

As identified in the study, it is important to note that wind farms have both positive and negative effects on the production potential of land. It is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The positive effects are:

1. **increased financial security for farming operations -** Reliable and predictable income will be generated by the farming enterprises through the lease of land to the energy facility. This will increase financial security and could improve farming operations and productivity through increased investment into farming.
2. **improved security against stock theft and other crime** due to the presence of security

infrastructure and security personnel at the energy facility.

3. **an improved road network**, with associated storm water handling system. The wind farm will construct turbine access roads of a higher standard than the existing farm roads which will give farming vehicles better access to farmlands. This will be especially relevant during wet periods when access to croplands for spraying etc is limited by the current farm roads.

There are two additional effects, but because they are highly unlikely to influence agricultural production, they are not considered further. They are:

- **Prevention of crop spraying by aircraft over land occupied by turbines** – ground based or using drones for spraying are effective, alternative methods that can be used without implications for production or profitability.
- **Interference with farming operations** - Construction (and decommissioning) activities are likely to have some nuisance impact for farming operations but are highly unlikely to have an impact on agricultural production.

The loss of agricultural potential by soil degradation can effectively be prevented for renewable energy developments by generic mitigation measures that are all inherent in the project engineering and/or are standard, best-practice for construction sites. Soil degradation does not therefore pose a significant impact risk.

Due to the facts that the proposed development is predominantly on grazing land, that it will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.

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. As this assessment has shown, the agricultural use of the land will be integrated with the renewable energy facility, and it will continue with no discernible change in terms of production. The expected losses in production and employment will therefore be zero.

9.2 Cumulative impact assessment

Specialist assessments for environmental authorisation are required to assess 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.

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?

The Department of Forestry, Fisheries and the Environment (DFFE) 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.

This cumulative impact assessment will determine the quantitative loss of agricultural land if all renewable energy project applications within a 30 km radius become operational. The quantification of the cumulative impact will be done in detail in the EIA phase. This is highly likely to confirm that the cumulative impact of loss of future agricultural production potential is low. The development is highly likely to have an acceptable impact on the agricultural production capability of the area and therefore be recommended for approval from a cumulative agricultural impact point of view.

9.3 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.

The site includes croplands, and it is highly likely that some of the turbines will need to be located within these. The positioning of turbines in a wind farm is complex and there are multiple, interacting factors that determine the locations that will ensure the viability of the wind farm. Each turbine influences the amount of wind that the other turbines receive. Therefore, the location of one turbine cannot simply be shifted without requiring other turbines to be shifted as well, to retain the viability of all the turbines. Turbines cannot therefore simply be shifted off the cropland. However, as has been discussed above, the agricultural impact of these turbines within croplands is so small that it does not make sense to compromise the viability of the wind farm, to make only an insignificant change to the agricultural impact.

Specialist assessments for environmental authorisation are required to assess the impacts of alternatives, including 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, on the other hand, offers an additional income source to agriculture, without excluding agriculture from the land. Therefore, the negative agricultural impact of the no-go alternative is more significant than that of the development, and so, from an agricultural impact perspective, the proposed development is the preferred alternative between the development and the no-go. In addition, the no-go option would prevent the proposed development from contributing to the environmental, social, and economic benefits associated with the development of renewable energy.

Of the two proposed alternatives for the substation hub, the preferred alternative (south) is on land that has been used as cropland within the last five years, while the alternative is on grazing land. The alternative is therefore preferred from an agricultural impact point of view.

10 MITIGATION MEASURES

Generic mitigation measures that are effective in preventing soil degradation are all inherent in the engineering of such a project and/or are standard, best-practice for construction sites.

- A system of storm water management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site. 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. As part of the 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 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.

11 ADDITIONAL ASPECTS REQUIRED IN AN AGRICULTURAL ASSESSMENT

11.1 Micro siting

The agricultural protocol requires confirmation that all reasonable measures have been taken through micro-siting to minimize fragmentation and disturbance of agricultural activities. An aspect of wind farm layout that can cause unnecessary fragmentation of croplands is the location of turbine access roads within croplands. This will be assessed in the EIA phase.

11.2 Confirmation of linear activity impact

The protocol requires confirmation, in the case of a linear activity, that the land can be returned to the current state within two years of completion of the construction phase. This is not relevant in this case because the proposed development is not limited to being a linear one.

11.3 Compliance with the allowable development limits

Compliance with the allowable development limits will be assessed in the EIA phase, once the footprint of the facility has been finalised.

11.4 Long term benefits versus agricultural benefits

The development will generate a significant and reliable additional income for the farming enterprises, without compromising the existing farming income. It 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 than existing, coal powered energy generation.

11.5 Additional environmental impacts

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

12 CONCLUSION

The overall conclusion of this assessment is that the proposed development offers a valuable opportunity for integrating renewable energy with agricultural production in a way that provides benefits to agriculture but leads to minimal loss of future agricultural production potential.

The site is classified as ranging from low to high agricultural sensitivity by the screening tool. This site sensitivity verification verifies those parts of the site that are indicated as cropland in this assessment as being of high agricultural sensitivity, and the rest of the site as being of low to medium agricultural sensitivity.

The site is in an area where there is little crop production. Cropping potential is limited by a combination of climate and soil constraints. The climate is classified as arid and therefore limiting to rain-fed cropping. The dominant soils are shallow soils on underlying weathered bedrock of the Glenrosa, Hutton, Swartland, and Mispah soil forms. There is a high proportion of rock outcrops. The soils are limited in their agricultural potential by shallow depths, rockiness, and low water holding capacity and are unsuitable for crop production as a result, except in some lower-lying areas where accumulation leads to deeper soils, and limited cropping is practised.

An agricultural impact is a change to the future agricultural production potential of land. This is primarily caused by the exclusion of agriculture from the footprint of a development. In the case of wind farms, the amount of land excluded from agriculture is so small that the total extent of the loss of future agricultural production potential is insignificantly small, regardless of how much production potential the land has. Furthermore, wind farms have both positive and negative effects on the production potential of land, and it is the net sum of these positive and negative effects that determines the extent of the change in future production potential. The positive effects are:

1. increased financial security for farming
2. improved security against stock theft and other crime
3. an improved road network, with associated storm water handling system

Due to the facts that the proposed development is predominantly on grazing land, that it will exclude agricultural production from only a very small area of land, and that its negative impact is offset by economic and other benefits to farming, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable.

Its acceptability is further substantiated by the following points:

1. The proposed development will also have the wider societal benefits of generating additional

income and employment in the local economy.

2. In addition, the proposed development will contribute to the country's urgent need for energy generation, particularly renewable energy that has much lower environmental and agricultural impact than existing, coal powered energy generation.
3. All renewable energy development in South Africa decreases the need for coal power and thereby contributes to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land throughout the coal mining areas of the country. Furthermore, a reduction in coal power saves water resources and therefore potentially makes more water available for irrigated agriculture.

From an agricultural impact point of view, it is recommended that the proposed development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any conditions.

13 REFERENCES

Beck, H.E., N.E. Zimmermann, T.R. McVicar, N. Vergopolan, A. Berg, E.F. Wood. 2018. Present and future Köppen-Geiger climate classification maps at 1-km resolution, Nature Scientific Data. Available at: https://gis.elsenburg.com/apps/cfm/.

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DEA. 2015. Strategic Environmental Assessment for wind and solar photovoltaic development in South Africa. CSIR Report Number CSIR: CSIR/CAS/EMS/ER/2015/001/B. Stellenbosch.

Lanz, J. 2018. The impact of wind farms on agricultural resources and production: a case study from the Humansdorp area, Eastern Cape. Unpublished Report.

Schulze, R.E. 2009. South African Atlas of Agrohydrology and Climatology, available on Cape Farm Mapper. Available at: https://gis.elsenburg.com/apps/cfm/

Soil Classification Working Group. 1991. Soil classification: a taxonomic system for South Africa. Soil and Irrigation Research Institute, Department of Agricultural Development, Pretoria.

APPENDIX 1: SPECIALIST CURRICULUM VITAE

Johann Lanz
Curriculum Vitae

Education

M.Sc. (Environmental Geochemistry)	University of Cape Town	1996 - 1997
B.Sc. Agriculture (Soil Science, Chemistry)	University of Stellenbosch	1992 - 1995
BA (English, Environmental & Geographical Science)	University of Cape Town	1989 - 1991
Matric Exemption	Wynberg Boy's High School	1983

Professional work experience

I have been registered as a Professional Natural Scientist (Pri.Sci.Nat.) in the field of soil science since 2012 (registration number 400268/12) and am a member of the Soil Science Society of South Africa.

Soil & Agricultural Consulting **Self employed** **2002 - present**

Within the past 5 years of running my soil and agricultural consulting business, I have completed more than 170 agricultural assessments (EIAs, SEAs, EMPRs) in all 9 provinces for renewable energy, mining, electrical grid infrastructure, urban, and agricultural developments. I was the appointed agricultural specialist for the nation-wide SEAs for wind and solar PV developments, electrical grid infrastructure, and gas pipelines. My regular clients include: Zutari; CSIR; SiVEST; SLR; WSP; Arcus; SRK; Environamics; Royal Haskoning DHV; ABO; Enertrag; WKN-Windcurrent; JG Afrika; Mainstream; Redcap; G7; Mulilo; and Tiptrans. Recent agricultural clients for soil resource evaluations and mapping include Cederberg Wines; Western Cape Department of Agriculture; Vogelfontein Citrus; De Grendel Estate; Zewenwacht Wine Estate; and Goedgedacht Olives.

In 2018 I completed a ground-breaking case study that measured the agricultural impact of existing wind farms in the Eastern Cape.

Soil Science Consultant **Agricultural Consultors International (Tinie du Preez)** **1998 - 2001**

Responsible for providing all aspects of a soil science technical consulting service directly to clients in the wine, fruit and environmental industries all over South Africa, and in Chile, South America.

Contracting Soil Scientist **De Beers Namaqualand Mines** **July 1997 - Jan 1998**

Completed a contract to advise soil rehabilitation and re-vegetation of mined areas.

Publications

- Lanz, J. 2012. Soil health: sustaining Stellenbosch's roots. In: M Swilling, B Sebitosi & R Loots (eds). *Sustainable Stellenbosch: opening dialogues*. Stellenbosch: SunMedia.
- Lanz, J. 2010. Soil health indicators: physical and chemical. *South African Fruit Journal*, April / May 2010 issue.
- Lanz, J. 2009. Soil health constraints. *South African Fruit Journal*, August / September 2009 issue.
- Lanz, J. 2009. Soil carbon research. *AgriProbe*, Department of Agriculture.
- Lanz, J. 2005. Special Report: Soils and wine quality. *Wineland Magazine.*

I am a reviewing scientist for the *South African Journal of Plant and Soil*.

forestry, fisheries & the environment

Department:
Forestry, Fisheries and the Environment
REPUBLIC OF SOUTH AFRICA

Private Bag X447, Pretoria, 0001, Environment House, 473 Steve Biko Road, Pretoria, 0002 Tel: +27 12 399 9000, Fax: +27 86 625 1042

APPENDIX 2: SPECIALIST DECLARATION FORM AUGUST 2023

Specialist Declaration form for assessments undertaken for 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)

REPORT TITLE
THE PROPOSED HUGO WIND ENERGY FACILITY NEAR DE DOORNS IN THE WESTERN CAPE

Kindly note the following:

7. This form must always be used for assessment that are in support of applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting, where this Department is the Competent Authority.
8. This form is current as of August 2023. 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.dffe.gov.za/documents/forms.
9. An electronic copy of the signed declaration form must be appended to all Draft and Final Reports submitted to the department for consideration.
10. The specialist must be aware of and comply with 't*he 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 act, when applying for environmental authorisation - GN 320/2020)'*, where applicable.

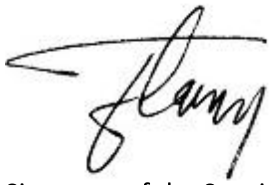
1. SPECIALIST INFORMATION

Title of Specialist Assessment	Agricultural Assessment
Specialist Company Name	Not applicable – sole proprietor
Specialist Name	Johann Lanz
Specialist Identity Number	6607045174089
Specialist Qualifications:	M.Sc. (Environmental Geochemistry)
Professional affiliation/registration:	Registered Professional Natural Scientist (Pr.Sci.Nat.) Reg. no. 400268/12 Member of the Soil Science Society of South Africa
Physical address:	1a Wolfe Street, Wynberg, Cape Town, 7800
Postal address:	1a Wolfe Street, Wynberg, Cape Town, 7800
Telephone	Not applicable
Cell phone	+27 82 927 9018
E-mail	johann@johannlanz.co.za

2. DECLARATION BY THE SPECIALIST

I, **Johann Lanz** declare that –

- I act as the independent specialist in this application;
- I am aware of the procedures and requirements 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 National Environmental Management Act (NEMA), 1998, as amended, when applying for environmental authorisation which were promulgated in Government Notice No. 320 of 20 March 2020 (i.e. “the Protocols”) and in Government Notice No. 1150 of 30 October 2020.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing –
  1. any decision to be taken with respect to the application by the competent authority; and;
  2. the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 48 and is punishable in terms of section 24F of the NEMA Act.



Signature of the Specialist

Name of Company: Johann Lanz – Soil Scientist (sole proprietor)

Date: 9 November 2023

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Johann Lanz**, swear under oath that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Specialist

Johann Lanz – Soil Scientist – sole proprietor

Name of Company

9 November 2023

Date

0595119 7.
Naphta GJ W/O

Signature of the Commissioner of Oaths

2023/11/09

Date

SUID-AFRIKAANSE POLISIEDIENS
COMM... SERVICE CENTRE
09 NOV 2023
PACALTSDORP
GEMEENSKAPS DIENS SENTRUM
SOUTH AFRICAN POLICE SERVICE

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Johan Lanz

Registration Number: 400268/12

is a registered scientist

in terms of section 20(3) of the Natural Scientific Professions Act, 2003
(Act 27 of 2003)
in the following fields(s) of practice (Schedule 1 of the Act)

Soil Science (Professional Natural Scientist)

Effective **15 August 2012** Expires **31 March 2024**

CUSTOS SCIENTIARUM NATURALIUM

Chairperson

Chief Executive Officer

To verify this certificate scan this code

APPENDIX 4: PROJECTS INCLUDED IN CUMULATIVE IMPACT ASSESSMENT

The table below will be completed in the EIA phase.

Table 2**:** Table of all projects that were included in the cumulative impact assessment.

DFFE Reference	Project name	Technology	Capacity (MW)
Total solar			
Total wind			
Total			

APPENDIX 5: 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
Ib74	R											61,5
Ib74	M	50	-	150	3	-	10				R	16,6
Ib74	Gs	100	-	250	6	-	15	15	-	25	so,R	7,2
Ib74	Ms	50	-	150	3	-	10				R,ka,ca	4,8
Ib74	Hu	150	-	300	5	-	10	6	-	15	R	3,1
Ib74	S	150	-	300	20	-	30	25	-	55	vr	2,5
Ib74	Oa	700	-	1000	5	-	10	6	-	15	R,so,sr	2,2
Ib74	Du	700	-	1000	5	-	15	10	-	20	R,so,sr	1,3
Ib74	Sw	150	-	250	25	-	35	40	-	60	vp	0,9
Ib426	R											69,0
Ib426	Ms	50	-	100	0	-	6				R	14,8
Ib426	Cf	50	-	100	0	-	6	0	-	6	R	8,3
Ib426	Gs	100	-	300	0	-	6	0	-	6	R	4,5
Ib426	Fw	100	-	300	0	-	6				R,so	2,5
Ib426	Du	400	-	1000	0	-	10				R	1,0
Ib427	R											60,1
Ib427	Ms	10	-	50	0	-	6				R	18,8
Ib427	Gs	50	-	100	0	-	6				R,lc	17,5
Ib427	Cf	50	-	100	0	-	6	0	-	6	R	3,8
Fc719	Gs	200	-	400	10	-	40	15	-	40	R	25,0
Fc719	Hu	250	-	700	15	-	30	15	-	35	R	18,8
Fc719	Gs	300	-	600	10	-	40	15	-	40	R	16,7
Fc719	Sw	400	-	700	10	-	40	25	-	55	R,vp,vr	16,2
Fc719	Ms	50	-	100	10	-	35				R,hp	7,8
Fc719	R											7,0
Fc719	Oa	300	-	600	10	-	30	10	-	35	R,so	6,1
Fc719	Sw	200	-	600	10	-	40	25	-	55	R,vp,vr	1,0
Fc719	Hu	200	-	600	15	-	30	15	-	35	R	1,0
Fc719	Du		>	1200	6	-	10					0,6

Land type	Soil series (forms)	Depth (mm)			Clay % A horizon			Clay % B horizon			Depth limiting layer	% of land type
Fc720	Gs	300	-	500	8	-	40	15	-	45	R	30,8
Fc720	Hu	300	-	700	10	-	25	25	-	35	R	21,1
Fc720	Sw	350	-	600	5	-	35	30	-	50	vp,vr	17,2
Fc720	Gs	200	-	400	8	-	40	15	-	45	R	10,0
Fc720	Ms	50	-	100	5	-	35	0	0	0	R,ka	7,3
Fc720	R											6,0
Fc720	Oa	300	-	600	10	-	25	10	-	35	R	2,8
Fc720	T											2,5
Fc720	Hu	200	-	600	10	-	25	25	-	35	R	1,0
Fc720	Sw	250	-	500	5	-	35	30	-	50	vp,vr	1,0
Fc720	Du		>	1000	5	-	15				R	0,5
Fc721	Gs	200	-	400	6	-	40				so	35,3
Fc721	Sw	200	-	400	20	-	25	25	-	40	vp,vr	23,8
Fc721	Hu	300	-	800	20	-	25	25	-	30	R,so	23,5
Fc721	Ms	50	-	100	10	-	15				R	4,9
Fc721	T											3,5
Fc721	R											2,9
Fc721	Oa	300	-	800	10	-	25	10	-	30	R,so	2,8
Fc721	Gs	200	-	400	6	-	40				so	2,5
Fc721	Sw	200	-	400	10	-	25	25	-	40	vp,vr	0,3
Fc721	Hu	300	-	800	20	-	25	25	-	30	R,so	0,3
Fc721	Du	400	-	650	15	-	25				R	0,3
Fc721	Du	650	-	1000	15	-	25				R	0,3
Fc722	R										0	37,6
Fc722	Ms	10	-	100	15	-	25				R	14,9
Fc722	Sw	100	-	400	20	-	25	35	-	50	vr	14,7
Fc722	Sw	100	-	400	20	-	25	35	-	50	vp	7,9
Fc722	Gs	50	-	150	10	-	25				lc,so	6,5
Fc722	Hu	200	-	400	10	-	25	10	-	35	so	5,0
Fc722	Ms	10	-	100	15	-	25				R,lc	4,7
Fc722	Oa	250	-	500	5	-	10	6	-	15	so	2,8
Fc722	Hu	250	-	500	10	-	25	10	-	35	so	2,2

Land type	Soil series (forms)	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Fc722	Sw	50 - 100	20 - 25	35 - 50	vr	1,8
Fc722	Du, Oa	300 - 700	5 - 10	10 - 35	so	1,1
Fc722	Hu	250 - 500	0 - 6	0 - 6	so	0,8