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SITE SENSITIVITY VERIFICATION AND AGRICULTURAL COMPLIANCE STATEMENT FOR THE PROPOSED BONSMARA SOLAR PV FACILITY AND ASSOCIATED GRID CONNECTION INFRASTRUCTURE NEAR KROONSTAD, FREE STATE PROVINCE

Report by
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EXECUTIVE SUMMARY

The purpose of the agricultural component in the Environmental Authorisation 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.

An agricultural impact is a temporary or permanent change to the future production potential of land. Whether a development should receive agricultural approval or not should be evaluated by asking the question: Does the extent of the loss of future agricultural production potential that will result from this development, justify keeping the land solely for agricultural production and therefore not approving the development?

South Africa needs agricultural production for food security. It also urgently needs renewable energy development. In order to achieve its renewable energy generation goals, agriculturally zoned land will inevitably need to be used for renewable energy generation.

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. Instead, the development is an opportunity for a renewable energy facility to be integrated with agricultural production in a way that provides benefits to agriculture and leads to little loss of future agricultural production potential.

This is substantiated by the following points:

- The layout of the facility has been deliberately designed to include only land that was identified as having soil limitations that make it unsuitable or marginal for supporting viable and sustainable crop production. There is not a scarcity of such agricultural land in South Africa and it is therefore considered to be below the threshold for being prioritised for conservation as agricultural production land.
- The proposed development offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The PV panels will not totally exclude agricultural production. The area can still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility.
- The loss of agricultural potential by occupation of land is not permanent. The land will become fully available again for agricultural production once the proposed activity ceases.
- The proposed development poses a low risk in terms of causing soil degradation, which can

be adequately and fairly easily managed by standard, best practice mitigation management actions.

- The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
- 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.
- 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.

The impact of the proposed development on the agricultural production capability of the site is assessed as being acceptable because of the above factors. Therefore, from an agricultural impact point of view, it is recommended that the development be approved.

1 INTRODUCTION

Environmental and agricultural authorisation is being sought for the proposed Bonsmara Solar PV Facility and associated grid connection infrastructure near Kroonstad, Free State 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, based on the verified agricultural sensitivity of the site (see Section 7), the level of agricultural assessment required is an Agricultural Compliance Statement.

Figure 1. *Locality map of the proposed facility (blue outlines) south-east of the town of Kroonstad.*

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

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.

However, all land that is excluded from potential future agricultural use by this development has serious limitations for crop production and therefore does not have high priority for being conserved as agricultural production land.

2 PROJECT DESCRIPTION

The proposed facility will consist of the standard infrastructure of a PV energy facility including PV arrays; inverters; cabling; battery storage; auxiliary buildings; access and internal roads; on-site substation and grid connection; temporary construction laydown areas; and perimeter fencing and will have a total generating capacity of up to 100MW.

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, for example, a solar array, a road or a BESS is irrelevant to agricultural impact. The total agricultural footprint of the facility is 326 hectares.

This assessment includes the power line options of the grid connection. However, it is important to note that the power lines have a very different level of agricultural impact than the solar power plant because agriculture is not excluded from the land underneath a power line. The power line corridor is not therefore considered to be part of the agricultural footprint, in keeping with NEMA's agricultural protocol. The agricultural impact of a power line is insignificant in this environment, regardless of its route and design and the agricultural potential of the land it crosses.

3 TERMS OF REFERENCE

The terms of reference for this study is 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 verified agricultural sensitivity of the site is medium (see Section 7). The level of agricultural assessment required in terms of the protocol for sites verified as less than high sensitivity is an Agricultural Compliance Statement.

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 Agricultural Compliance Statement must be prepared by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP) **(Appendix 5)**.
2. The compliance statement must:
    1. be applicable to the preferred site and proposed development footprint;
    2. confirm that the site is of "low" or "medium" sensitivity for agriculture **(Section 7)**; and
    3. indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site **(Section 9.11)**.
3. The Agricultural Compliance Statement must contain, 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 statement including a curriculum vitae **(Appendix 1)**;
    2. a signed statement of independence by the specialist **(Appendix 2)**;
    3. 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)**;
    4. 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)**;
    5. confirmation that the development footprint is in line with the allowable development limits contained in Table 1 of the protocol **(Section 9.9)**;
    6. confirmation from the specialist that all reasonable measures have been taken through micro-siting to avoid or minimize fragmentation and disturbance of agricultural activities **(Section 9.7)**;
    7. a substantiated statement from the soil scientist or agricultural specialist on the acceptability, or not, of the proposed development and a recommendation on the approval, or not of the proposed development **(Section 9.11)**;
    8. any conditions to which this statement is subjected **(Section 11)**;
    9. in the case of a linear activity, confirmation from the agricultural specialist or soil scientist, that in their opinion, based on the mitigation and remedial measures proposed, the land can be returned to the current state within two years of completion of the construction phase **(Section 9.8)**;
    10. where required, proposed impact management outcomes or any monitoring requirements for inclusion in the EMPr **(Section 10)**; and
    11. a description of the assumptions made and any uncertainties or gaps in knowledge or data **(Section 5)**.

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;
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 3 September 2022. An interview was also conducted with the two farmers, Johann Mienaar and Hermanus Crous, to get details of farming practices.

The soil investigation was based on existing exposures, 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 spring has no bearing on its results.

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 positive 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.

Power lines require the registration of a servitude for each farm portion crossed. In terms of the Subdivision of Agricultural Land Act (Act 70 of 1970) (SALA), the registration of a power line servitude requires written consent of the Minister unless either of the following two conditions apply:

- if the servitude width does not exceed 15 metres; and
- if Eskom is the applicant for the servitude.

If one or both conditions apply, then no agricultural consent is required. The second condition is likely to apply, even if another entity gets Environmental Authorisation for and constructs the

power line, but then hands it over to Eskom for its operation. Eskom is currently exempt from agricultural consent for power line servitudes.

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 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

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 Authorisation 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 (≥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. The direct relationship between land capability and 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

A map of the proposed development area overlaid on the screening tool sensitivity is given in Figure 2. None of the land is classified as cropland and agricultural sensitivity is therefore purely a function of land capability. The land capability of the site on the screening tool is predominantly 6, but varies from 5 to 8. 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. On this site there is little real difference between low and medium agricultural sensitivity on the ground.

Figure 2. *The proposed agricultural footprint of the development (blue outline) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high).*

The agricultural sensitivity, as identified by the screening tool, is confirmed by this assessment. The motivation for confirming the sensitivity is that the site is not under crop production, and that the climate and terrain are suitable for agricultural crop production but the soils are limited to shallow soils on underlying dense clay or weathered rock. The site is therefore of insufficient land capability for viable and sustainable crop production, which is befitting for medium agricultural sensitivity.

This site sensitivity verification verifies the entire site as being of medium agricultural sensitivity with a land capability value of 6. The land capability value is in keeping with the soil limitations that make the site unsuitable for crop production.

8 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The purpose of this section of the report is to present the baseline information that controls the agricultural production potential of the site, which in turn determines the significance of the

agricultural impact upon it.

A satellite image map of the agricultural footprint of the proposed PV facilities is shown in Figure 3 and photographs of site conditions are shown in Figures 4 to 6.

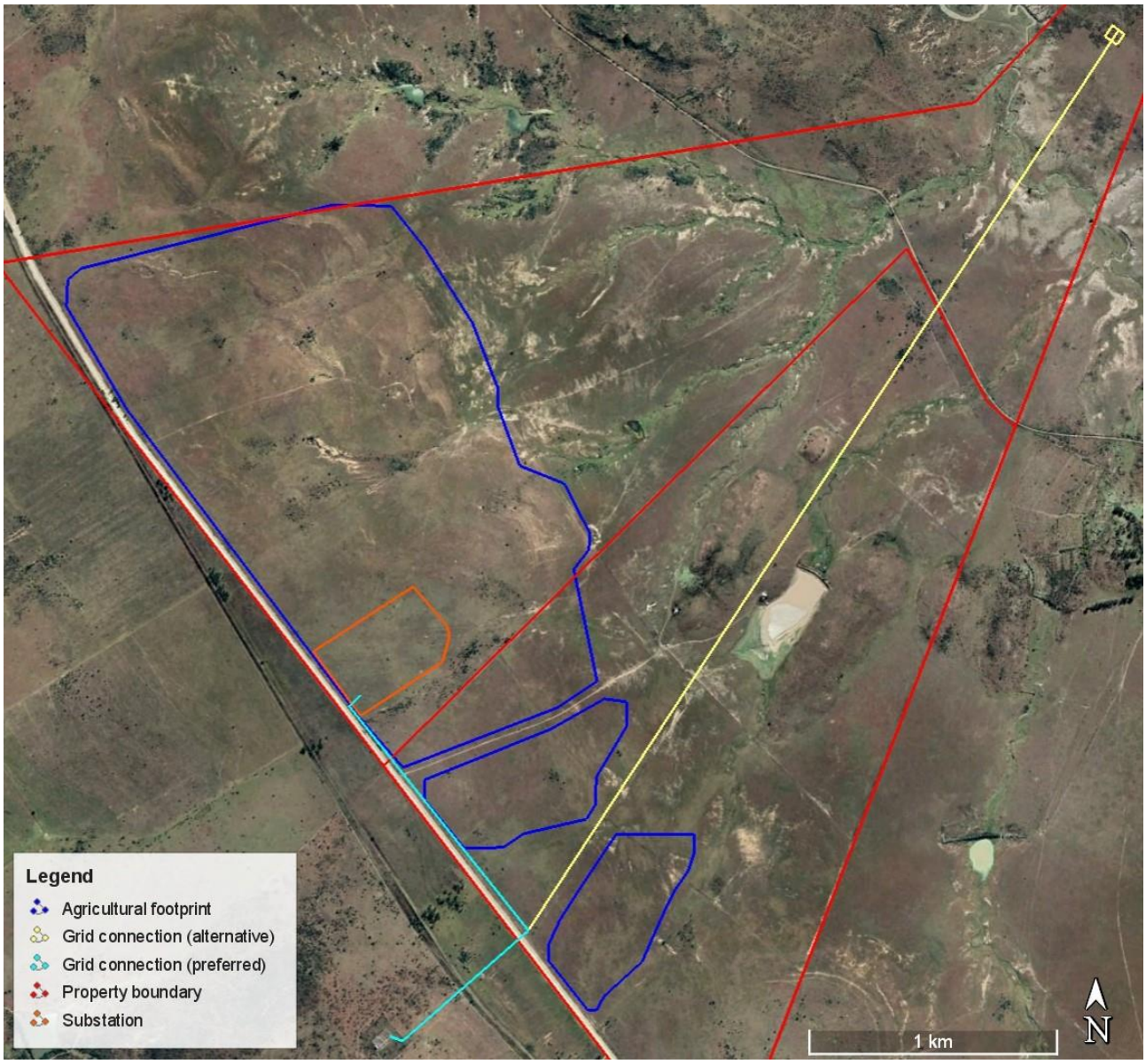

Figure 3. *Satellite image map of the proposed facility. The substation site also includes the BESS, O&M Buildings, and laydown area.*

Figure 4. *Typical site conditions showing fairly prevalent rock outcrops.*

Figure 5. *Typical site conditions.*

Figure 6. *Typical soil conditions, limited by shallow, dense clay.*

The site is on land with a north-easterly aspect and gentle slope gradients that average approximately 3%. The geology is mudstone, siltstone, and subordinate sandstone of the Balfour Formation of the Beaufort Group, Karoo Supergroup. The site falls almost entirely within one land type, Dc10. The land type soil data is given in Appendix 4. The land type across the site has a very high proportion of shallow, clay-rich soils predominantly of the Valsrivier soil form but including the Swartland, Mispah, Bonheim and Glenrosa soil forms as well as rock outcrops. These soils are all unsuitable for crop production due to their limited depth. The on-site soil investigation confirmed the dominance of these shallow, clay-rich soils across the site. The shallow soils have too little potential root volume and moisture reservoir to support viable cropping. This land is therefore only suitable for grazing. The long-term grazing capacity of the site is 5 hectares per large stock unit.

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. If a development will not change the future production potential of the land, then there is no agricultural impact. 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

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. The threshold for conserving land for agricultural production 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, depending on the importance and value of the proposed non-agricultural land use that will replace it. Renewable energy has high national importance and benefit and the use of agricultural land that is below the threshold is therefore considered to be justified for renewable energy development.

It is also important to note that renewable energy facilities have both positive and negative effects on the production potential of land (see Section 9.3) and so it is the net sum of these positive and negative effects 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 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. Loss of topsoil can result from poor topsoil management during construction related excavations. Soil erosion and loss of topsoil are completely preventable. The stormwater management that will be an inherent part of the engineering on site and standard, best-practice erosion control and topsoil management measures recommended and included in the Environmental Management Programme (EMPr), are likely to be effective in preventing soil erosion and loss of topsoil.

Two indirect mechanisms have been identified that lead 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.
2. **improved security against stock theft and other crime** due to the presence of security infrastructure and security personnel at the energy facility.

Considering what is detailed in Section 9.2 above, the extent to which any of these mechanisms is likely to actually affect levels of agricultural production is small and the overall impact of a change in agricultural production potential is therefore small.

Note that the overhead power lines have insignificant agricultural impact in this environment, regardless of their route and design and the agricultural potential of the land they traverse. This is because the direct, permanent, physical footprint of a power line, that has any potential to interfere with agriculture is insignificantly small. A power line does not exclude agriculture from the land, and all agricultural activities can continue completely unhindered underneath a power line. There is therefore no reduction in future agricultural production potential underneath a power line.

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.

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?

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.

The cumulative impact assessment has considered all renewable energy projects within a 30 km radius. These are listed in Appendix 3 of this report. In quantifying the cumulative impact, the area of land taken out of agricultural use as a result of all the projects listed in Appendix 3 (total

generation capacity of 320 MW) will amount to a total of approximately 800 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 30 km radius (approximately 282,700 ha), this amounts to only 0.28% of the surface area. That is well within an acceptable limit in terms of loss of land which is only suitable for grazing, of which there is no scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to develop the renewable energy generation that it urgently needs, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of agricultural land in a region such as the one being assessed, which has no crop production potential, and low grazing capacity, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.

It should also be noted that renewable energy development can only be located in fairly close proximity to a substation that has available capacity. This creates cumulative impact in such places. However, this is acceptable because it also effectively protects most agricultural land in the country from renewable energy development because only a small proportion of the country's total land surface is located in close enough proximity to an available substation to be viable for renewable energy development.

It should also be noted that there are few land uses, other than renewable energy, that are competing for agricultural land use in this area. The cumulative impact from developments, other than renewable energy, is therefore likely to be low.

As discussed above, the risk of a loss of agricultural potential by soil degradation can effectively be mitigated for renewable energy developments and therefore does not pose a cumulative impact risk.

Because of the negligible agricultural impact of grid connection infrastructure, its cumulative impact cannot exceed acceptable levels of change in terms of agricultural land loss, no matter how much grid infrastructure exists. The cumulative impact of the grid infrastructure is therefore also assessed as negligible.

Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential is assessed as low. It will not have an unacceptable negative impact on the agricultural production capability of the area and it is therefore recommended that it be approved.

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. The one identified potential such impact is that due to non-regular rainfall in the area, which is likely to be exacerbated by climate change, agriculture in the area will come under increased pressure in terms of economic viability.

The development offers an alternative income source to agriculture, but it restricts agricultural use of the site. Therefore, even though the excluded land has low agricultural production potential, 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. 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 Comparative assessment of alternatives

Design and layout alternatives and technology alternatives within the footprint will make absolutely no material difference to the significance of the agricultural impacts because it is the total footprint size (and its agricultural production potential) that determines the impact significance. Any alternative layout within the footprint is considered acceptable.

Because of the negligible impact of the overhead power lines, there will be no material difference between the agricultural impact of the two proposed alternatives. Both alternatives are acceptable in terms of agricultural impact.

9.7 Micro-siting to minimize 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. However, as noted above, if the agricultural footprint avoids all areas used for crop production, which it does, the exact position of the footprint and all infrastructure within it will not make any material difference to agricultural impacts and disturbance.

9.8 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. It is hereby confirmed

that the land under the overhead power line can be returned to the current state of agricultural production potential within two years of construction, with the obvious disclaimer that the pylons will continue to be present for the duration of the operational life time of the power line.

9.9 Impact footprint

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 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 therefore represents the total land that is actually excluded from agricultural use as a result of the renewable energy facility (the agricultural footprint).

The allowable development limit on land of low or medium agricultural sensitivity with a land capability of < 8, as this site has been verified to be, is 2.5 ha per MW. This would allow the proposed facility of 100 MW to occupy an agricultural footprint of 100 X 2.5 = 250 hectares. The proposed footprint of the facility is 326 hectares, which means that the facility is not in line with the allowable development limits contained in the agricultural protocol. However, the purpose of the allowable development limits is to steer renewable energy developments away from high potential, predominantly arable, land. This proposed facility is already on land that is of insufficient land capability to be viable as cropland and that function of the allowable development limits is therefore unnecessary in this case.

The agricultural footprint is larger than usual (>2.5 hectares per MW) in this case because the fenced area includes patches of land between the panel areas that is not suitable for solar panels. If the panel areas are used for sheep grazing, this land will still be utilised for agricultural production.

9.10 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 used their 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 3 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 Mpumulanga 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. Where croplands are avoided, solar energy development can be 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.

9.11 Impact assessment

An Agricultural Compliance Statement is not required to formally rate agricultural impacts. It is only required to indicate whether or not the proposed development will have an unacceptable impact on the agricultural production capability of the site.

Nevertheless, the agricultural impact of this proposed development is assessed here as being of low significance.

10 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The environmental management programme inputs for the protection of soil resources are all inherent in the project design and/or are standard, best-practice for construction sites. These are detailed in the tables below for each development phase.

Table 2: 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	Design an effective	Ensure that the storm water	Once-off during the design	Holder of the EA

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
	and existence of hard surfaces causes no erosion on or downstream of the site.	system of storm water 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 from all accumulation points and it must prevent any potential down slope erosion.	run-off control is included in the engineering design.	phase.	

Table 3: 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 disturbance and existence of hard surfaces causes no erosion on or downstream	Implement an effective system of storm water run-off control, where it is required - that	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of	Every 2 months during the construction phase	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
	of the site.	is at any points where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	the storm water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.		
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 stabilize 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	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		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.	stripping and replacement. Check that topsoil covers the entire disturbed area.		

Table 4: 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 existence of hard surfaces causes no erosion on or downstream of the site.	Maintain the storm water run-off control system. Monitor erosion and remedy the storm water control system in the event of any erosion occurring.	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm water run-off control system and to specifically record the	Bi-annually	Facility Environmental Manager

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
			occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.		
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 5: 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 disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Implement an effective system of storm water run-off control, where it is required - that is at any points	Undertake a periodic site inspection to verify and inspect the effectiveness and integrity of the storm	Every 2 months during the decommissioning phase, and then every 6 months after completion of decommissioni	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		where run-off water might accumulate. The system must effectively collect and safely disseminate any run-off water from all accumulation points and it must prevent any potential down slope erosion.	water run-off control system and to specifically record the occurrence of any erosion on site or downstream. Corrective action must be implemented to the run-off control system in the event of any erosion occurring.	ng, until final sign-off is achieved.	
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 stabilize 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 any way, then any available topsoil should first be stripped	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		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.	replacement. Check that topsoil covers the entire disturbed area.		

11 CONCLUSIONS

The entire site was verified in this assessment as being of medium sensitivity for impacts on agricultural resources with a land capability value of 6. The land was assessed as being of insufficient land capability for viable and sustainable future crop production. The cropping potential of the site is limited by the shallow soils which are limited by dense clay and weathered bedrock in the subsoil.

Two potential negative mechanisms of agricultural impact were identified, occupation of land, and soil erosion and degradation. Two positive mechanisms of agricultural impact were identified as increased financial security for farming operations, and improved security against stock theft and other crime. All of these are likely to have a low impact on future agricultural production potential and are therefore assessed as having low significance.

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. Instead, the development is an opportunity for a renewable energy facility to be integrated with agricultural production in a way that provides benefits to agriculture and leads to little loss of future agricultural production potential.

This is substantiated by the following points:

- The layout of the facility has been deliberately designed to include only land that was identified as having soil limitations that make it unsuitable for supporting viable and sustainable crop production. There is not a scarcity of such agricultural land in South Africa and it is therefore considered to be below the threshold for being prioritised for conservation as agricultural production land.
- The proposed development offers positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
- The PV panels will not totally exclude agricultural production. The area can still be used to graze sheep that will, in addition, be protected against stock theft within the security area of the facility.
- The loss of agricultural potential by occupation of land is not permanent. The land will become fully available again for agricultural production once the proposed activity ceases.
- The proposed development poses a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.
- The proposed development will also have the wider societal benefits of generating additional income and employment in the local economy.
- 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.
- 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.

The impact of the proposed development on the agricultural production capability of the site is assessed as being acceptable because of the above factors. Therefore, from an agricultural impact point of view, it is recommended that the 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, other than recommended mitigation.

12 REFERENCES

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Department of Agriculture, Forestry and Fisheries, 2017. National land capability evaluation raster data layer, 2017. Pretoria.

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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.

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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 (Pr.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*.

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

PROPOSED BONSMARA SOLAR PV FACILITY AND ASSOCIATED GRID CONNECTION INFRASTRUCTURE NEAR KROONSTAD, FREE STATE 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

1. SPECIALIST INFORMATION

Specialist Company Name:	Johann Lanz – Soil Scientist			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Johann Lanz			
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			
Postal code:	7800	Cell:	082 927 9018	
Telephone:	082 927 9018	Fax:	Who still uses a fax? I don't	
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 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 - any decision to be taken with respect to the application by the competent authority; and - 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 Act.

Signature of the Specialist

Johann Lanz – Soil Scientist (sole proprietor)

Name of Company:

03/03/2023

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, **Johann Lanz**, swear under oath / affirm 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

03/03/2023

Date

Signature of the Commissioner of Oaths

2023/03/03

Date

SUID-AFRIKAANSE POLISIEDIENS
CSM
WYNBERG KP
03 MAR 2023
CSM
WYNBERG CP
SOUTH AFRICAN POLICE SERVICE

APPENDIX 3: PROJECTS INCLUDED IN CUMULATIVE ASSESSMENT

Table 6**:** Table of all projects that were included in the cumulative impact assessment.

Project	DEA Reference No	Technology	Capacity (MW)	Status
Proposed Heuningspuit PV 1 solar energy facility, Free State Province	14/12/16/3/3/1/1083	Solar PV	5	In process
Proposed Heuningspuit PV2 solar energy facility, Free State Province	14/12/16/3/3/1/1084	Solar PV	5	In process
The construction and operation of the Grid connection infrastructure for 100Mac Rondavel solar energy facility, near Kroonstad in Free State Province	14/12/16/3/3/1/2405	Solar PV	100	Approved
Proposed Steynrus solar facility PV1 near Kroonstad, Moqhaka Local Municipality, Free State Province	14/12/16/3/3/1/798	Solar PV	5	In process
Proposed Steynrus solar facility PV1 near Kroonstad, Moqhaka Local Municipality, Free State Province	14/12/16/3/3/1/798/1	Solar PV	5	In process
The construction and operation of the EGI to the proposed 100Mac Vrede Solar Energy facility, BESS and associated infrastructure located near Kroonstad, Free State Province	14/12/16/3/3/1/2406	Solar PV	100	Approved
Bonsmara PV			100	
Total			**320**	

APPENDIX 4: SOIL DATA

Table 7: 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
Dc10	Va / Sw	100 - 300	15 - 30	30 - 55	vp	29.8
Dc10	Rock outcrop				R	17.7
Dc10	Ms	100 - 150	15 - 25		R	12.6
Dc10	Bo	300 - 580	20 - 48	25 - 41	vp	7.6
Dc10	Gs	150 - 200	15 - 35		so,R	7.2
Dc10	Mw / My	200 - 400	20 - 45		so,R	6.3
Dc10	Ss	250 - 350	12 - 25	30 - 55	pr	3.9
Dc10	Ar	500 - 800	45 - 65		gh	3.8
Dc10	Oa / Du	> 1200	15 - 35	15 - 35	R,so	3.6
Dc10	We	400 - 600	15 - 20	30 - 40	sp	2.8
Dc10	Es / Kd	300 - 700	10 - 20	30 - 55	pr,gc	2.3
Dc10	Av	600 - 800	15 - 25	25 - 40	sp	1.6
Dc10	Rg / Ka / Wo	450 - 900	35 - 65		gh	0.8

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 2023**

Chairperson

Chief Executive Officer

To verify this certificate scan this code