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SITE SENSITIVITY VERIFICATION
AND
AGRICULTURAL AGRO-ECOSYSTEM SPECIALIST ASSESSMENT
FOR
THE PROPOSED MERCURY CLUSTER PROJECT (SOUTHERN PV FARMS)
NEAR VILJOENSKROON IN THE 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 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 ideal, win-win scenario for both agricultural production and for electricity generation in South Africa, is for renewable energy facilities to be integrated with agricultural production in a way that provides benefits to agriculture and leads to very little loss of future agricultural production potential. In this scenario, renewable energy development does not pose a threat to agricultural production or to the agricultural economy of rural areas.

The conclusion of this assessment is that the proposed developments offer such a win-win scenario. It will cause very little loss of future agricultural production potential. This is substantiated by the following points:

1. The only agricultural land that will be used by the developments has limited agricultural production potential. The layout of the facilities has deliberately avoided all higher potential land on the farms. It will only utilise land that was identified as having insufficient land capability for viable and sustainable crop production and is therefore only good enough for grazing. 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.
2. The amount of agricultural land loss for the Hormah development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with lower agricultural production potential. The Ratpan development exceeds the limits but this is justified by all of the other points in this list.
3. The proposed developments offer 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 facilities.

4. 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.
5. The proposed developments pose a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.
6. The proposed developments are within a REDZ, which is an area that has specifically been designated within South Africa for the prioritisation of renewable energy development. The designation of the REDZ has taken into account the country's need to balance renewable energy development against the conservation of land required for agricultural production and national food security.
7. The proposed developments will also have the wider societal benefits of generating additional income and employment in the local economy. In addition, it will contribute to the country's urgent need for energy generation, particularly renewable energy that has lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

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

1 INTRODUCTION

Authorisation is being sought for the proposed Mercury Cluster Project (Southern PV farms) near Viljoenskroon in the 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 an Agricultural Agro-Ecosystem Specialist Assessment.

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

Figure 1. *Locality map of the proposed solar energy facilities (blue outlines) to the north-west of the town of Viljoenskroon.*

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 aim of the agricultural protocol of NEMA is primarily to preserve the agricultural production potential of scarce arable land by ensuring that development does not exclude agricultural production from such land or impact it to the extent that the crop

production potential is reduced. However, the land that is excluded from potential future agricultural use by this project has serious limitations for crop production and is therefore not considered particularly preservation-worthy as agricultural production land.

2 PROJECT DESCRIPTION

The proposed project covered in this report comprises two separate solar energy facilities, Hormah and Ratpan. An additional report for the Mercury Cluster covers three Northern PV farms. Each facility covered in this report will consist of the standard infrastructure of a PV facility including PV array; inverters; on-site substation and grid connection (which is subject to a separate assessment and EA); battery storage; auxiliary buildings; access and internal roads; and fencing. The generating capacity of Hormah is up to 120 MW and of Ratpan is 80 MW.

The exact nature and layout of the different infrastructure within a solar energy facility has absolutely no bearing on the significance of agricultural impacts. It is therefore not necessary to detail the design and layout of the facilities any further in this assessment. All that is of relevance is simply the total footprint of the facilities that excludes agricultural land use or impacts agricultural land, referred to as the agricultural footprint. This is the area within the facility fence. Whether that footprint comprises a solar array, a road or a substation is irrelevant to agricultural impact. The total agricultural footprints for the facilities are Hormah – 227 ha and Ratpan - 202 ha.

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 site includes land that is classified by the national web-based environmental screening tool on 22 May 2022 as high sensitivity for impacts on agricultural resources. The level of agricultural assessment required in terms of the protocol (and hence in terms of NEMA) is therefore an Agricultural Agro-Ecosystem Specialist Assessment. The terms of reference for such an assessment, as stipulated in the protocol, are listed below, and the section number of this report which fulfils each stipulation is given after it in brackets. The protocol also requires that a Site Sensitivity Verification be done.

1. The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP).
2. The assessment must be undertaken on the preferred site and within the proposed

development footprint.

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, especially 9.13 & 9.15);
    2. whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site (Section 9.15), and in the event where it does, whether such a negative impact is outweighed by the positive impact of the proposed development on agricultural resources.
4. The status quo of the site must be described, including the following aspects which must be considered as a minimum in the baseline description of the agro-ecosystem:
    1. The soil form/s, soil depth (effective and total soil depth), top and sub-soil clay percentage, terrain unit and slope (Sections 8.1 & 8.2);
    2. Where applicable, the vegetation composition, available water sources as well as agro-climatic information (Sections 8.3, 8.4 & 8.5);
    3. The current productivity of the land based on production figures for all agricultural activities undertaken on the land for the past 5 years, expressed as an annual figure and broken down into production units (Section 8.7);
    4. The current employment figures (both permanent and casual) for the land for the past 3 years, expressed as an annual figure (Section 8.8);
    5. Existing impacts on the site, located on a map where relevant (e.g. erosion, alien vegetation, non-agricultural infrastructure, waste, etc.)(Section 8.9).
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 9.15);
    2. Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure (Section 9.14);
    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 9.6).
6. The findings of the Agricultural Agro-Ecosystem Specialist Assessment must be written up in an Agricultural Agro-Ecosystem Specialist Report that contains as a minimum the following information:
    1. Details and relevant experience as well as the SACNASP registration number of the soil scientist or agricultural specialist preparing the assessment including a curriculum vita (Appendix 1);
    2. A signed statement of independence by the specialist (Appendix 2);

3. The duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment (Section 4.1);
4. A description of the methodology used to undertake the on-site assessment inclusive of the equipment and models used, as relevant (Section 4.1);
5. A map showing the proposed development footprint (including supporting infrastructure) with a 50 m buffered development envelope, overlaid on the agricultural sensitivity map generated by the screening tool (Figure 2);
6. An indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development (Section 9.14 & 9.15);
7. an indication of possible long-term benefits that will be generated by the project in comparison to the benefits of the agricultural activities on the affected land (Section 9.7);
8. Additional environmental impacts expected from the proposed development based on the current status quo of the land including erosion, alien vegetation, waste, etc. (Section 9.8);
9. Information on the current agricultural activities being undertaken on adjacent land parcels (Section 8.6);
10. a motivation must be provided if there were development footprints identified as per point 5.3 above that were identified as having a medium or low agricultural sensitivity and that were not considered appropriate (not applicable);
11. Confirmation from the soil scientist or agricultural specialist that all reasonable measures have been considered in the micro-siting of the proposed development to minimise fragmentation and disturbance of agricultural activities (Section 9.9);
12. A substantiated statement from the soil scientist or agricultural specialist with regards to agricultural resources on the acceptability or not of the proposed development and a recommendation on the approval or not of the proposed development (Section 9.15 & 11);
13. Any conditions to which this statement is subjected (Section 11);
14. Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr) (Section 10);
15. A description of the assumptions made and any uncertainties or gaps in knowledge or data (Section 5).
16. calculations of the physical development footprint area for each land parcel as well as the total physical development footprint area of the proposed development (including supporting infrastructure) (Section 9.10);
17. confirmation whether the development footprint is in line with the allowable development limits set in Table 1 above, including where applicable any deviation from the set development limits and motivation to support the deviation, including (Section

9.10):

a. where relevant, reasons why the proposed development footprint is required to exceed the limit (Section 9.10);

b. where relevant, reasons why this exceedance will be in the national interest (Section 11); and

c. where relevant, reasons why there are no alternative options available including evidence of alternatives considered (9.6); and

18. a map showing the renewable energy facilities within a 50km radius of the proposed development (Appendix 3)

4 METHODOLOGY OF STUDY

4.1 Methodology for assessing soils and agricultural potential

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

be excluded from agricultural use;

This was achieved by a drive and walk-over investigation across the site. Site investigations were conducted on two separate occasions, on 18 November 2021 and on 14 and 16 February 2022.

The soil investigation was based on the investigation of soil auger samples, some existing excavations, 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 study.

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

Interviews with the farmers, John Gossayn and Hans Pretorius were conducted for additional information on farming on the site.

4.2 Methodology for assessing impact significance

A standard methodology for assessing impact significance has been used throughout all the specialist assessments that form a part of this impact assessment and is described in detail in the impact assessment reports.

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 issued by the Deputy Director General (Agricultural Production, Health and Food Safety, Natural Resources and Disaster Management). This letter is one of the requirements for receiving municipal rezoning. It is advisable to apply for this as early in the renewable 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 will not significantly compromise the future agricultural production potential of the development site.

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 be easy and 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 EA is in hand.

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 (personal communication per email on 17 April 2021) (Acting Scientific Manager: Natural Resources Inventories and Assessments in the Directorate: Land and Soil Management of the DALRRD. The construction and operation of the facilities will therefore not require consent from the DALRRD in terms of this provision of CARA.

7 SITE SENSITIVITY VERIFICATION

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

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

The purpose of including an agricultural component in the Environmental 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.

Agricultural sensitivity, as used in the national web-based environmental screening tool, is a direct function of the capability of the land for agricultural production. The general assessment of agricultural sensitivity that is employed in the national web-based environmental screening tool,

identifies all arable land that can support viable crop production, 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.

A map of the proposed development areas overlaid on the screening tool sensitivity is given in Figure 2, below. The land capability of the sites on the screening tool is an average of 7, but varies from 6 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. Values of 6 to 8 translate to a medium agricultural sensitivity.

The allocation of high sensitivity to most of the site (red in Figure 2) is because the land is classified as cropland in the data set used by the screening tool. However that data set is outdated. Almost all of the lands indicated as croplands on the screening tool are no longer under crops and have not been, according to the historical imagery on Google Earth, for at least 17 years on Hormah and at least 11 years on Ratpan. All these lands are used only for grazing (see Figures 4 and 5). These lands should therefore no longer be classified as cropland or allocated high sensitivity because of it.

There is one small section of land within the Ratpan project area that is still under crop production. This is shown in Figures 2 and 3. This is a small section of an existing field that was identified by the farmer as having drainage problems that compromise production on this patch. The soil investigation confirmed the drainage limitations in this area (see Section 8). Because this patch is marginal for viable crop production, it is justified to include it in the development footprint.

This site sensitivity verification verifies the patch of the site that is indicated as cropland in Figure 3 as the only part of the site that is of high agricultural sensitivity, because of its cropping status. The rest of the site is verified as medium agricultural sensitivity.

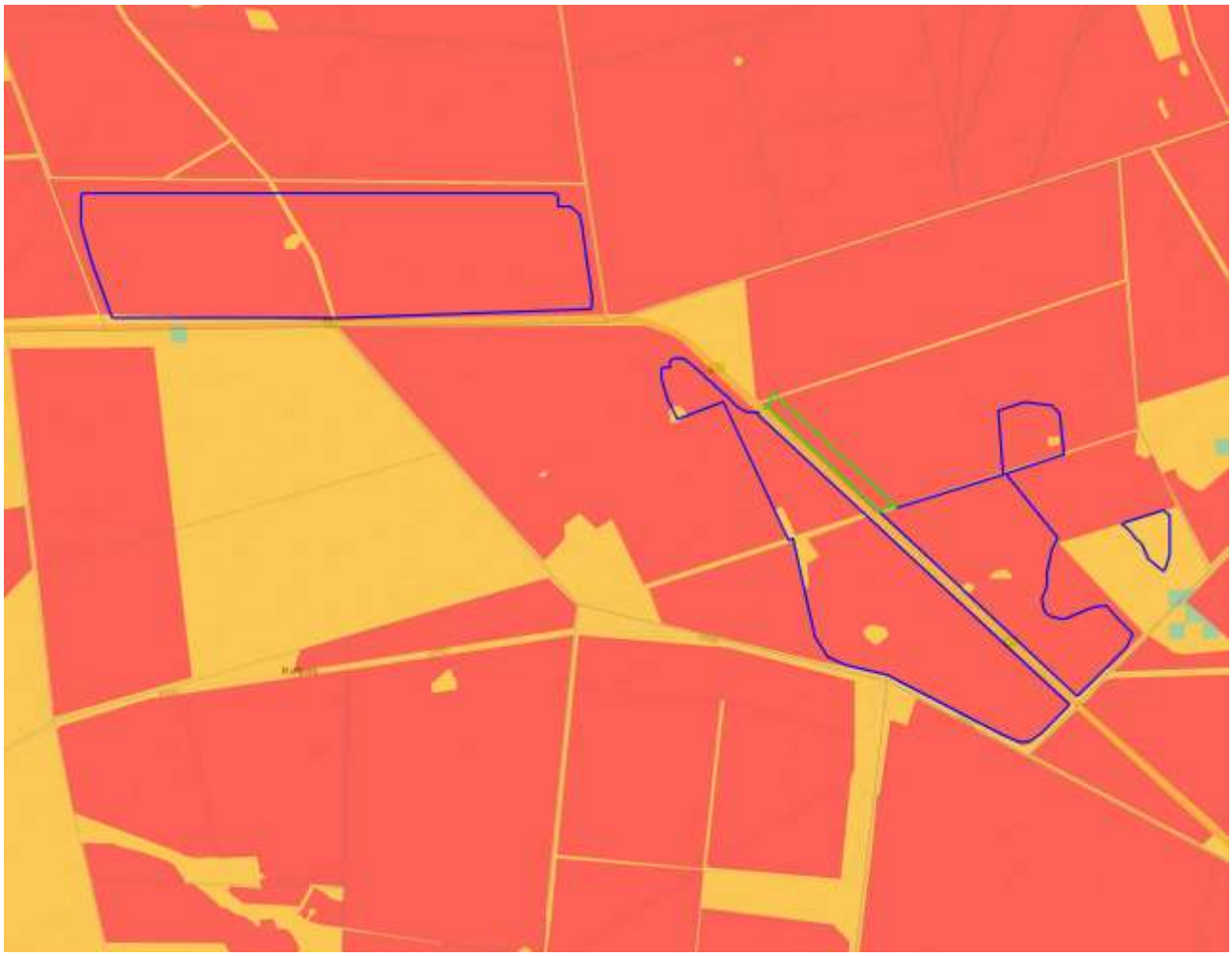

Figure 2. *The proposed development footprints (blue outlines) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high). The screening tool classification of cropland (high sensitivity) is outdated and the only land within the development footprint that should still be classified as cropland is indicated in green outline. Although this strip is currently cropped it has been identified as being of limited soil capability for viable crop production*

8 BASELINE DESCRIPTION OF THE AGRO-ECOSYSTEM

The aim of this section of the report is to present the baseline information that controls the agricultural production potential of the site and then, based on that information, to make an assessment of the production potential. That assessment is provided near the end of this section in sub-section 8.7.

A satellite image map of the proposed footprint of the facilities is shown in Figure 3 and photographs of site conditions are shown in Figures 4 to 9.

Figure 3. *Satellite image map of the proposed footprints of the two facilities. Although the Ratpan facility includes a small strip of cropland, this was identified as being of insufficient soil capability for viable crop production.*

8.1 **Soils**

The land type soil data as well as the soil data from investigated auger samples across the sites is given in Appendix 4. The entire site falls within one land type, Bd13. The geology is mainly Ecca sandstone. Ecca shale and mudstone may occur in places.

The land type includes a fairly high proportion of deep, red and yellow, reasonably-drained, sandy soils of the Avalon, Clovelly and Hutton soil forms that are good for crop production. It also includes other soils that have various limitations for crop production, which include poor drainage, limited depth, and limited water and nutrient holding capacity. These are soils of the Longlands, Westleigh, Kroonstad and Katspruit soil forms.

In a well-developed agricultural area with a long history of cropping, like the one being assessed, the suitable versus the unsuitable soils have been identified over time through trial and error. All the suitable soils are generally cropped, and uncropped soils can therefore fairly reliably be

considered to be unsuitable for crop production. It should be noted that the suitability changes with a changing agricultural economy over time. Slightly poorer soils that may have been cropped with economic viability in the past, are abandoned as cropland because they become too marginal for viable crop production in a more challenging agricultural economy.

Because the uncropped soils on the farm are very likely to be marginal for crop production, the soil investigation focused instead on those two areas within croplands that were identified to be limiting.

The layout of the facilities has deliberately avoided all higher potential soils within the larger assessed area. It will only utilise land that was identified as having insufficient land capability for viable and sustainable crop production and is therefore only good enough for grazing. Soils within the identified areas are predominantly limited in depth by poor drainage that causes saturation in underlying horizons and thereby limits root development and depth. Many of these soils are also depth-limited by a distinct transition to a dense, underlying clay horizon in the subsoil. Furthermore the leached E horizons, that are present as a result of the drainage limitations, have low water and nutrient holding capacity and can also have low pH. Crops on these soils are at risk of water logging in wet seasons and suffering from drought in dry seasons because the poorly developed, shallow roots and the soil's low water holding capacity provide an insufficient moisture reservoir to carry the plants through the season.

Details of the soil limitations specific to each of the two developments is given below.

8.1.1 Hormah

The farm was last cropped more than 17 years ago, according to the historical imagery on Google Earth. It was abandoned as cropland because it was found to be too marginal for viable crop production (personal communication from John Gossayn on 18 November 2021). If it had not been too marginal it would have continued to be successfully cropped like the other hundreds of hectares that are still cropped in the surrounding area by the family enterprise that own this land and many more farms in the area. The investigation of auger samples indicated that the soils are limited by poor drainage, low water and nutrient holding capacity in the upper soil horizons and depth limitations due to cemented hardpans in the subsoil. Soils are of the Longlands and Wasbank soil forms.

Figure 4. *Typical site conditions on the Hormah development area.*

Figure 5. *Typical site conditions on the Hormah development area.*

Figure 6. *Distinction between cropped lands on the left and uncropped lands on the right on the Ratpan site. The development almost entirely uses the uncropped lands.*

Figure 7. *Typical site conditions on uncropped lands on the Ratpan site.*

Figure 8. *Edge of the cropland on Ratpan that is affected by poor soil drainage.*

Figure 9. *Auger sample of one of the Longlands soils on Ratpan.*

8.1.2 Ratpan

Almost the entire farm was cropped in the past but the area chosen for the development is almost entirely on land that was abandoned as cropland at least 11 years ago, according to the historical imagery on Google Earth, because it was found to be too marginal for viable crop production (personal communication from Hans Pretorius on 18 November 2021). If it had not been too marginal it would have continued to be cropped like the other approximately 518 hectares that are still cropped on the farm.

There is one small section of land within the Ratpan project area (7 hectares) that is still under crop production. This is shown in Figures 2 and 3. This is a small section of an existing field that was identified by the farmer as having drainage problems that compromise production on this patch. The soil investigation confirmed the drainage limitations in this area. The soils elsewhere in the block are better drained soils of the Hutton, Avalon and Glencoe soil forms while those in the limited patch are of the Longlands and Kroonstad soil forms.

8.2 Terrain and slope

The site is situated on flat terrain with a very low slope gradient at an altitude of between 1,345 and 1,360 metres.

8.3 Available water sources

There is no irrigation available anywhere across the site.

8.4 Vegetation

Natural vegetation of the site is Vaal-Vet Sandy Grassland, which has been disturbed by agricultural activities.

8.5 Agro-climatic information

The site has a summer rainfall with a mean annual rainfall of between 496 and 520 mm and a mean annual evaporation of approximately 1,490 mm.

8.6 Land use and development on and surrounding the site

The site is located in a grain farming agricultural region, but the soils vary in their suitability for crop production. Crops in the area include maize, sunflowers and soya beans. Farmers generally utilise all suitable soil as cropland. Only soil that is not suitable for crop production is used for

grazing. Limitations that render the soil unsuitable for crop production are discussed in Section 8.1. The footprint of the solar facilities has been deliberately laid out so that it utilises only areas that are unsuitable or marginal for crop production.

8.7 Agricultural potential and productivity

The cropping potential of the proposed site is limited by the combination of a somewhat marginal climate (annual rainfall of 496 to 520 mm per annum) and soils with poor drainage, limited depth, and limited water and nutrient holding capacity. Crop production on these soils is therefore high risk and no longer considered economically viable.

The long-term grazing capacity of the farm is high at 7 hectares per large stock unit.

8.8 Agricultural employment

The agricultural enterprises employ a low number of farm workers (approximately 7) across their entire enterprises.

8.9 Existing impacts on the site

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

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. 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. The significance of the agricultural impact is directly proportional to the extent of the change in production potential.

9.2 Assessing the significance of agricultural impact

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.

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 to determine the importance, from an agricultural production point of view, of that land not being utilised for the development and kept solely for agriculture.

In other words, the significance of an agricultural impact 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? If the loss is small, then it is unlikely to justify non approval. If the loss is big, then it is likely to justify it.

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

It is also important to note that renewable energy facilities have both positive and negative 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 a farm or significant part of a farm is likely to be highly significant at the scale of that farm, but may be much less so 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

Two potential negative agricultural impacts have been identified, that are direct impacts:

1. **Loss of agricultural potential by 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. This impact is relevant only in the construction phase. No further loss of agricultural land use occurs in subsequent phases.
2. **Loss of agricultural potential by soil degradation –** This impact only occurs during the construction and decommissioning phases, but only becomes relevant once the land is returned to agricultural land use after decommissioning. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth. Soil degradation control measures, as recommended and included in the EMPr as standard best practice, are likely to be effective in preventing soil degradation.

Two positive agricultural impacts have been identified, that are indirect impacts:

1. **Enhanced agricultural potential through increased financial security for farming operations -** Reliable income will be generated by the farming enterprises through the lease of the land to the energy facilities. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.
2. **Enhanced agricultural potential through improved security against stock theft and other crime** due to the presence of security infrastructure and security personal at the energy facilities.

9.4 Cumulative impacts

The cumulative impact of a development is the impact that development will have when its impact

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

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

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

> What level of 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.

The DFFE compliance for this project requires considering all renewable energy project applications within a 30 km radius. According to the DFFE database, there are 7 other renewable energy projects within a 30 km radius. Furthermore there are another 4 projects associated with this current one. All these 12 projects that are considered for cumulative impacts are listed in Appendix 3 of this report.

The cumulative impact is affecting an agricultural environment that has been declared a Renewable Energy Development Zones (REDZ) precisely because it is an environment that can accommodate numerous renewable energy developments without exceeding acceptable levels of

agricultural land loss. This is primarily because farms in the area have a proportion of their surface area covered by lower potential soils that are unsuitable for crop production and can therefore be utilised for solar development without significantly lowering the future production potential of the farmland.

In quantifying the cumulative impact, the area of land taken out of agricultural production (mostly grazing) as a result of all 12 developments (total generation capacity of 1,140 MW) will amount to a total of approximately 2,850 hectares. This is calculated using the industry standards of 2.5 and 0.3 hectares per megawatt for solar and wind energy generation respectively, as per the Department of Environmental Affairs (DEA) Phase 1 Wind and Solar Strategic Environmental Assessment (SEA) (2015). As a proportion of the total area within a 30km radius (approximately 282,700 ha), this amounts to only 1.01% of the surface area. That is within an acceptable limit in terms of loss of land that is only suitable as grazing land, of which there is no particular scarcity in the country. This is particularly so when considered within the context of the following point.

In order for South Africa to achieve its renewable energy generation goals, agriculturally zoned land will need to be used for renewable energy generation. It is far more preferable to incur a cumulative loss of lower potential agricultural land in a region which has been designated as a REDZ, than to lose agricultural land that has a higher potential, and that is much scarcer, to renewable energy development elsewhere in the country.

All of these projects have the same agricultural impacts in a very similar agricultural environment, and therefore the same mitigation measures apply to both.

As discussed above, the proposed developments pose a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard best practice mitigation management actions included in the EMPr. If the risk for each individual development is low, then the cumulative risk is also low.

Due to all of the considerations discussed above, the cumulative impact of loss of future agricultural production potential will not have an unacceptable negative impact on the agricultural environment in the area. The proposed developments are therefore acceptable in terms of cumulative impact, 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 developments. There are no agricultural impacts of the no-go alternative.

The developments offer an alternative income source to agriculture, but it excludes agriculture

from a proportion of the land. Therefore, even though the excluded land has low agricultural production potential, the negative agricultural impact of the developments 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 developments and the no-go. However, the no-go option would prevent the proposed developments from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa.

9.6 Alternative development footprints and comparative assessment of alternatives

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

The proposed sites for the Mercury Cluster were chosen from a much larger investigated area, which underwent a detailed assessment that deliberately eliminated those parts of the larger area which were assessed as having sufficient land capability to support viable and sustainable crop production. Such land is considered to be above the threshold for being prioritised for conservation as agricultural production land and has not therefore been proposed for solar development. The proposed site includes only land within the larger assessed area that is not of sufficient land capability to support viable and sustainable crop production and is therefore the part of the assessed larger area that has the lowest agricultural sensitivity. These sites are shown in relation to the larger assessed area in Figure 10.

Design and layout alternatives within the proposed agricultural footprint will make absolutely no material difference to the significance of the agricultural impacts. The same applies to technology alternatives, and there are therefore no preferred alternatives from an agricultural impact perspective. All alternatives are considered acceptable.

9.7 Long term project benefits versus agricultural benefits

The developments will generate a greater per hectare income for the farming enterprise than the existing agricultural production will earn. It will also generate additional income and employment in the local economy. In addition, it will contribute to the country's urgent need for energy generation, particularly renewable energy that has lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

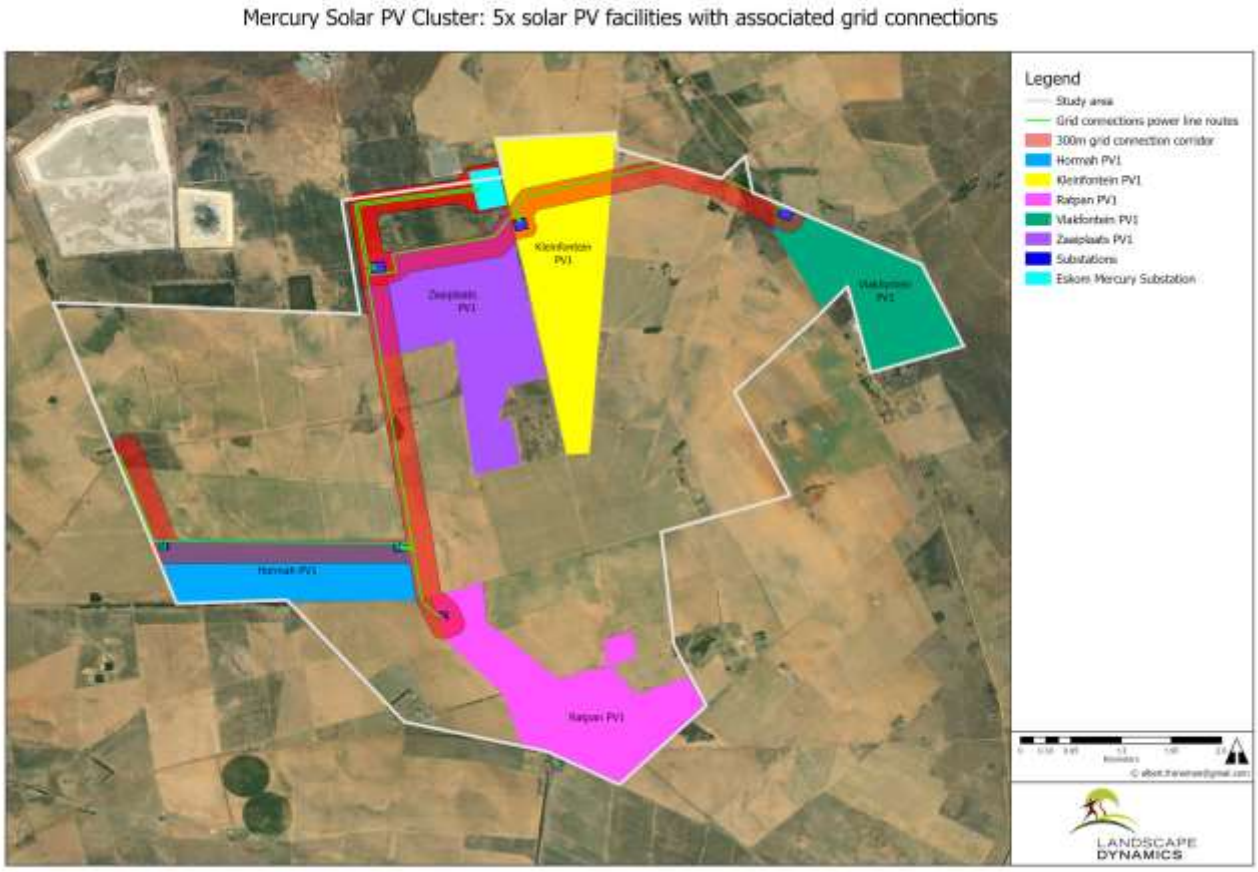

Figure 10. *Proposed sites for the Mercury Cluster Project that were identified within the larger assessed area (Study area) as being those parts of the study area that had insufficient land capability to support viable and sustainable crop production.*

9.8 Additional environmental impacts

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

9.9 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. As discussed in Section 9.6 above, the proposed siting minimizes agricultural impact and disturbance. The exact position of all infrastructure within the proposed site will not make any material difference to agricultural impacts.

9.10 Allowable development limits

The agricultural protocol requires confirmation of whether the development footprint is in line

with the allowable development limits or not, and requires motivation to support any deviation from the limits.

The entire Hormah development is on land that is not cropped and that has been shown to be unsuitable for crop production and therefore not deserving of a land capability of more than 7. The allowable development limit on such land is 2.5 ha per MW. The capacity of the facility is 120 MW and the agricultural footprint is 227 hectares. It can therefore be confirmed that the agricultural footprint of this development is within the allowable limit.

The proposed Ratpan development includes 7 hectares of cropland which means that the facility will not be within the allowable development limits. However, as has been discussed above, all the land within the proposed site is marginal for viable crop production and its use for solar energy can therefore be justified. The motivation for this is detailed below.

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 ideal, win-win scenario for both agricultural production and for electricity generation in South Africa, is for renewable energy facilities to be integrated with agricultural production in a way that provides benefits to agriculture and leads to very little loss of future agricultural production potential.

The proposed sites were chosen from a much larger investigated area, which underwent a detailed assessment that deliberately eliminated those parts of the larger area which were assessed as having sufficient land capability to support viable and sustainable crop production (see Figure 10). The proposed site includes only land within the larger assessed area that was identified as having soil limitations that make it marginal for supporting viable and sustainable crop production.

The proposed Ratpan solar energy facility will be on a farm on which the majority of the land is successfully cropped, but it will be on those parts that have the least agricultural production potential and are not suitable or marginal for crop production. There is therefore no danger that the proposed developments will replace successful crop production on the farm.

Both of the proposed development sites offer the win-win situation of renewable energy development that is integrated with agricultural production in a way that provides benefits to agriculture – reliable, additional income and security - and leads to little loss of future agricultural production potential because they utilise only lower potential land that is not suitable or marginal for crop production.

9.11 **The 10% rule**

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

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

The rule was established when solar energy development was new and unknown. However, it is now evident that solar energy development is less of a threat to agricultural production and the agricultural economy than it was initially feared that it might be. Solar energy development has demonstrated benefits for agriculture and has potential to be integrated into the rural agricultural economy. It is a source of much needed income injections 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 REDZ (DEA, 2015). This was if all the country's solar development was located only in those 8 REDZ, which it is not. An additional 2 REDZ have been proclaimed since then and much of the country's solar development is occurring outside the REDZ. This means that for the foreseeable future, solar energy will only ever occupy

much less than 0.4% of land in an area. If it will only ever occupy such a small proportion of the land, anyway, it cannot replace agriculture in the rural economy and it serves no purpose to limit solar facilities to 10% of each farm. From an agricultural production and food security point of view there is only a need to preserve scarce arable land for crop production and therefore to limit solar development to land that is of insufficient land capability to support viable crop production.

Early solar development in the country was located predominantly in arid, low potential agricultural environments with large farm sizes, such as the Northern Cape. In such environments the 10% rule is achievable, even if not desirable. However, because solar development has now used up the available grid capacity in the Northern Cape, it needs to move to more intensively farmed areas in the North West, Free State and 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. Solar energy development is integrated with agricultural production, it will not replace agriculture from the land and therefore does not pose a threat to agricultural production or to the agricultural economy of rural areas.

9.12 **Mitigation measures**

The following standard, best practice mitigation measures are recommended for controlling soil degradation at each project site.

- Implement an effective 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.
- 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.
- Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to stabilize disturbed soil against erosion, and to reduce dust formation.
- If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be

evenly spread over the entire disturbed surface, and then stabilized by facilitating vegetation cover.

9.13 **Impact assessment**

An Agricultural Agro-Ecosystem Specialist Assessment is required by the protocol to identify the extent of the impact of the proposed developments on agricultural resources. The assessment of the extent of the impact for the different phases of the two solar facilities is provided in table format below.

As discussed in Section 9.1, the significance of an agricultural impact is a direct function of the extent to which that impact will affect future agricultural production potential. The extent to which any of these impacts is likely to actually affect future agricultural production potential is small and the significance of all agricultural impacts is therefore low.

The assessment of impacts for both separate energy facilities are identical because both are located within a very similar agricultural environment.

9.13.1 Impacts associated with the design and pre-construction phase of the Hormah and Ratpan PV farms

There are no agricultural impacts associated with the design and pre-construction phase

9.13.2 Impacts associated with the construction phase of the Hormah and Ratpan PV farms

Impact Description: Loss of agricultural potential by 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. This impact is relevant only in the construction phase. No further loss of agricultural land use occurs in subsequent phases.

Cumulative impact description: Loss of agricultural potential by occupation of land

Mitigation: None possible

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Loss of land	Site	Long term	Definite	High	Low	Low

Impact on Irreplaceable Resources (after mitigation): No

Cumulative impact rating (after mitigation): Low

Impact Description: Loss of agricultural potential by soil degradation – This impact only occurs during the construction and decommissioning phases, but only becomes relevant once the land is returned to agricultural land use after decommissioning. Soil can be degraded by impacts in three different ways: erosion; topsoil loss; and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support vegetation growth.

Cumulative impact description: Loss of agricultural potential by soil degradation

Mitigation: storm water run-off control; maintain vegetation cover; strip, stockpile and re-spread topsoil.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Soil degradation	Site	Long term	Possible	Medium	Low	None

Impact on Irreplaceable Resources (after mitigation): No

Cumulative impact rating (after mitigation): Low

9.13.3 Impacts associated with the operational phase of the Hormah and Ratpan PV farms

Impact Description: Enhanced agricultural potential through increased financial security for farming operations - Reliable income will be generated by the farming enterprises through the lease of the land to the energy facilities. This is likely to increase their cash flow and financial security and could improve farming operations and productivity through increased investment into farming.

Cumulative impact description: Enhanced agricultural potential through increased financial security for farming operations

Mitigation: None possible

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Increased financial security	Site	Long term	Possible	High	Low	Low

Impact on Irreplaceable Resources (after mitigation): No

Cumulative impact rating (after mitigation): Low

Impact Description: Improved security against stock theft and other crime due to the presence of security infrastructure and personal at the facilities.

Cumulative impact description: Improved security against stock theft and other crime

Mitigation: None possible

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Improved security	Site	Long term	Possible	High	Low	Low

Impact on Irreplaceable Resources (after mitigation): No

Cumulative impact rating (after mitigation): Low

9.14 Impacts on agricultural employment of the Hormah and Ratpan PV farms

Because of the large size of the total farm operations, the loss of marginal parts of these operations is unlikely to have any impact on agricultural employment.

9.15 Impact statement

An Agricultural Agro-Ecosystem Specialist Assessment is required by the protocol to provide a substantiated statement on the acceptability, or not, of the proposed developments and a recommendation on the approval, or not of the proposed developments.

The impact of the proposed developments on the agricultural production capability of the site is assessed as being acceptable. This is substantiated by the following points:

1. The only agricultural land that will be used by the developments has limited agricultural production potential. The layout of the facilities has deliberately avoided all higher potential land on the farms. It will only utilise land that was identified as having insufficient land capability for viable and sustainable crop production and is therefore only good enough for grazing. 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.
2. The amount of agricultural land loss for the Hormah development is within the allowable

development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with lower agricultural production potential. The Ratpan development exceeds the limits but this is justified by all of the other points in this list.

3. The proposed developments offer positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
4. 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 facilities.
5. 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.
6. The proposed developments pose a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.
7. The proposed developments are within a REDZ, which is an area that has specifically been designated within South Africa for the prioritisation of renewable energy development. The designation of the REDZ has taken into account the country's need to balance renewable energy development against the conservation of land required for agricultural production and national food security.
8. The proposed developments will also have the wider societal benefits of generating additional income and employment in the local economy. In addition, it will contribute to the country's urgent need for energy generation, particularly renewable energy that has lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

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

10 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The EMPr inputs for the protection of soil resources are presented in the tables below for each phase of the developments.

Table 1: Management plan for the planning and design phase

Impact	**Mitigation /**	**Mitigation /**	**Monitoring**

	management objectives and outcomes	management actions	Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That disturbance and existence of hard surfaces causes no erosion on or downstream of the site.	Design an effective system of 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.	Ensure that the storm water run-off control is included in the engineering design.	Once-off during the design phase.	Holder of the EA

Table 2: Management plan for the construction phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout	Undertake a periodic site inspection to record the occurrence of and re-vegetation progress of all	Every 4 months during the construction phase	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
		the site, to stabilize disturbed soil against erosion.	areas that require re-vegetation.		
Topsoil loss	That topsoil loss is minimised	If an activity will mechanically disturb the soil below surface in any way, then any available topsoil should first be stripped from the entire surface to be disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that topsoil covers the entire disturbed area.	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Table 3: Management plan for the operational phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	**Frequency**	**Responsibility**
Aspect: Protection of soil resources					
Erosion	That denuded	Facilitate re-	Undertake a	Bi-annually	Facility

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
	areas are re-vegetated to stabilise soil against erosion	vegetation of denuded areas throughout the site	periodic site inspection to record the progress of all areas that require re-vegetation.		Environmental Manager

Table 4: Management plan for the decommissioning phase

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
Aspect: Protection of soil resources					
Erosion	That vegetation clearing does not pose a high erosion risk.	Maintain where possible all vegetation cover and facilitate re-vegetation of denuded areas throughout the site, to 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 from the entire surface to be	Record GPS positions of all occurrences of below-surface soil disturbance (e.g. excavations). Record the date of topsoil stripping and replacement. Check that	As required, whenever areas are disturbed.	Environmental Control Officer (ECO)

Impact	Mitigation / management objectives and outcomes	Mitigation / management actions	Monitoring		
			Methodology	Frequency	Responsibility
		disturbed and stockpiled for re-spreading during rehabilitation. During rehabilitation, the stockpiled topsoil must be evenly spread over the entire disturbed surface.	topsoil covers the entire disturbed area.		

11 CONCLUSIONS

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 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 ideal, win-win scenario for both agricultural production and for electricity generation in South Africa, is for renewable energy facilities to be integrated with agricultural production in a way that provides benefits to agriculture and leads to very little loss of future agricultural production potential.

The conclusion of this assessment is that the proposed developments offer such a win-win scenario. This is substantiated by the following points:

1. The only agricultural land that will be lost as a result of the developments has limited agricultural production potential. The layout of the facilities has deliberately avoided all higher potential land on the farms. It will only utilise land that was identified as having insufficient land capability for viable and sustainable crop production and is therefore only good enough for grazing. 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.
2. The amount of agricultural land loss for the Hormah development is within the allowable development limits prescribed by the agricultural protocol. These limits reflect the national need to conserve valuable agricultural land and therefore to steer, particularly renewable energy developments, onto land with lower agricultural production potential. The Ratpan development exceeds the limits but this is justified by all of the other points in this list.
3. The proposed developments offer some positive impact on agriculture by way of improved financial security for farming operations, as well as security benefits against stock theft and other crime.
4. 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 facilities.
5. 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.
6. The proposed developments pose a low risk in terms of causing soil degradation, which can be adequately and fairly easily managed by standard, best practice mitigation management actions.
7. The proposed developments are within a REDZ, which is an area that has specifically been designated within South Africa for the prioritisation of renewable energy development. The designation of the REDZ has taken into account the country's need to balance renewable energy development against the conservation of land required for agricultural production and national food security.
8. The proposed developments will also have the wider societal benefits of generating additional income and employment in the local economy. In addition, it will contribute to the country's urgent need for energy generation, particularly renewable energy that has lower environmental and agricultural impact, on a national scale, than existing, coal powered energy generation.

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

The conclusion of this assessment on the acceptability of the proposed developments and the recommendation for its approval is not subject to any conditions other than implementation of the

recommended mitigation measures.

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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 (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**

In the past 5 years of running my soil and agricultural consulting business, I have completed more than 120 agricultural assessments (EIAs, SEAs, EMPRs) in all 9 provinces for renewable energy, mining, urban, and agricultural developments. My regular clients include: Aurecon; CSIR; SiVEST; Arcus; SRK; Environamics; Royal Haskoning DHV; Jeffares & Green; JG Afrika; Juwi; 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.

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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

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

PROJECT TITLE

THE PROPOSED MERCURY CLUSTER PROJECT (SOUTHERN PV FARMS) NEAR VILJOENSKROON IN THE 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:

04/04/2022

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

04/04/2022

Date

J. MULLER
0619058 8 CAPTAIN

Signature of the Commissioner of Oaths

Wynberg SAPolice Chuichshe

Date

SOUTH AFRICAN POLICE SERVICE
STATION COMMANDER
WYNBERG
2022 -04- 04
STASIEBEVELVOEDER
WYNBERG
SOUTH AFRICAN POLICE SERVICE

APPENDIX 3: PROJECTS CONSIDERED FOR CUMULATIVE IMPACT

Table 5: All renewable energy applications within a 30 km radius of the proposed developments.

Site name	Proposed generating capacity	DEFF reference	Project status
Kabi Vaalkop PV 1	75 MW	12/12/20/2513/1	Approved
Kabi Vaalkop PV 2	75 MW	12/12/20/2513/2	Approved
Kabi Vaalkop PV 3	75 MW	12/12/20/2513/3	Approved
Kabi Vaalkop PV	75 MW	12/12/20/2513/4	Approved
Genesis Orkney Solar (Pty) Ltd	100MW	14/12/16/3/3/2/954	Approved
Buffels Solar PV 1	100MW	14/12/16/3/3/2/777	Approved
Buffels Solar PV 2	100 MW	14/12/16/3/3/2/778	Approved
Hormah PV	120 MW		In process
Ratpan PV	80 MW		In process
Zaaiplaats PV	120 MW		In process
Kleinfintein PV	120 MW		In process
Vlakfontein PV	100 MW		In process
Total	**1,140 MW**		

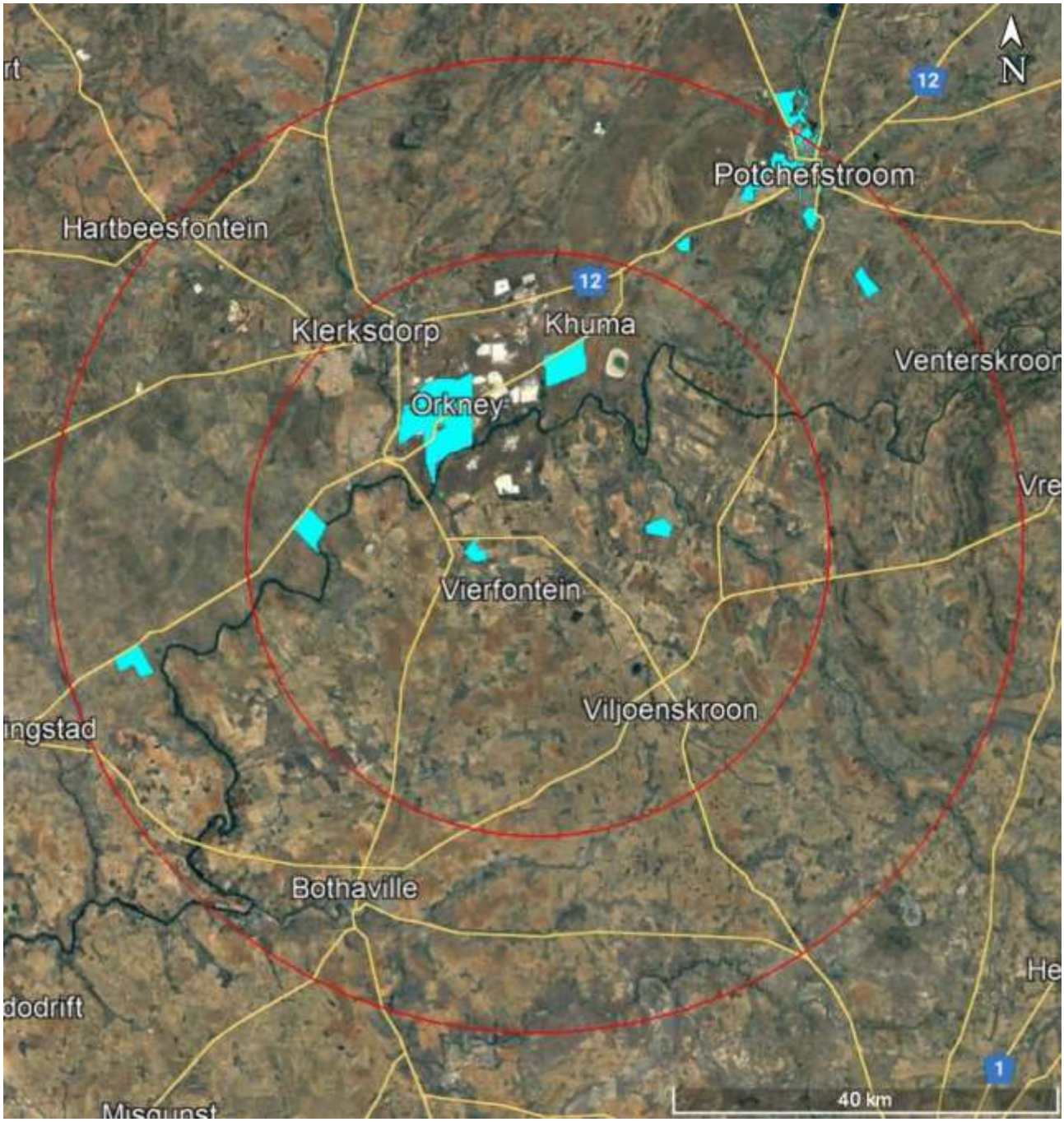

Figure 10. *35 km and 50 km radius around the site showing all renewable energy projects in light blue.*

APPENDIX 4: SOIL DATA

Table 6: Soil data of land types

Land type	Soil series (forms)	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Bd13	Avalon	900 - 1200	4 - 15	6 - 20	B2gc	26
Bd13	Clovelly	900 - 1100	0 - 8	2 - 10	R,so	13
Bd13	Avalon	900 - 1000	0 - 4	1 - 6	B2gc	12
Bd13	Hutton	> 1200	4 - 10	6 - 15	R,so	9
Bd13	Glencoe	700 - 800	0 - 6	2 - 10	hp	8
Bd13	Kroonstad	400 - 600	2 - 10	25 - 35	B2	7
Bd13	Longlands	900 - 1100	0 - 6	10 - 25	B2gc	6
Bd13	Rock					6
Bd13	Katspruit / Willowbrook	300 - 600	15 - 40		G	3
Bd13	Sterkspruit / Estcourt	300 - 400	6 - 20	25 - 35	B2	3
Bd13	Longlands	900 - 1100	6 - 15	15 - 25	B2gc	3
Bd13	Mispah / Glenrosa	150 - 250	4 - 15		R,hp,so	3
Bd13	Fernwood / Oakleaf	> 1200	6 - 10	15 - 20	R,so	1

Table 7: Table of soil data from investigated auger samples on site.

Sample no.	Soil forms	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer
1	Longlands	700	3	12	Poorly drained soft plinthic horizon with distinct transition to dense clay
2	Glencoe	900	5	7	Cemented hardpan
3	Avalon	900	5	7	Distinct transition to poorly drained dense clay
4	Longlands	700	3	10	Poorly drained soft plinthic horizon with distinct transition to dense clay
5	Kroonstad	700	3	35	Distinct transition to poorly drained dense clay
6	Longlands	700	3	10	Poorly drained soft plinthic horizon with distinct transition to dense clay
7	Hutton	>1200	6	8	No depth limitation
8	Avalon	1000	6	8	Distinct transition to poorly drained dense clay
9	Longlands	800	3	8	Distinct transition to poorly drained dense clay
10	Kroonstad	700	3	35	Distinct transition to poorly drained dense clay
11	Avalon	1000	6	8	Distinct transition to poorly drained dense clay
12	Avalon	1000	6	8	Distinct transition to poorly drained dense clay
13	Westleigh	600	5	10	Poorly drained soft plinthic horizon with distinct transition to dense clay
14	Westleigh	600	5	10	Poorly drained soft plinthic horizon with distinct transition to dense clay
15	Wasbank	300	2	5	Cemented hardpan
16	Longlands	600	3	6	Poorly drained soft plinthic horizon with distinct transition to dense clay
17	Wasbank	300	2	5	Cemented hardpan
18	Longlands	600	3	10	Poorly drained soft plinthic horizon with distinct transition to dense clay

Table 8: GPS coordinates of auger samples.

Sample no.	latitude	longitude
1	-27.0592980087	26.8273249827
2	-27.0583480038	26.8307189830
3	-27.0574359689	26.8337799702
4	-27.0534770284	26.8201950006
5	-27.0540500153	26.8205300253
6	-27.0565349981	26.8233729992
7	-27.0559090376	26.8128299899
8	-27.0550850127	26.8153729755
9	-27.0540459920	26.8182759639
10	-27.0550600346	26.8189699855
11	-27.0581459999	26.8206190411
12	-27.0606889855	26.8219090160
13	-27.0697215758	26.8361067865
14	-27.0676392596	26.8381019309
15	-27.0472419821	26.7952160072
16	-27.0461934898	26.7870199308
17	-27.0452506095	26.7973737605
18	-27.0464717690	26.8103856593