Johann Lanz
Soil Scientist (Pr.Sci.Nat.)
Reg. no. 400268/12

Cell: 082 927 9018
e-mail: johann@johannlanz.co.za

1A Wolfe Street
Wynberg
7800
Cape Town
South Africa

SITE SENSITIVITY VERIFICATION
AND
AGRICULTURAL AGRO-ECOSYSTEM SPECIALIST ASSESSMENT
FOR
THE PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY
NEAR HENDRINA IN MPUMALANGA PROVINCE

Report by
Johann Lanz

6 April 2023

Table of Contents

EXECUTIVE SUMMARY

The purpose of the agricultural component in the environmental assessment 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.

It is important to assess the agricultural impact of this plant within the context of the net overall agricultural impact of the whole Hendrina renewable energy project of which it is an integral part. Within this context, the conclusion of this assessment is that the agricultural impact of the proposed development will be acceptable because:

1. The proposed development will exclude only a fairly small area of land (up to 25 ha) from future agricultural production.
2. The proposed plant is an integral part of the greater Hendrina renewable energy project which offers a valuable opportunity for renewable energy facilities to be integrated with agricultural production in a way that provides renewable energy to the country as well as benefits to agriculture with very little loss of future agricultural production potential. The agricultural benefits are increased economic viability for agricultural operations on site, security benefits against stock theft and other crime, an improved road network, with associated storm water handling system, and that the project will decrease the need for coal power and thereby contribute to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land in the area.

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

Of the three proposed site alternatives, the location for the plant in alternative 3 has lower agricultural impact than alternatives 1 and 2, which have equal agricultural impact, and alternative 3 is therefore preferred from an agricultural impact point of view.

1 INTRODUCTION

Environmental authorisation is being sought for the proposed Hendrina green hydrogen and ammonia facility near Hendrina in Mpumalanga 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.

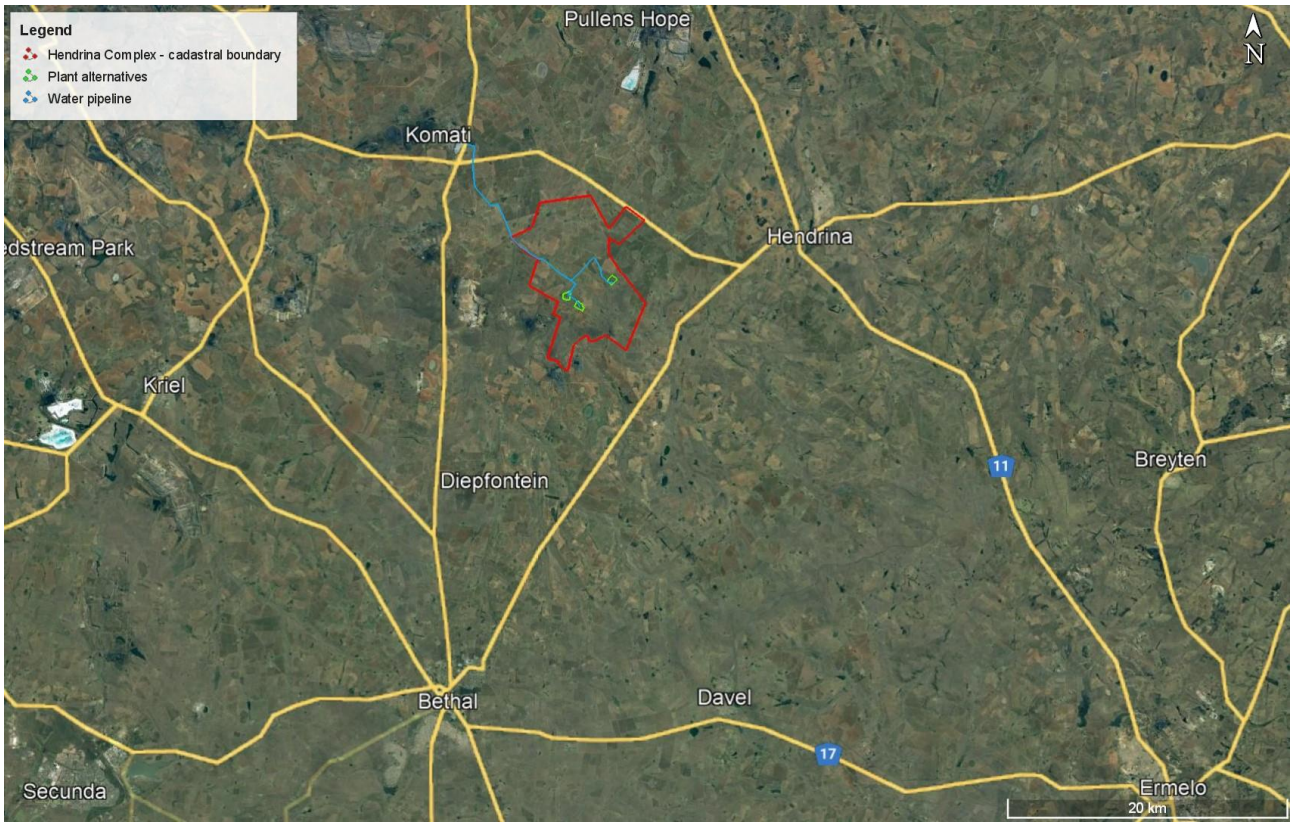

Figure 1. *Locality map of the proposed development.*

The purpose of the agricultural component in the Environmental Authorisation 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.

It is important to assess the agricultural impact of this facility within the context of the net overall agricultural impact of the whole Hendrina renewable energy project of which it is an integral part and without which it would not be brought into existence.

2 PROJECT DESCRIPTION

The proposed plant will be up to 25 hectares in extent and comprise of various different infrastructure. The exact nature and layout of the different infrastructure within the facility has absolutely no bearing on the significance of agricultural impacts. It is therefore not necessary to detail the design and layout of the facility any further in this assessment. All that is of relevance is simply the total up to 25 hectare footprint of the facility that excludes agricultural land use, referred to as the agricultural footprint. This is the area within the facility fence.

This assessment includes the construction of a new pipeline (up to 16km) from the Komati Power Station to supply water to the plant. The pipeline route runs only on the edges of croplands rather than across them and it therefore has negligible agricultural impact. The assessment also includes the power line connections for the plant. The agricultural impact of a power line is however 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*, 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 includes land that is of high or more agricultural sensitivity. The level of agricultural assessment required in terms of the agricultural protocol for sites verified as high or more sensitivity is 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.

1. The assessment must be undertaken by a soil scientist or agricultural specialist registered with the South African Council for Natural Scientific Professions (SACNASP) **(Appendix 5)**.
2. The assessment must be undertaken on the preferred site and within the proposed development footprint **(Figure 3)**.
3. The assessment must be undertaken based on a site inspection as well as an investigation of the current production figures, where the land is under cultivation or has been within

the past 5 years, and must identify:

1. the extent of the impact of the proposed development on the agricultural resources **(Section 9.11)**;
2. whether or not the proposed development will have an unacceptable negative impact on the agricultural production capability of the site (Section 11), 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 9.11)**;
    2. Change in employment figures (both permanent and casual) for the past 5 years expressed as an annual figure **(Section 9.11)**;
    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 9.11)**;
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. an identification of any areas to be avoided, including any buffers **(Section 9.10)**;
11. a motivation must be provided if there were development footprints identified as per point 5.3 above that were identified as having a medium or low agricultural sensitivity and that were not considered appropriate **(Section 9.6)**;
12. 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)**;
13. 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 11)**;
14. Any conditions to which this statement is subjected **(Section 11)**;
15. Where identified, proposed impact management outcomes or any monitoring requirements for inclusion in the Environmental Management Programme (EMPr) **(Section 10)**;
16. 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 28 March 2022.

The soil investigation was conducted on the entire wind farm site. It was based on the investigation of existing excavations and exposures, soil 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 a wind farm 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 autumn 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

The 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, i.e. no subdivision is applicable. 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 (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.

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.

A map of the proposed development area overlaid on the screening tool sensitivity is given in Figure 2. The land capability values of all three alternative facility sites vary between 8 and 10. However, the small scale differences in land capability across the project area are not very accurate or significant at this scale and are more a function of how the land capability data is generated by modelling, than actual meaningful differences in agricultural potential on the ground. Historical land use is a more reliable indication of soil cropping potential than land capability. The suitable versus the unsuitable soils have been identified over time through trial and error. In an agricultural environment like the one being assessed, all the suitable soils are generally cropped, and uncropped soils can therefore fairly reliably be considered to be unsuitable for crop production. Cropped areas are shown in Figure 3.

The most easterly of the 3 sites (alternative 3) is therefore actually the lower potential site because it is uncropped and should be classified as medium agricultural sensitivity. Part of both of the other 2 sites are on cropland which is therefore confirmed as high agricultural sensitivity. Much of the pipeline route runs on land classified as high agricultural sensitivity, but the entire pipeline route

runs on the edges of croplands rather than through them, which reduces its agricultural impact.

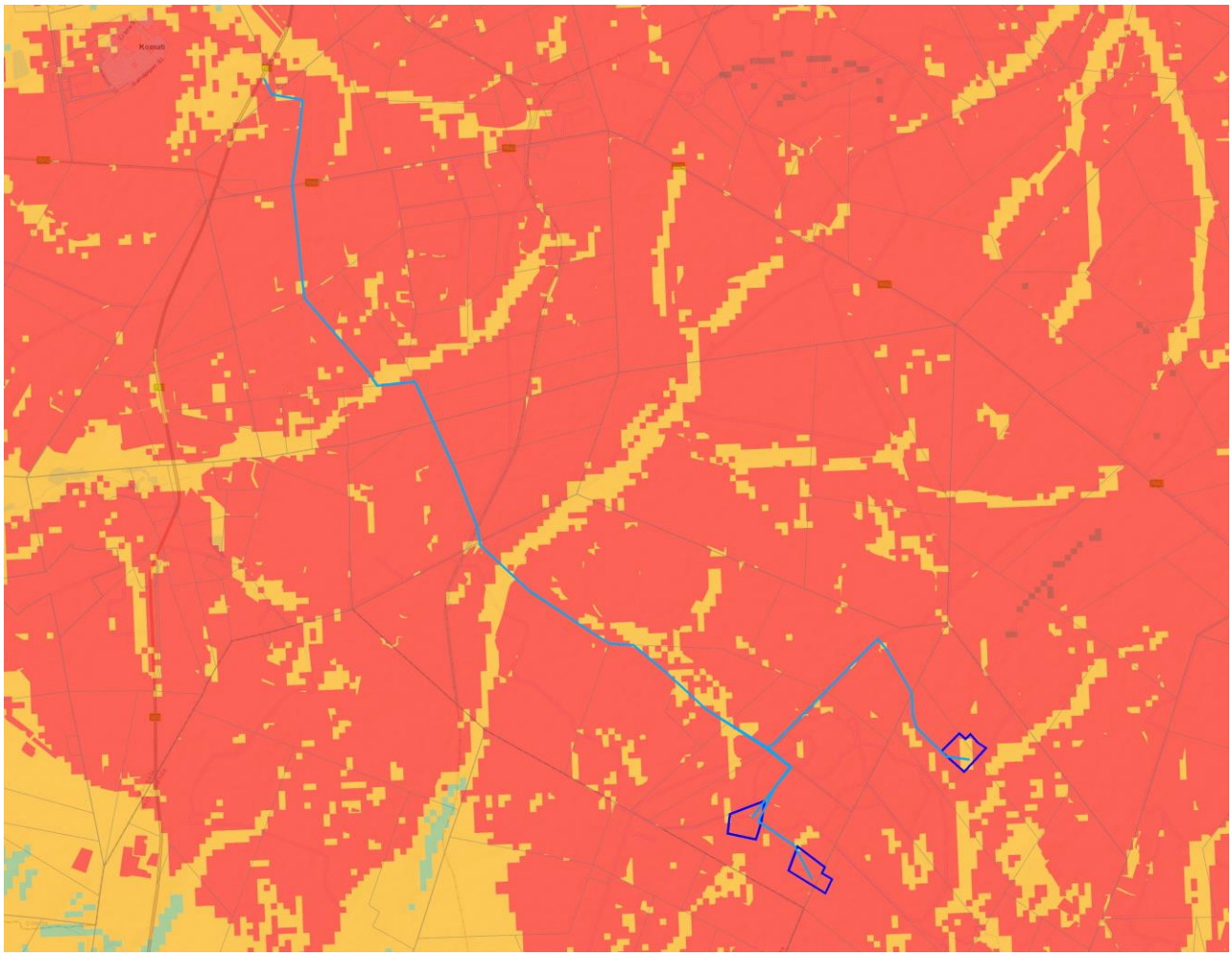

Figure 2. *The three proposed alternative sites for the facility (dark blue outlines) and the pipeline (light blue line) overlaid on agricultural sensitivity, as given by the screening tool (green = low; yellow = medium; red = high)*

This site sensitivity verification verifies those parts of the site that are indicated as cropland in Figures 3 and 4 as being of high agricultural sensitivity and the rest of the site as being of medium agricultural sensitivity.

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 so that the significance of the agricultural impact on it can be assessed.

A satellite image map of the alternative agricultural footprints of the facility is shown in Figure 3. A map showing the pipeline route is shown in Figure 4 and photographs of site conditions are shown in Figures 5 and 6.

Figure 3. *Satellite image map of the three alternative sites for the proposed facility, showing all cropland shaded green. Alternatives 1 to 3 are located in numerical order from west to east.*

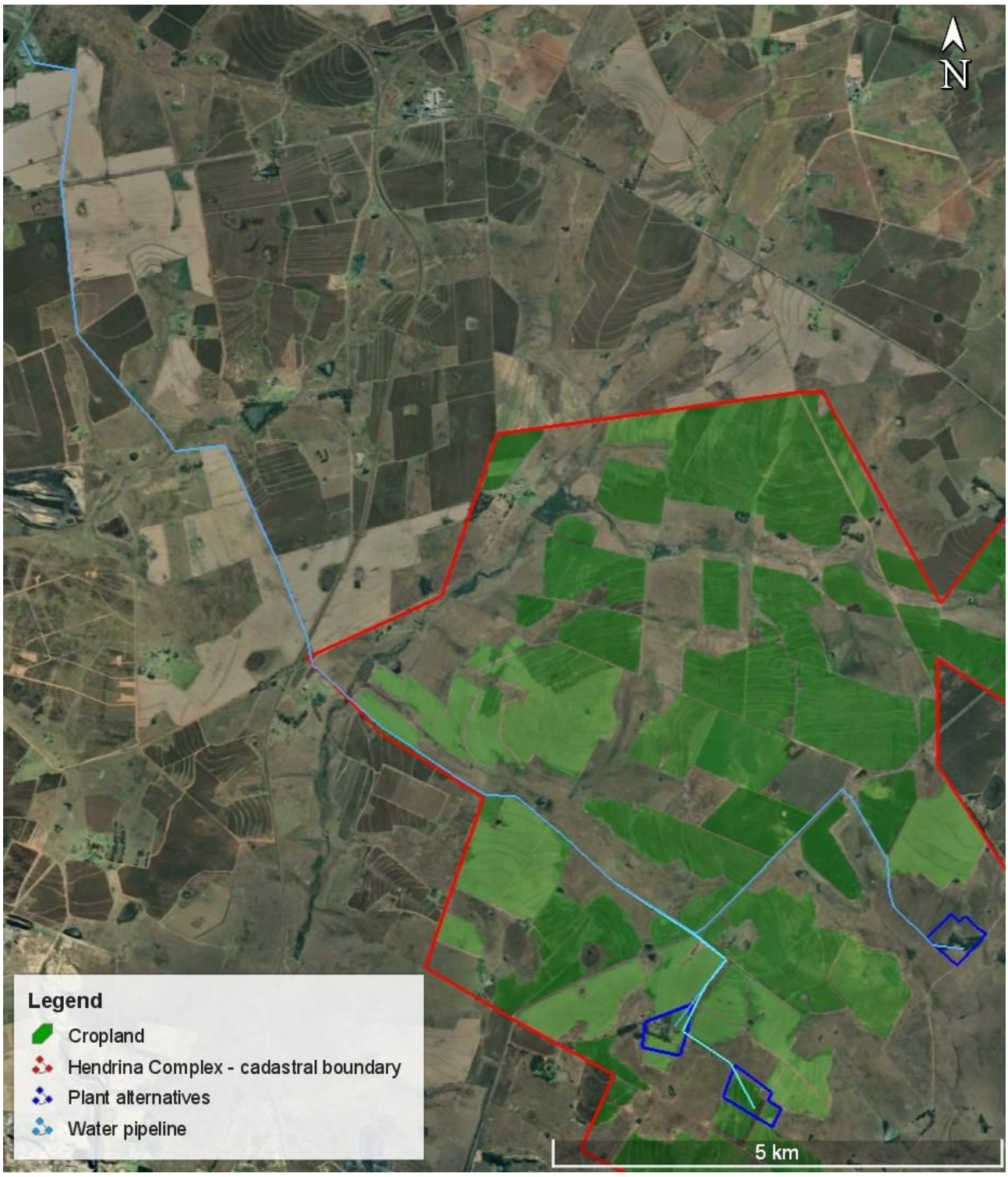

Figure 4. *Satellite image map of the proposed pipelines to the alternative facility sites.*

Figure 5. *View of alternative site number 3, which includes the clump of trees, on the horizon.*

Figure 6. *View of alternative site number 1, showing some of the cropland over which the site extends.*

8.1 Soils

All three alternative locations fall within one land type, Bb4 (see table of soil data in Appendix 4). The geology is predominantly shale and sandstone of the Ecca Group of the Karoo Supergroup and includes dolerite. The land type includes a fairly high proportion of deep, red and yellow, reasonably-drained, loamy soils of the Avalon, Hutton and Glencoe soil forms that are good for crop production. It also includes other soils that have various limitations for crop production, which are predominantly the result of poor drainage or limited depth due to underlying clay or bedrock. These soils are of the Mispah and Glenrosa soil forms (shallow bedrock) and the Westleigh, Longlands, Rensburg, Estcourt, and Katspruit soil forms (poor drainage and underlying clay).

8.2 Terrain and slope

The wind farm site is situated on elevated, slightly hilly terrain, with all aspects, at an altitude of between 1,600 and 1,700 metres and slopes up to about 7%, but the actual green hydrogen facility sites are much flatter.

8.3 Available water sources

There is no significant irrigated crop production anywhere across the site (as per Figure 3 above) because water for irrigation is generally not available in the area.

8.4 Vegetation

Natural vegetation of the site is Eastern Highveld Grassland, which has been disturbed by agricultural and other anthropogenic activities.

8.5 Agro-climatic information

The site has a summer rainfall with a mean annual rainfall of between 617 and 696 mm and a mean annual evaporation of approximately 1,290 mm (Schulze, 2009).

8.6 Land use and development on and surrounding the site

The development is located in a grain and cattle farming agricultural region, but the soils vary in their suitability for crop production. Crops in the area include mainly maize and soya beans. Farmers generally utilise all suitable soil as cropland. Only soil that is not suitable for crop production is used for grazing of cattle and sheep. Limitations that render the soil unsuitable for crop production are poor drainage and depth limitations due to rock or dense clay in the subsoil.

Alternatives 1 and 2 are on cropland while alternative 3 is on land not used for crops and therefore presumed to be unsuitable.

Coal-fired electricity generation and mining take place in the surrounding area.

8.7 Agricultural potential and productivity

Because of the favourable climate and suitable soils on the croplands, crop yields are fairly high with average maize yields of around 7 to 8 tons per hectare according to the farmers on site. The long-term grazing capacity of the area is fairly high at 5 hectares per large stock unit (DAFF, 2018).

8.8 Agricultural employment

The socio-economic specialist study for the Hendrina North and South wind energy facilities has estimated, from data obtained from surveyed landowners, that agricultural operations in the directly affected area employ approximately 112 people, the majority of whom are permanent employees (71 people).

8.9 Existing impacts on the site

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

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 The significance of agricultural impact and the factors that determine it

The purpose of the agricultural component in the environmental assessment 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 loss 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. In this case the loss is of up to 25 hectares of land, which on alternatives 1 and 2 is cropland and on alternative 3 is not.

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.

9.3 Impact identification

The only impact of this development is the loss of up to 25 hectares of agricultural land on the site of the facility. The proposed pipeline, because it is linear infrastructure and runs only between and on the edges of croplands, instead of through them, has minimal agricultural impact. The proposed overhead power lines have negligible agricultural impact, regardless of their route and design and the agricultural potential of the land they traverse. All agricultural activities can continue completely unhindered underneath the power lines. This is because their direct, permanent, physical footprint that has any potential to interfere with agriculture (pylon bases), is insignificantly small and the pylons can easily be located on the edges of cropland where they do not interfere with it. There will therefore be no reduction in future agricultural production potential underneath the power lines.

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.

This development is an integral part of the Hendrina wind energy facilities. A cumulative impact assessment needs to consider it as such and not in isolation. 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 these projects (total generation capacity of 490 MW) will amount to a total of approximately 344 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 0.12% of the surface area. That is considered to be within an acceptable limit in terms of loss of agricultural land.

The cumulative impact of mining in the area is also relevant because it has excluded large areas of agricultural land. However, 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 had on highly productive agricultural land in this area.

Due to the considerations discussed above, the cumulative impact of loss of agricultural land use will not have an unacceptable negative impact on the agricultural production capability of the area. The proposed development is 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 development. There are no agricultural impacts of the no-go alternative but it would prevent the proposed development from contributing to the environmental, social and economic benefits associated with the development of renewable energy in South Africa. It should be noted that any future coal mining on the site will have a significant and much greater agricultural impact than the proposed facility with its associated wind energy facility.

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.

As discussed in Section 7, the location of alternative 3 is on lower potential agricultural land than the other two alternatives, which is not suitable for crop production. Alternative 3 is therefore preferred from an agricultural impact point of view. Alternative 1 and 2 have the same agricultural impact as both are partly located on cropland.

Because of the insignificant agricultural impact of the power lines and the pipelines, there can be no material difference between the agricultural impacts of any proposed route alternatives. All have insignificant agricultural impact. All proposed alternatives are considered acceptable in terms of agricultural impact.

9.7 Long term project benefits versus agricultural benefits

The subject of this assessment, the green hydrogen and ammonia facility, should be considered as an integral part of the wind energy facilities rather than being assessed in unrealistic isolation. The entire development will generate a significant (at the scale of an individual farm), reliable, and predictable additional income for the directly affected farming enterprises, without compromising the existing farming income. It will also generate additional income and employment in the local economy. In addition, it will contribute to the country's need for energy generation, particularly renewable energy that has lower environmental and agricultural impact on a national scale than

existing, coal powered energy generation.

9.8 Additional environmental impacts

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

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 has been noted in Section 9.6 above, alternative 3 has lower agricultural impact than the other two alternatives.

The only micro-siting that is recommended is that pylons not be placed within any croplands, but instead be located on the edges of them.

9.10 Areas to be avoided including buffers

No buffers are required for agricultural impacts. No parts of the proposed sites need to be avoided for agricultural impacts. However, as has been noted in Section 9.6 above, alternative 3 has lower agricultural impact than the other two alternatives. In addition it is recommended that pylons not be placed within any croplands, but instead be located on the edges of them.

9.11 Impact assessment

An Agricultural Agro-Ecosystem Specialist Assessment is required by the protocol to identify the extent of the impact of the proposed development on agricultural resources. The assessment of impacts in an environmental impact assessment is done according to a prescribed, semi-quantitative rating methodology that is supposed to cover all specialist disciplines and allow comparison of the impacts across them. However, the system was designed for biological components of the ecosystem such biodiversity and does not rate agricultural impacts in a sensible or particularly useful way. As has been discussed above, the significance of the agricultural impact is simply the degree to which the future agricultural production potential of the site will be changed and that is predominantly a function of the size of the area of land that is impacted and the production potential of that impacted land. The dominant factor in this case is the relatively small size of the area of land that is impacted (up to 25 ha) which is a small proportion of the affected farm. The prescribed methodology is presented below for compliance purposes but is not really an effective indication of the significance of the agricultural impact.

Furthermore, it is important to assess the agricultural impact within the context of the whole Hendrina renewable energy project. It does not make sense to consider the agricultural impacts of the different components of the project in isolation from each other, in the way that the rating methodology forces one to do. The context of the net overall agricultural impact of the greater project is important to take into account.

Aspect:	Agricultural production potential
Description:	Decrease in agricultural production potential due to occupation of up to 25 hectares of land by the green hydrogen plant.
Stage:	There is only one agricultural impact and it occurs for the duration of the project life time. To differentiate between the different phases of the project does not make sense, but for compliance purposes the impact, as assessed below, can be considered to be identical across the construction, operation and decommissioning phases of the project.
Character:	Negative
Ease of mitigation:	Loss of facility site cannot be mitigated

	Without mitigation	
Magnitude (M)	Low (2)	
Extent (E)	Site only (1)	
Reversibility (R)	Recoverable (3)	
Duration (D)	Long term (4)	
Probability (P)	Definite (5)	
Significance (S)	N1 – Moderate (50)	

The agricultural protocol requires an indication of the potential losses in production and employment from the change of the agricultural use of the land as a result of the proposed development. The development will result in production losses of up to 25 hectares of annual crops. No losses of agricultural employment are expected because the site occupies only a small proportion of a much larger farming operation and the cessation of cropping on the site will not significantly reduce the farm's labour requirement.

10 ENVIRONMENTAL MANAGEMENT PROGRAMME INPUTS

The entire site of the facility will be excluded as agricultural production land by the development and there can therefore be no environmental management programme inputs to protect the agricultural production potential of that site.

To mitigate disturbance to croplands it is recommended that pylons not be placed within any croplands, but instead be located on the edges of them. The overhead power lines can cross croplands, but they should span across them with the pylons being placed on either side.

Where excavation is done to bury the pipeline, the upper 30 cm of topsoil must be kept separate from the rest of the excavation spoils and stored in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface, as it originally was.

11 CONCLUSIONS

The conclusion of this assessment is that the agricultural impact of the proposed development is acceptable because:

1. The proposed development will exclude only a small area of land (up to 25 ha) from future agricultural production.
2. The proposed facility is an integral part of the greater Hendrina renewable energy project which offers a valuable opportunity for renewable energy facilities to be integrated with agricultural production in a way that provides renewable energy to the country as well as benefits to agriculture with very little loss of future agricultural production potential. The agricultural benefits are increased economic viability for agricultural operations on site, security benefits against stock theft and other crime, an improved road network, with associated storm water handling system, and that the project will decrease the need for coal power and thereby contribute to reducing the large agricultural impact that open cast coal mining has on highly productive agricultural land in the area.

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.

12 REFERENCES

Cape Farm Mapper. Available at: https://gis.elsenburg.com/apps/cfm/

Crop Estimates Consortium, 2019. *Field Crop Boundary data layer, 2019*. Pretoria. Department of Agriculture, Forestry and Fisheries.

Department of Agriculture Forestry and Fisheries (DAFF), 2018. Long-term grazing capacity map for

South Africa developed in line with the provisions of Regulation 10 of the Conservation of Agricultural Resources Act, Act no 43 of 1983 (CARA), available on Cape Farm Mapper. Available at: https://gis.elsenburg.com/apps/cfm/

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

Department of Agriculture, Forestry and Fisheries, 2002. National land type inventories data set. Pretoria.

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.

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

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

APPENDIX 1: SPECIALIST CURRICULUM VITAE

Johann Lanz
Curriculum Vitae

Education

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

Professional work experience

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

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

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

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

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

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

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

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

Publications

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

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 HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY NEAR HENDRINA IN MPUMALANGA 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

2335491

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 CONSIDERED FOR CUMULATIVE IMPACT

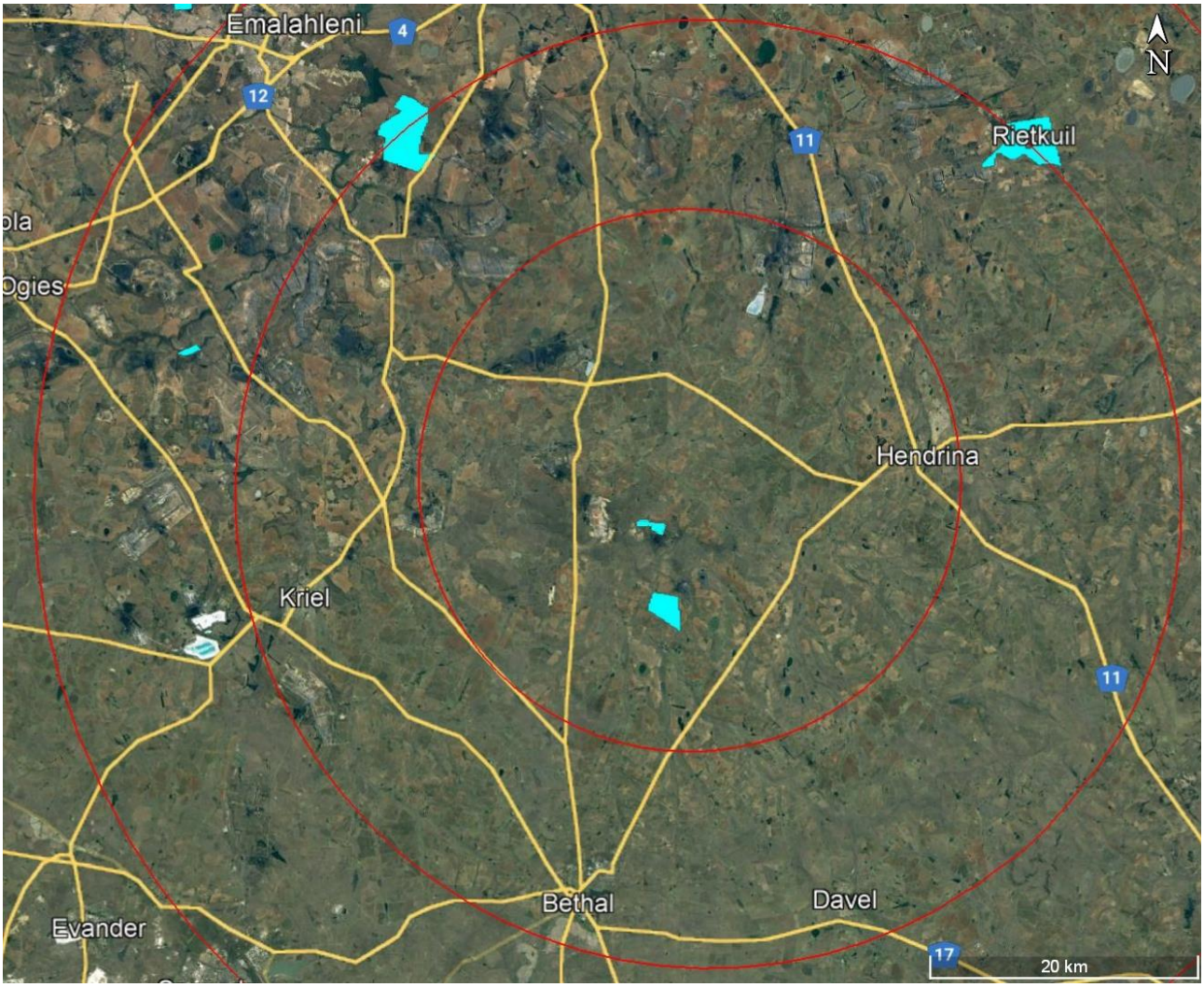

Figure 7. *30 km and 50 km radius around the Hendrina site showing all other renewable energy projects in light blue.*

Table 1: Projects considered for cumulative impact.

DFFE Reference	Project name	Technology	Capacity (MW)
14/12/16/3/3/2/2130	Hendrina North Wind Energy Facility	Wind	200
14/12/16/3/3/2/2131	Hendrina South Wind Energy Facility	Wind	200
14/12/16/3/3/2/2068	Proposed Halfgewonnen Solar PV Facility	Solar PV	80
14/12/16/3/3/1/452	Proposed Forzando North Coal Mine photovoltaic solar facility	Solar PV	9.5
Totals		**Wind**	**400**
		Solar PV	**89.5**

APPENDIX 4: SOIL DATA OF LAND TYPE

Land type	Soil series (forms)	Depth (mm)	Clay % A horizon	Clay % B horizon	Depth limiting layer	% of land type
Bb4	Av	800 - 1200	15 - 20	15 - 35	sp	30,0
Bb4	Hu	900 > 1200	15 - 25	15 - 35	so,hp	10,5
Bb4	Av	700 - 1000	25 - 30	35 - 45	sp	9,0
Bb4	Gc	700 - 1000	15 - 20	15 - 25	hp	9,0
Bb4	Ms	200 - 400	10 - 20		hp	6,0
Bb4	We	300 - 500	15 - 25	35 - 45	sp	4,8
Bb4	Lo	700 - 1000	10 - 15	30 - 40	sp	4,5
Bb4	Gc	700 - 1000	10 - 15	10 - 15	hp	4,5
Bb4	Ms	200 - 400	10 - 25		R	4,5
Bb4	Gs	300 - 500	10 - 25		lc	4,5
Bb4	P					4,5
Bb4	Rg	400 - 500	40 - 60		gc	2,5
Bb4	Es	300 - 500	10 - 20	40 - 50	pr	1,8
Bb4	Ka	300 - 400	15 - 30		gc	1,5
Bb4	Va	400 - 500	25 - 30	35 - 45	vp	1,3
Bb4	Ss/Sw	300 - 400	10 - 20	35 - 45	pr	0,5
Bb4	Ar	300 - 600	40 - 60		so,lc	0,5
Bb4	Kd	500 - 700	10 - 15	35 - 45	gc	0,3

SACNASP

South African Council for Natural Scientific Professions

herewith certifies that

Johan Lanz

Registration Number: 400268/12

is a registered scientist

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

Soil Science (Professional Natural Scientist)

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

Chairperson

Chief Executive Officer

To verify this certificate scan this code