



KHAUTA SOLAR PV CLUSTER, NEAR WELKOM, FREE STATE PROVINCE

DESKTOP STUDY

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Prepared for:



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Today's Impact | Tomorrow's Legacy

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1. PROJECT DESCRIPTION

WNK-Windcurrent (PTY) Ltd. (The Applicant) appointed Enviroworks, an Independent Environmental Assessment Practitioner (EAP) to undertake the required Environmental Impact Assessment Processes for the proposed development of three (3) 100 MW Solar PV Energy Facilities. Each facility will be applied for separately. As there are no Eskom grid lines with the available capacity crossing the site, a separate application for an overhead power-line grid connection of approximately 12 km will be required.

The client has expressed their interest in possibly developing two (2) smaller additional facilities, just to the south of the 3 x 100 MW facilities. The development of the two smaller facilities (19.9 MW) will depend on the available suitable space. The 2 x 19.9 MW facilities will also be connected to a new separate Eskom 44 kV power line.

2. STUDY AREA

- Three (3) x 100 MW Solar Facility areas;
- Two (2) x line route options for the 132 kV line (150 m corridor assessed on either side of the proposed line);
- Two (2) x additional 19.9 MW Solar Facility areas; and,
- Two (2) x line route options for the 44 kV line (150 m corridor assessed on either side of the proposed line).

3. SYNOPSES OF SPECIALISTS’ DESKTOP ASSESSMENTS

3.1. AVIFAUNAL ASSESSMENT

The full Avifaunal desktop assessment, sensitivity maps and associated spatial files can be viewed in Appendix A.

No red-flags have been identified for the three (3) 100 MW Solar Facilities and the two (2) 19.9 MW Solar Facilities and overall, the impacts associated with the facilities and associated infrastructure can be mitigated.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
<p>Option 2 Motivation: The overhead power-line will cross a watercourse at the same location as existing power routes?, which will make line marking easier and more cost effective.</p>	<p>Option 1 Motivation: The route is located far from the other routes and will require its own line markers.</p>
132 kV Route to Leander Substation:	
<p>Option 2 Motivation: The overhead power-line will cross a watercourse at the same location as existing power route/the proposed 44kV route option?, which will make line marking easier and more cost effective.</p>	<p>Option 1 Motivation: The route runs past Doringspan which is likely to be a high collision risk area.</p>

3.2. AQUATIC ECOLOGICAL ASSESSMENT

The full Aquatic desktop assessment, sensitivity maps and associated spatial files can be viewed in Appendix B.

It is not recommended that the southern Solar Facility of the two (2) 19.9 MW Solar Facilities be considered for developed, due to its close proximity to a number of potential ecologically significant wetlands, that could be of conservation importance. Final confirmation of this preliminary recommendation, will only be obtained from ‘ground truthing’ during the specialist site assessment.

The small south-easterly corner of the three (3) 100 MW Solar Facilities should be adequately buffered out of the proposed development footprint area, due to its close proximity to a significantly sized ecologically/ significant wetland that could be of conservation importance.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
Option 1 or Option 2 Motivation: There is no significant difference in conservation value or significance between the line route options.	N/A
132 kV Route to Leander Substation:	
Option 2 Motivation: Option 2 is the least ecologically intrusive option.	Option 1 Motivation: Option 1 traverses the formally protected Thabong Game Ranch.

Take note:

Numerous significantly sized and smaller depression wetlands as well as watercourses are scattered throughout the landscape, associated with the proposed developments. Such depression wetlands often provide locally distinct and important semi-aquatic habitat, which is likely utilised by various common and habitat-specific bird-, amphibian- and aquatic invertebrate species for breeding, foraging and/or persistence purposes.

The Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) of such semi-aquatic habitats and surrounding areas will determine the potential requirements for buffer zones around such wetlands. The minimum recommended sizes of such buffer zones will also be dependent on the EIS and PES values. In the event that important bird species, or other conservation-significant faunal and floral species are found to be present, which will subsequently lead to high PES and EIS values, recommended buffer zones could range from 300 m upwards.

A potential 300 m buffer zone have been indicated in watercourse maps, which could be applicable to the proposed solar development areas. In the event of lower PES and EIS values, buffer zones could potentially be smaller or even not be applicable. A potential 200 m buffer zones, which could be applicable to the proposed transmission line development corridors have been indicated.

Final clarity on potential buffer zone requirements, will only be obtained from ‘ground truthing’ during the specialist site assessment.

Potential alternative transmission line route options for the proposed 132 kV and 44 kV lines have been suggested, which should prove to be the least ecologically intrusive options, based on the findings of the desktop aquatic assessment.

3.3. AGRICULTURAL ASSESSMENT

This screening assessment has found that there are no red flags, no-go areas or major sensitivities associated with achieving agricultural approval for all of the proposed facilities and grid connections. The risk of not achieving agricultural approval for all projects is assessed as being low. It must further be noted that the risk of not achieving agricultural approval is subject to the unpredictability of DALRRD decision making, and that their 10% rule does pose some risk to the projects.

For more information and detailed maps, please refer to Appendix C.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
Option 1 or Option 2 Motivation: Because of a grid's negligible agricultural impact, there is no material difference to the significance of the agricultural impacts of the proposed alternative grid corridor options. Therefore, all proposed alternatives are considered acceptable and there are no preferred corridor alternatives from an agricultural impact perspective.	N/A
132 kV Route to Leander Substation:	
Option 1 or Option 2 Motivation: Because of a grid's negligible agricultural impact, there is no material difference to the significance of the agricultural impacts of the proposed alternative grid corridor options. Therefore, all proposed alternatives are considered acceptable and there are no preferred corridor alternatives from an agricultural impact perspective.	N/A

Take note:

A potential challenge with DALRRD decision-making is that there is the so called 10% 'rule' that the land use committee of DALRRD, who are responsible for decision making for agricultural approval, seem to somewhat inconsistently apply to their decisions. This 'rule' states that a renewable energy facility may not result in the exclusion from agricultural use of more than 10% of a farm portion. All 5 of the facilities would fall foul of this rule.

DALRRD will make their own decision, regardless of the findings and recommendations of an agricultural assessment, and it may well be in contradiction to the defensible logic that is presented in that assessment. Also unfortunately, they will only respond to an official application. They will not usefully discuss and indicate the likely success of an application, prior to it actually being officially submitted.

They seem to, very inconsistently, apply their 10% rule, even though its value to agriculture can logically be invalidated and it has definite disadvantages in terms of other environmental impacts, infrastructural practicalities and the costs to the country of renewable energy.

As a result of this, it is recommended, especially if projects exceed the allowable development limits, and possibly the 10% rule as well, that developers try to get rezoning/SALA approval as soon as possible in the project development process. It would obviously be pointless to incur all the costs of EA approval only to have the project stopped in its tracks by a denial of rezoning/SALA approval.

3.4. HERITAGE ASSESSMENT

Red Flags in the proposed area include cemeteries, and unmarked graves that could be present, although no no-go areas have been identified. The most frequently found heritage resources are farmsteads, old buildings, ruins and structures such as kraals, cemeteries and burial sites, therefore the cultural heritage profile in the proposed area is low. For more information and detailed maps, please refer to Appendix D.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
Option 1 or Option 2 Motivation: No one route is preferred over the other.	N/A
132 kV Route to Leander Substation:	
Option 1 or Option 2 Motivation: No one route is preferred over the other.	N/A

Take note:

The desktop study/screening assessment has highlighted a number of *potential* heritage indicators that may occur within the proposed Khauta Solar PV Cluster. These include mostly Colonial Period farm buildings, structures and features, cemeteries and grave sites.

An assessment by an architectural historian of each historic building and structure located within the study footprint areas, will have to be undertaken. These studies will be required to determine significance of each building or structure and will assess the possible development impacts on each of them during the Heritage Impact Assessment (HIA) phase. At the same time appropriate mitigation measures will also be outlined.

Cemeteries and grave sites are protected by various legislations. Such legislation may include the National Heritage Resources Act 25 of 1999, the Removal of Graves and Dead Bodies Ordinance (Ordinance no. 7 of 1925), the Human Tissue Act 65 of 1983, the Ordinance on Excavations (Ordinance no. 12 of 1980) as well as any local

and regional provisions, laws and by-laws that may be in place. The best option is *in-situ* preservation of the grave sites. Should this not be possible, a standard grave relocation process including a detailed social consultation process with former or present residents, must be undertaken.

Historic homesteads of black African communities may also occur within the study area. The presence of these features raises another heritage concern, that of unmarked still born babies. In terms of black African tradition, stillborn babies were often buried in unmarked graves underneath or adjacent to the homesteads of their parents .

Sacred Natural Sites may also occur, but for obvious reasons these are often not revealed. The International Union for Conservation of Nature (IUCN) defines Sacred Natural Sites as areas of land or water having special spiritual significance to peoples and communities. Such Sacred Natural Sites are found across Southern Africa as well, and for distinct reasons are often kept secret. The belief in water spirits for example, have been recorded amongst many of the South-Eastern Bantu speaking groups such as the Zulu, Xhosa, Shona, Swazi, Venda, Sotho, Tshangaan, Ndebele and Tswana as well as the first nations who resided in South Africa, namely the San and Khoi. Sacred sites relating to water include springs and fountains that are used for medicinal, cultural and ritualistic purposes. The location of such sacred springs and fountains are also often kept secret.

Fieldwork must still be undertaken which would confirm the presence/absence of heritage resources in the study area.

3.4.1. PALAEOLOGICAL HERITAGE ASSESSMENT

The great majority of the large and small solar facility project areas as well the grid connection corridors are of Low to Medium Palaeosensitivity. No palaeontological red flags or no-go areas have been identified in the proposed area. For more information and detailed maps, please refer to Appendix E.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
Option 1 or Option 2 Motivation: There is no preference for either one or other route option on palaeontological heritage terms.	N/A
132 kV Route to Leander Substation:	
Option 1 or Option 2 Motivation: There is no preference for either one or other route option on palaeontological heritage terms.	N/A

Take note:

Small outcrop areas of Adelaide Subgroup continental sediments are traversed by the 132 kV corridor option to Everest Substation as well as both 44 kV corridor; these area are *potentially* of High Palaeosensitivity but this can only be verified though a palaeontological site visit.

3.5. SOCIAL ASSESSMENT

Based on the findings of the desktop Screening, the proposed development is expected to have an overall positive impact at a municipal and local level. From a social perspective, no fatal flaws have been identified for the three (3) 100 MW PV facilities or for the two (2) 19.9 MW PV facilities. Impacts to tourism and agriculture are not expected.

No ‘No-Go Areas’ have been identified although the routing of electrical grid infrastructure through residential areas should be avoided. The placement of infrastructure, including the access roads, should also avoid farmsteads. For more information and detailed maps, please refer to Appendix F.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
<p>Option 1 Motivation: The overhead power line passes through a residential area, is routed along a regional road (i.e. larger road) with a larger open area between the road and houses. The option is likely to have less social impact than Option 2.</p>	<p>Option 2 Motivation: The overhead grid line passes through a residential area, routed along a residential street, and is likely to result in visual impacts.</p>
132 kV Route to Leander Substation:	
<p>Option 2 Motivation: The overhead grid line would be placed next to existing electrical grid infrastructure, where visual impacts already exist.</p>	<p>Option 1 Motivation: The overhead grid line passes through farmland and is not expected to result in negative impacts, however, engagement with the relevant landowners would be required in order to confirm that the powerlines would not conflict with existing or planned land uses, such as agriculture, event venues and tourism.</p>

Take note:

Khauta / 75-100MW / 192ha, 193ha & 200 ha PV Developments

With regards to the PV developments, no fatal flaws have been identified for the three 100MW PV developments and for the two 19.9MW developments. The constrained water resources in the Matjhabeng Municipality must however be considered. If a significant percentage of the labour is sourced from outside the Welkom area, particularly during the construction phase, increased pressure on potable water sources may result. Furthermore, the aging electricity distribution infrastructure within the municipality is of concern and could potentially impact the project and/or the distribution of the electricity generated by the project.

Based on the findings of the desktop Screening, the proposed development is expected to have an overall positive impact at a municipal and local level. From a social perspective, no fatal flaws have been identified for the three 100MW PV facilities or for the two 19.9MW PV facilities. Impacts to tourism and agriculture are not expected, but engagement with stakeholders will be required to confirm this.

Grid infrastructure

The routing of electrical grid infrastructure through residential areas should be avoided. The placement of infrastructure, including the access roads, should also avoid farmsteads.

3.6. ECONOMIC ASSESSMENT

The projects will have an overwhelming positive impact on the economy and job creation. The only negative impact will be the potential loss of agricultural land, which have to be weighed against the positive impact of the proposed Solar PV Cluster. The project will help diversify the national energy grid and assist in improving energy generation in the region.

No red flags have been identified for the entire Solar PV Cluster. For more information and detailed maps, please refer to Appendix G.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
<p>Option 1 Motivation: Both options will have a similar impact, the preferred option will be Option 1 as it is a more direct route.</p>	<p>Option 2 Motivation: Both options will have a similar impact, the preferred option will be Option 1 as it is a more direct route.</p>
132 kV Route to Leander Substation:	
<p>Option 2 Motivation: The overhead grid line it is shorter and will have less of a negative impact on the potential loss of agriculture and/or negative impact on agricultural activities.</p>	<p>Option 1 Motivation: The overhead grid line is approximately 2 km longer than Option 2, this line option also traverses more agricultural land. It is likely to be more expensive and thus have a greater economic impact than Option 2.</p>

3.7. VISUAL ASSESSMENT

No visual sensitive areas were identified during the desktop analysis and no red flags were identified from a Visual perspective during the Desktop Study. For more information and detailed maps, please refer to Appendix H.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
<p>Option 2 Motivation: Solely based on the viewshed, the potential impacts are more concentrated than Option 1, but this is influenced by the visual</p>	<p>Option 1 Motivation: Solely based on the viewshed, the potential impacts are less concentrated than Option 2, but this is influenced by the visual absorption</p>

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
absorption capacity and number of observants along the route, which can only be confirmed via a site visit.	capacity and number of observants along the route, which can only be confirmed via a site visit.
132 kV Route to Leander Substation:	
Option 2 Motivation: Solely based on the viewshed, the potential impacts are more concentrated than Option 1, but this is influenced by the visual absorption capacity and number of observants along the route, which can only be confirmed via a site visit.	Option 1 Motivation: Solely based on the viewshed, the potential impacts are less concentrated than Option 2, but this is influenced by the visual absorption capacity and number of observants along the route, which can only be confirmed via a site visit.

3.8. TERRESTRIAL BIODIVERSITY, PLANT- AND ANIMAL SPECIES ASSESSMENT

All three (3) development footprints of the three (3) 100 MW Solar Facilities will have an impact on Terrestrial Biodiversity, even though their sensitivity for the Animal and Plant Species theme is low. It is also expected that a Plant and Animal Species Compliance Statement and Terrestrial Biodiversity Impact Assessment Report be compiled for the proposed developments given the potentially high Terrestrial Biodiversity sensitivity of the footprints.

The two (2) development footprints of the two (2) 19.9 MW Solar Facilities is not likely to have a significant impact on the aforementioned themes given that the areas are classified as Degraded. It must also be noted that the eastern section of both development footprints includes an area classified as a CBA 1 and an Endangered Vegetation Type. For more information and detailed maps, please refer to Appendix I.

PREFERRED OVER HEAD POWER-LINE ROUTES:	NOT PREFERRED OVER HEAD POWER-LINE ROUTES:
44 kV Route to Riebeeckstad Substation:	
Option 1 Motivation: Grid Connection Option 2 is likely to traverse through a larger area that is considered to be near-natural/natural vegetation.	Option 2 Motivation: Grid Connection Option 2 is likely to traverse through a larger area that is considered to be near-natural/natural vegetation.
132 kV Route to Leander Substation:	
Option 2 Motivation: The proposed footprint will mostly impact areas that have been transformed by cultivation and urbanisation based on satellite imagery.	Option 1 Motivation: Grid Connection Option 1 will have a higher impact on potential terrestrial biodiversity, plant species and animal species given that the area is likely to traverses through a portion of natural or near natural area (based on satellite imagery) which also includes a watercourse.

Take note:

Each of the 3 x 100MW development footprints are sensitive in terms of the Terrestrial Biodiversity Theme and will likely contribute to conservation. Where development is proposed to take place in large, undisturbed, and highly sensitive areas, it expected that off-sets may be recommended. However, this can only be confirmed once

the site verification has taken place. It is also expected that a Plant and Animal Species Compliance Statement and Terrestrial Biodiversity Impact Assessment Report be compiled for the proposed developments given the potentially high Terrestrial Biodiversity sensitivity of the footprints.

Based on the desktop assessment, both development footprints of the 19.9 MW PV solar installation are similar in terms of sensitivity. Both development footprints are found within the same vegetation type (which is classified as Least Concern) and traverse through an Ecological Support Area 1. However, the PV solar installation Small 2 includes a mapped watercourse (depression). This watercourse is likely to provide important habitat for various plant and animal species especially given that the watercourse is located in an ESA 1. Note that the sensitivity of the sites in terms of aquatic biodiversity will be analysed by a separate Aquatic Biodiversity Desktop Assessment.

At this stage, both development footprints will have a significant impact on the Terrestrial Biodiversity Theme and potentially the Animal Species Theme. The following is recommended:

- A Animal and Terrestrial Biodiversity Impact Assessment and Plant Compliance Statement must be conducted to determine the full impact of the proposed developments.
- An Aquatic Biodiversity Assessment be conducted to determine the impact of the proposed development on the mapped water course
- Should the watercourse be verified on site, it is recommended that the watercourse be excluded from the development area.
- Given then large areas of development (approximately 40 hectares), it may also be recommended that some offsets or ecological corridors (should the area be verified to be very sensitive) be required should the development take place. These offsets or ecological corridors will be required to ensure that at least some of the ecological processes on site remain intact. These offsets or corridors can only, however, be confirmed once the site inspection and assessment has been conducted.

4. CONCLUSION

Taking into account the various specialists desktop assessment and recommendations regarding the preferred route options for the overhead power-line the following preferred route options are proposed:

- For the **132 kV Route** to the Leander Substation **Option 2** should be implemented.
- For the **44 kV Route** to the Riebeeckstad Substation **Option 1** should be implemented.

The individual specialist themes recommend sensitivities areas to avoid, where applicable.

In terms of the 2 x 19 MW PV solar installations, there are potential restriction in terms of available space for development of the southernmost site: Khauta Small 2, because a depression wetland possibly occur on site. If a conservative preliminary 300m buffer is placed around the 'no-go' wetland, less than 50% of the surface area remains for development. Final clarity on potential buffer zone requirements, will only be obtained from 'ground

truthing' during the specialist site assessment. It is thus recommended that the aquatic and terrestrial biodiversity studies be commissioned to verify the presence of the watercourse, determine the site sensitivity & confirm the buffer requirements.

5. LIST OF APPENDICES

Appendix A - Avifaunal Assessment

Appendix B – Aquatic Biodiversity Assessment

Appendix C – Agricultural Assessment

Appendix D – Heritage Assessment

Appendix E – Paleontological Assessment

Appendix F – Social Assessment

Appendix G – Economic Assessment

Appendix H – Visual Assessment

Appendix I - Terrestrial Biodiversity, Plant- and Animal Species Assessment