



A total of 129 549 bat calls were recorded at a median of 41,57 calls per hour at ground level classifying fatality risk of the PAOI as **High**. Recorded bat activity was much higher at UVE-01, the detector deployed near the river, compared to all other detectors (Table 7) indicating the sensitivity of the rivers in the area.

Table 8. Bat detectors deployed across the Project Area of Influence with the relative abundance recorded at each

Detector	Height	Habitat	Number of bat calls recorded	Median bat passes per hour
UVE-01	10 m	River	115 127,00	100,88
UVE-02	10 m	Grassland near ridges	7 878,00	5,69
UVE-03	10 m	High grassland	4 419,00	13,63
UVE-04	70 m	High grassland	48,00	0,08
UVE-05	120 m	High grassland	2 068,00	3,85

Activity recorded per bat detector was similar to that observed for species, with high activity early in the evening (Figure 13). This was particularly noticeable for UVE-01 where the median number of bat passes per hour at 19:00 was above 300 BP/h. Activity declined steadily after 19:00, but activity at UVE-01 remained higher than other detectors. This detector was deployed next to the river which could attract bats, but it is also likely that it is situated near roosts.

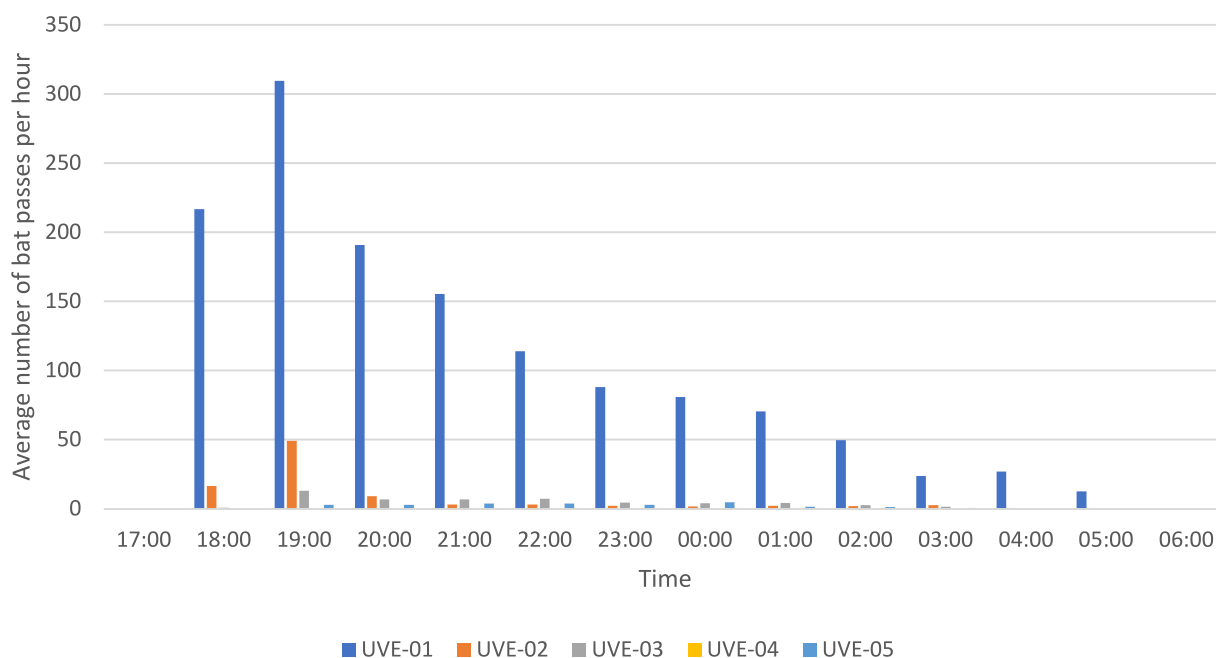


Figure 13. Hourly bat activity per bat detector across the Project Area of Influence

Activity per bat detector closely resembles the activity for the two most commonly recorded species, *L. capensis* and *T. aegyptiaca* (Figure 14 and 15). It is also clear that the peak for *L. capensis* on the 15th and 26th of September was recorded at UVE-01. The river offers a source of open water and the denser vegetation is likely to attract insects which could lead to higher bat activity. With this high number of bats, however, it is expected that a rather large roost is located near the river.

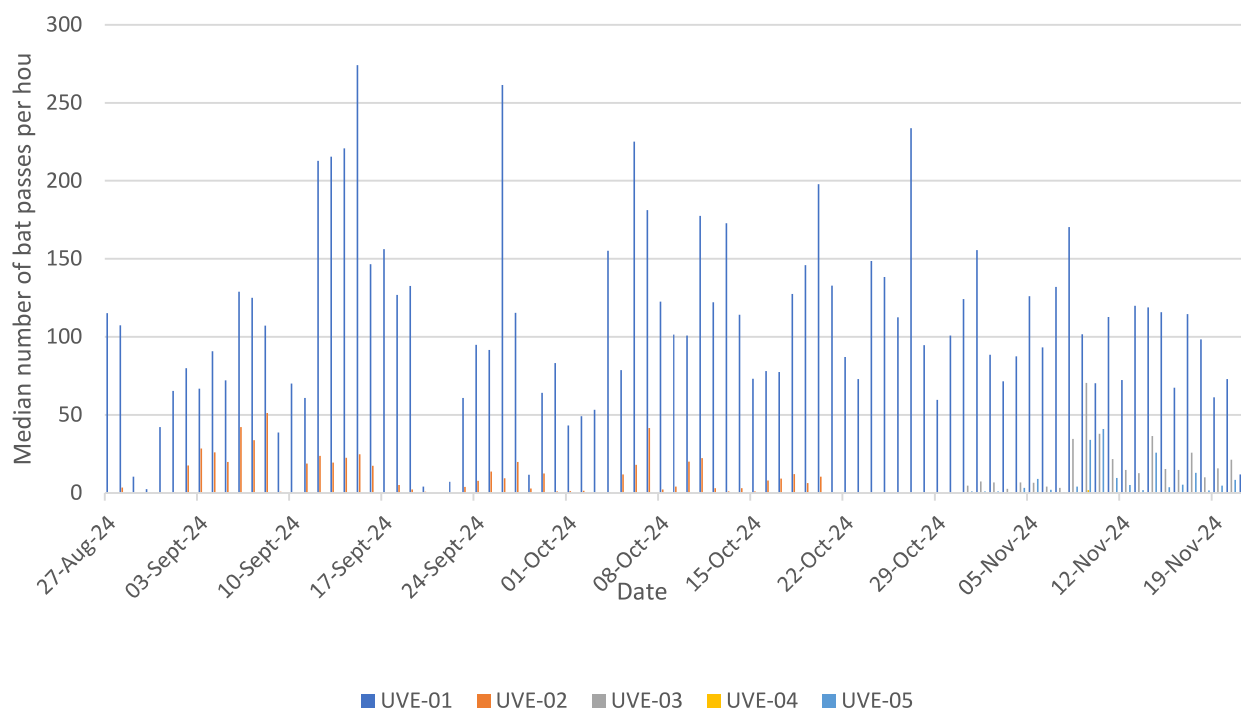


Figure 14. Number of bat passes recorded daily per bat detector

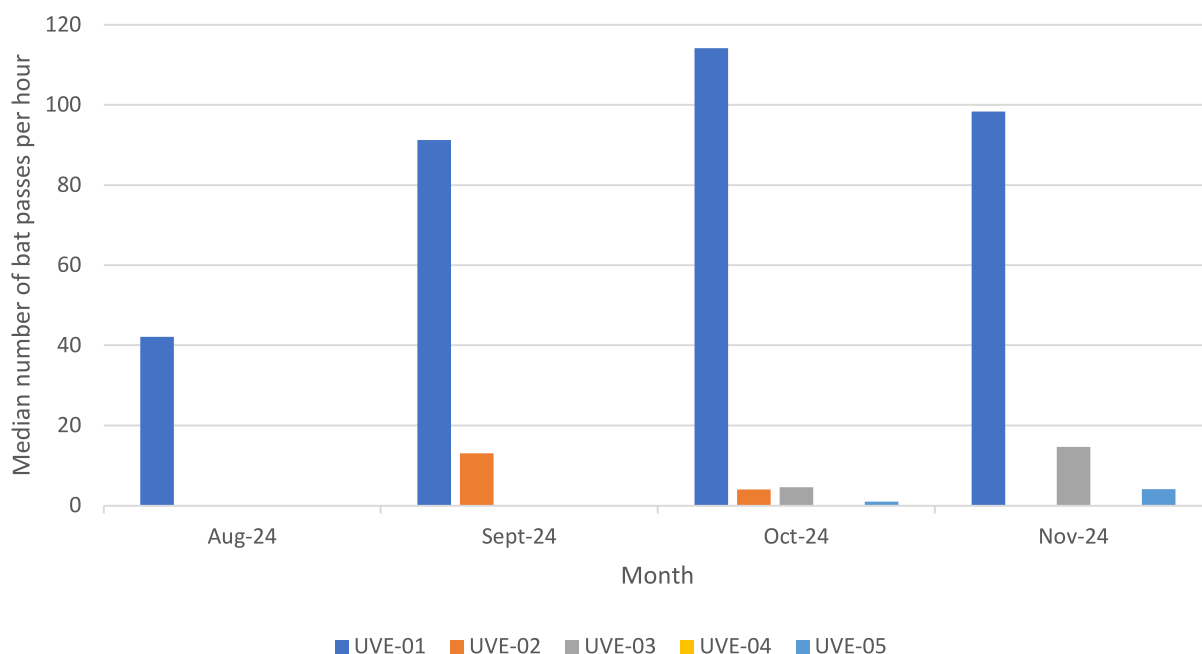


Figure 15. Bat activity per bat detector across the Project Area of Influence during the survey period

4.2.3 Bat Passes at Height

No data was recorded at height during August and September 2024, and as such only data from October and November 2024 are displayed for the microphones deployed at 70 and 120 m. Overall, activity was significantly higher at ground level than at height, indicating that bats travel and forage closer to ground level (Figure 16 and Figure 17). In fact, bats were only active at height in any significant number during November 2023, and this is possibly an artifact of the high numbers present in the area which will force some individuals to forage in areas not used under normal conditions.

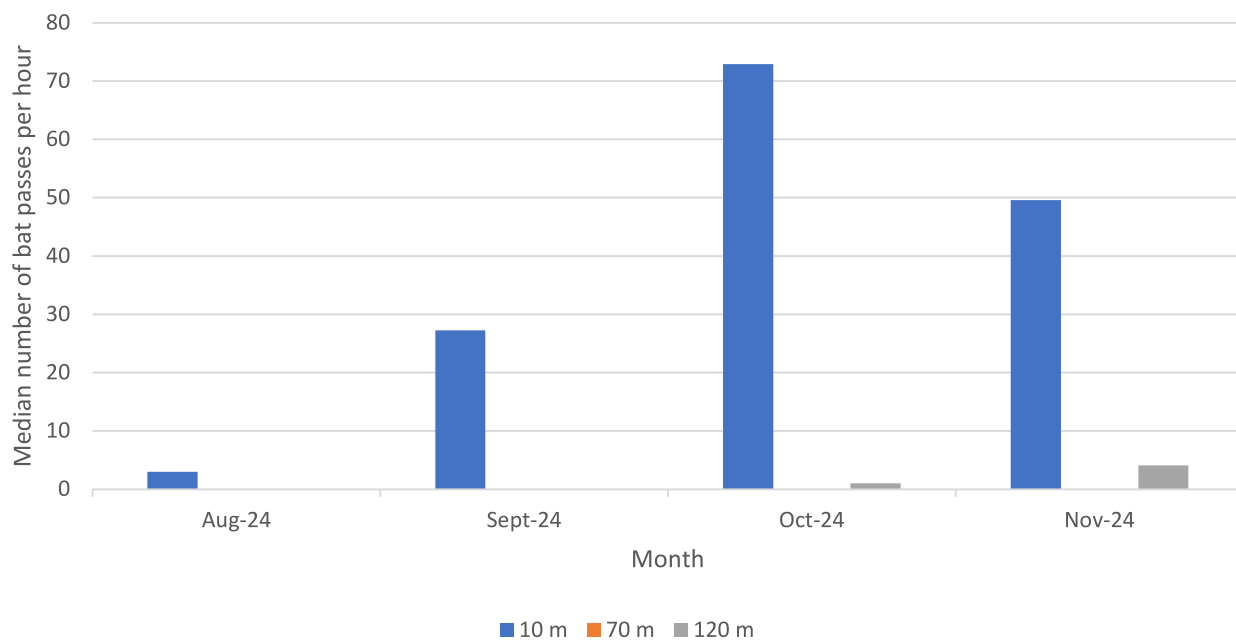


Figure 16. Comparison of bat activity at various heights across the Project Area of Influence

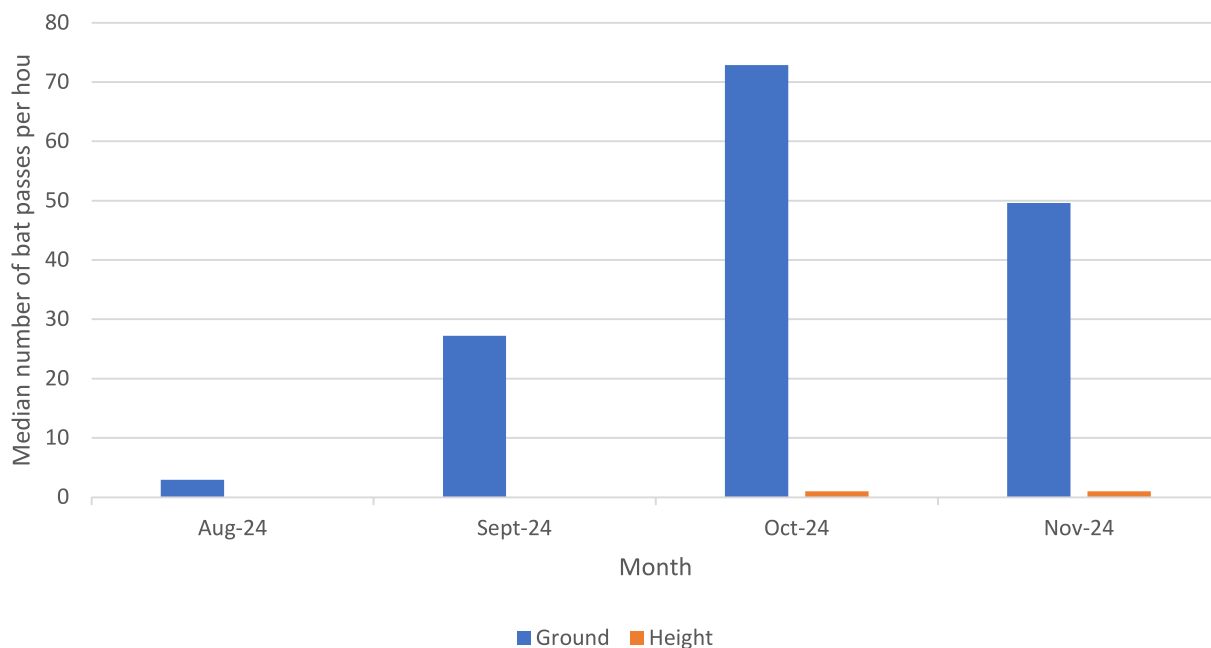


Figure 17. Comparison of bat activity at various heights across the Project Area of Influence when only bat detectors deployed on the met masts are considered

4.3 Roost inspections

The SABPG are very specific as to buffers that must be implemented around roosts, and these are as follows:

- A buffer of 500 m for a small roost of Least Concern (LC) bats and/or Low Fatality Risk bats.
- A buffer of 1 km for a medium roost of LC bats and/or Low Fatality Risk bats.
- A buffer of 2.5 km for a large roost of LC bats and/or Low Fatality Risk bats.
- A buffer of 1 km for a small roost of SCC bats and/or Medium, Medium-High and High Turbine Fatality Risk.
- A buffer of 2.5 km for a medium roost of SCC bats and/or Medium, Medium-High and High Turbine Fatality Risk.



- A buffer of 5 km for a large roost of SCC bats with a Low Fatality Risk.
- A buffer of 10 km for a large roost of SCC bats with a Medium, Medium-High and High Turbine Fatality Risk.
- A buffer of 20 km for an extra-large roost of bats with any conservation status and/or risk level.

When considering roost size, the following has been defined: small roost = 1 - 49 bats; medium roost = 50 – 499 bats; large roost = 500 – 1999 bats; extra-large roost = ≥ 2000 bats.

One active bat roost was identified in a building near the PAOI, belonging to *L. capensis* (Figure 18 and 19). As *L. capensis* was previously classified as *Neoromicia capensis* it is considered as a species with High Turbine Fatality Risk even though it is a species of Least Concern. It was deemed as small and will require a 1 km buffer. A number of old mine shafts were identified during this visit, with one of these shafts being occupied by four individual *R. clivosus*. These shafts are however outside the PAOI of ABO Uvemvane WEF 2. It is, however, expected that these shaft will be used by other species and could potentially host large colonies that might have an impact on the PAOI. These shafts will be inspected during a roost survey in January and June 2025 to confirm the presence of bats and the size of potential roosts.

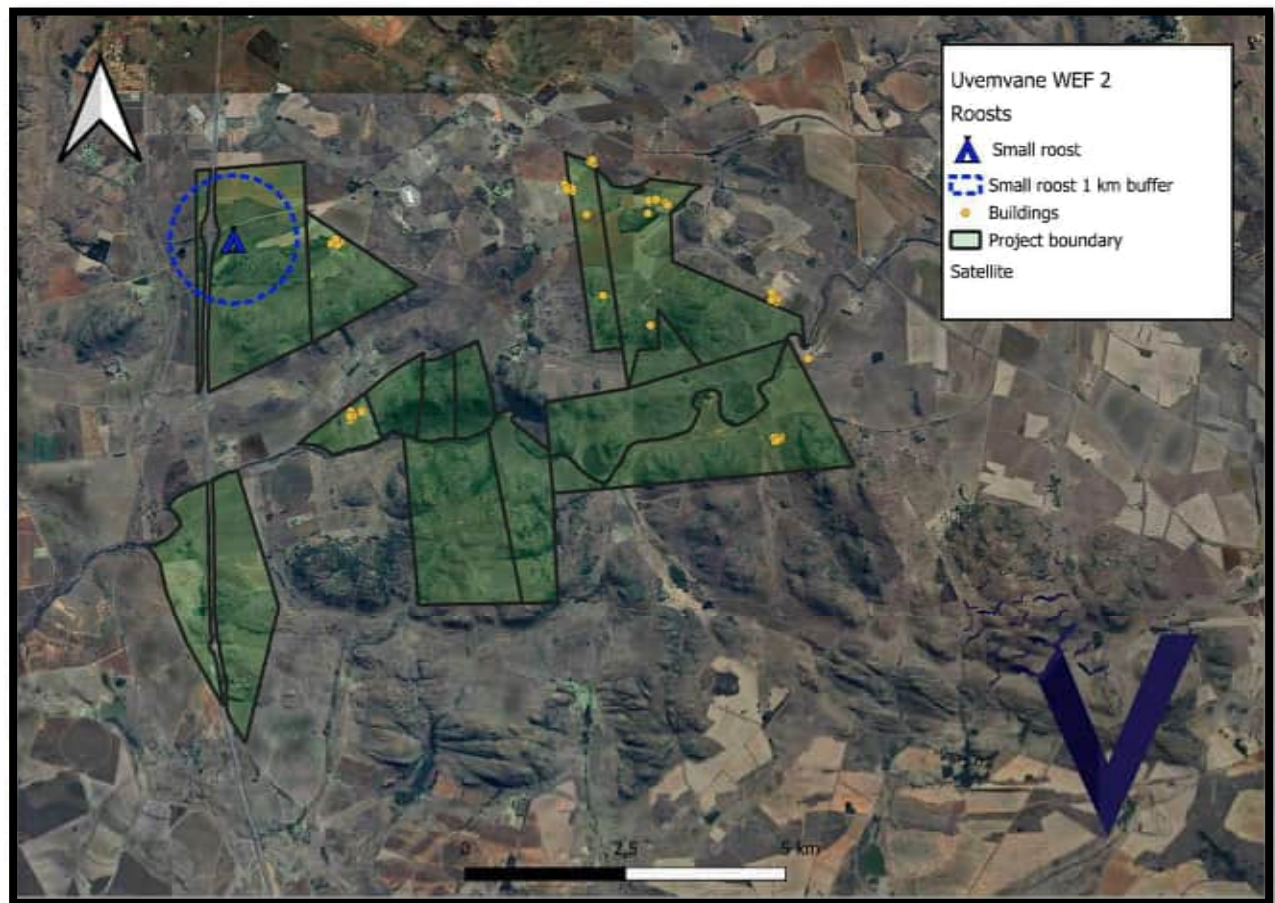


Figure 18. Locations of active bat roosts that have been detected during the current survey period with required buffers



Figure 19. Examples of roosts found on the Project Area of Interest

4.4 Bat Sensitive Areas

Several potential bat sensitive areas, including water sources and potential foraging areas, are outlined below. Based on data obtained from bat detectors water sources, including rivers, open water and wetlands are highly sensitive. The ridges and vegetated areas will be used by bats for roosts and foraging and should be seen as highly sensitive. A 200 m buffer was implemented around sites that are considered to be of High Sensitivity to bats as required by MacEwan (2022).



4.4.1 Water bodies

All bat species are dependent on sources of open water and will visit at least one of these sites once per night. This includes pools in streams, lakes, ponds, slow-flowing streams, rivers and artificial bodies of water with similar properties such as farm dams, cattle troughs, swimming pools (Korine et al, 2016). Some evidence also showed calm water sources tends to attract more bats as the water surface provides a less cluttered acoustic signal return being advantages to bats hunting behavior (Von Frenckell et al, 1978). Based on the South Africa Best Practice Guidelines for Bats at Wind Energy Facilities (SABPG, MacEwan et al 2020) a 200 m buffer is required around all areas that are seen as Medium Sensitivity areas for bats, and this includes all sources of open water (Figure 20).

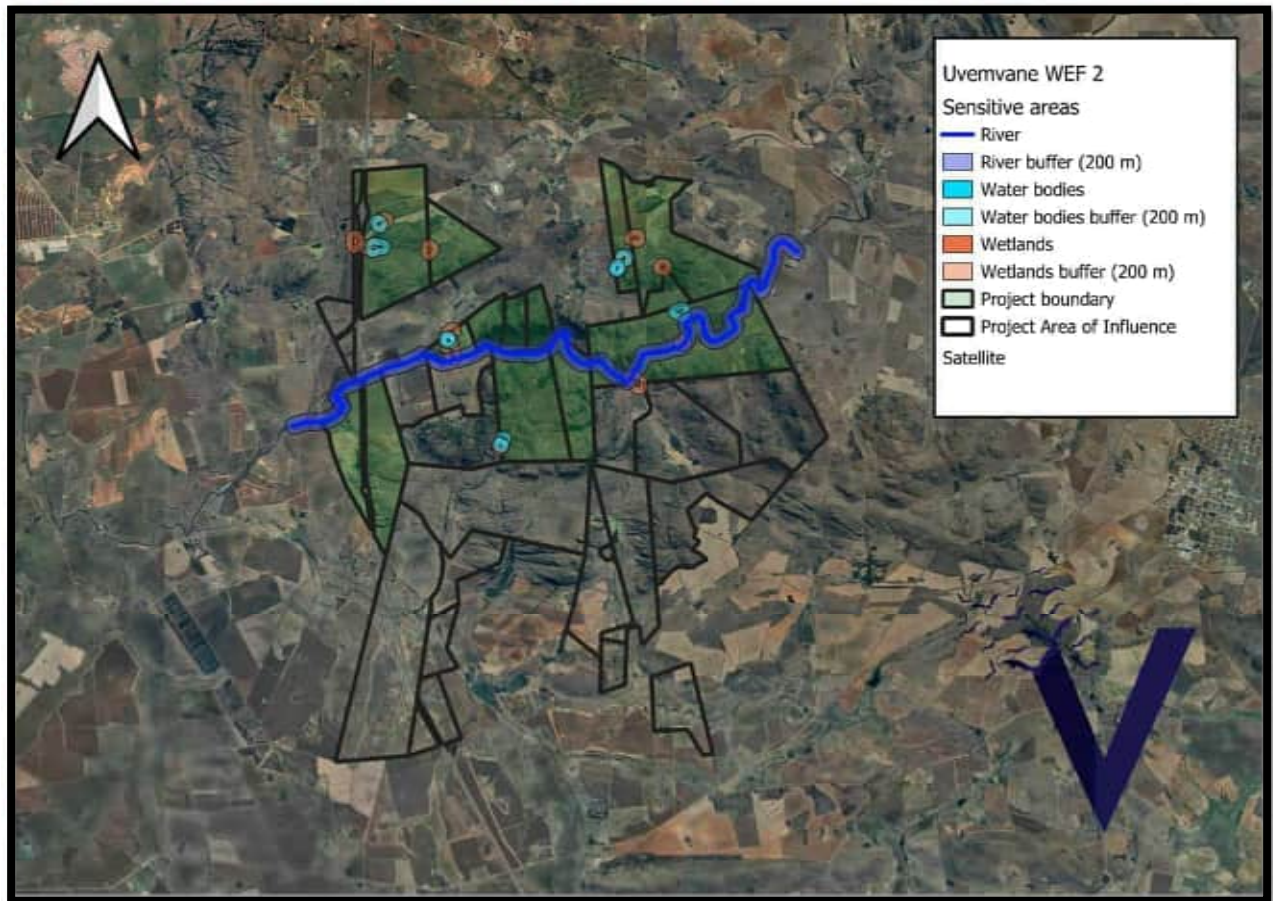


Figure 20. Locations of sources of wetlands that are classified as sensitive to bats with required 200 m buffer applied.

4.4.2 Ridges

While there were mountain side sloped areas present on ABO Uvemvane WEF 2 we did not deem this as important bat features. As such these areas have not been included in the sensitivities and not buffered.



4.4.3 Wooded Areas

Bats use dense patches of trees as both foraging and roosting locations, and has been deemed to be of High sensitivity to bats. As such a 200 m buffer will be required (Figure 21).

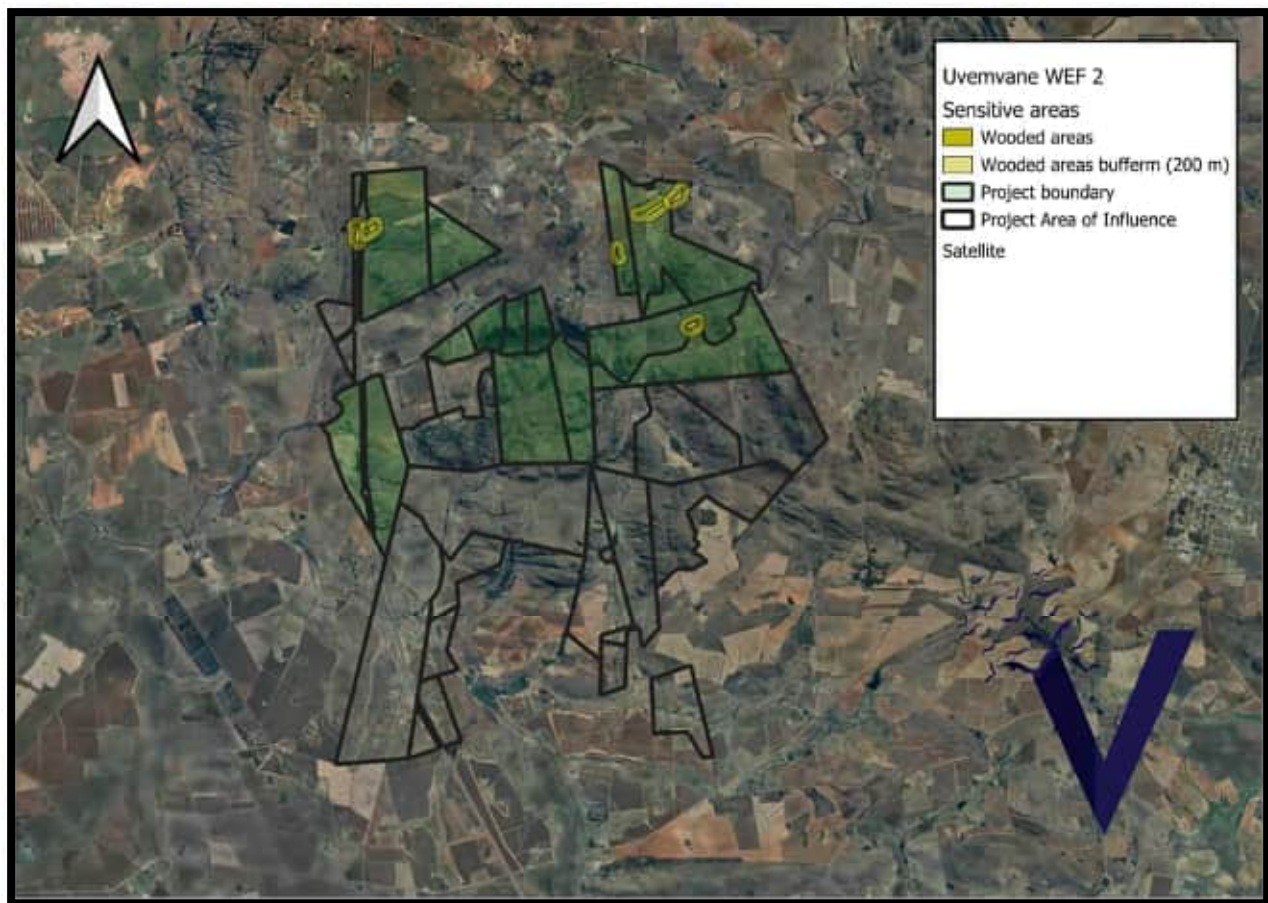


Figure 21. Wooded areas located on the Project Area of Influence including required buffers



4.5 Bat buffers

Water bodies, rivers, wetlands, ridges and wooded areas must be given 200 m buffers, and buffers have been applied around all confirmed roosts (Figure 22). Roosts found have been classified as small and will require a 1 km. As the guidelines regarding the buffer sizes and shapes are stringent and well defined, it is important that all applied buffers be respected and followed when considering final facility layout. No part of the wind turbine, including the blade tips must encroach into these buffer zones. The buffers zones can be measured on a map during the preparation of report sensitivity maps or on the ground. The applied buffer zones are measured from the ground all the way to the full length of the turbine sweep and it includes all parts of the turbine, tower and rotor sweep.

For other associated WEF developments, such as buildings, sub-stations, roads and powerlines, developers must:

- For roads: A 200 m minimum buffer applies to bat roosts, and disturbances to foraging areas by roads must be considered in the assessment.
- For power lines: A 500 m powerline buffer applies to bat roosts. Powerlines can cross bat important foraging areas area, as long as all the other water use license mitigation measures are in place in the case of wetlands and rivers.
- For buildings and sub-station infrastructure: A 500 m minimum buffer applies to bat roosts, and disturbances to foraging areas by roads must be considered in the assessment. Light pollution and noise from such building must also be considered in the assessment.

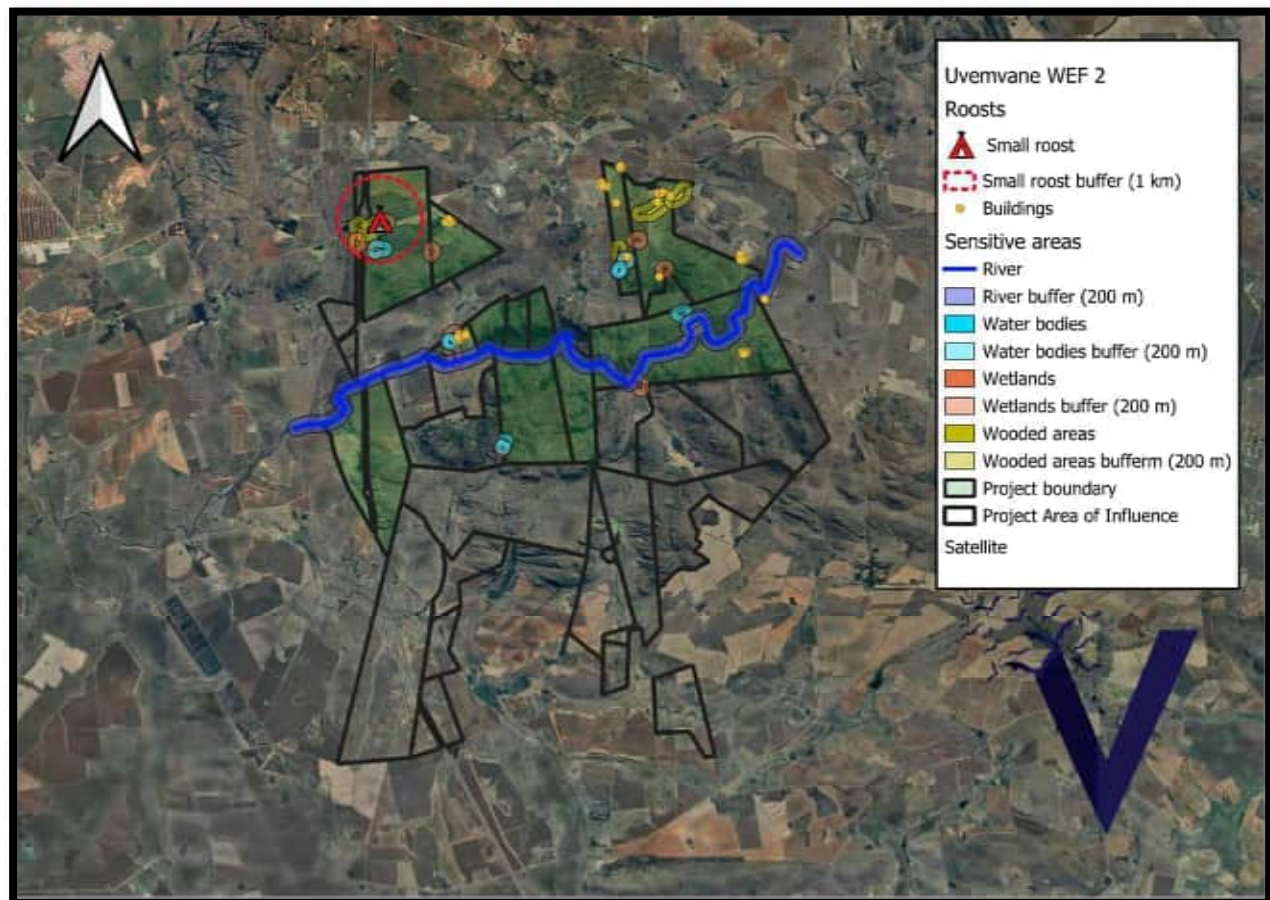


Figure 22. Buffers for bat sensitive areas that could be determined based on data collected during the current survey period.



5. Potential Impacts

Construction Phase:

- **Habitat destruction:** The construction access roads, turbine or infrastructure may lead to foraging habitat and sensitive bat features being removed.
- **Destruction or disturbance of bat roosts:** The construction access roads, turbine or infrastructure may lead to bat roosts being disturbed removed.

Operational Phase:

- **Bat mortality:** Bats killed due to barometric trauma or being struck by blades of the turbines during the operational phase.
- **Artificial lighting:** Artificial lights can have a negative effect on bat behaviour by affecting flight paths used or attracting them to lights due to higher insect abundance and elevating the likelihood of collision mortality.
- **Habitat destruction:** The construction access roads, turbine or infrastructure may lead to foraging habitat and sensitive bat features being removed

Due to the construction of roads, turbines and infrastructure it expected that a certain amount of habitat destruction will occur. The most sensitive habitat features for bats in the area appears to be sources of open water, and these must be avoided at all costs. In addition, the confirmed roosts must be avoided, and the buffers suggested above seen as **NO-GO** areas.



6. Conclusion

This report presents data obtained during the first three months of bat monitoring. Data was collected from three bat detectors that were deployed at 10 m above ground and a further two bat detectors that were deployed at height. A total of four bat species were detected with stationary bat detectors and one in a mine shaft during the monitoring period. Of the species *T. aegyptiaca* and *L. capensis* were the most active throughout the monitoring period.

The Screening Tool classified the area as a **High Sensitive** area for bats, but based on our desktop survey, ground truth and data obtained we refute this result and deem the area to be of **Medium Sensitivity** to bats. The rivers, open water and wetlands are highly sensitive areas, but are few and far between. While mitigation measures will be required for the ABO Uvemvane WEF 2 most sensitive areas can be easily avoided if the needed buffers and No-Go areas are observed and respected.



7. References

- Abdullah, M. (1961). Behavioural effects of temperature on insects.
- Amorim, F., Rebelo, H., & Rodrigues, L. (2012). Factors influencing bat activity and mortality at a wind farm in the Mediterranean region. *Acta Chiropterologica*, 14(2), 439-457.
- Aronson J. 2022. Current state of knowledge of wind energy impact on bats in South Africa. *Acta Chiropterologica* 24: 221-238
- Arnett, E.B., Huso, E.B., Schirmacher, M.R and Hayes, J.P. (2010). Altering turbine speed reduces bat mortality at wind-energy facilities.
- Bernard, R. & Cumming, G., (1997). African bats: evolution of reproductive patterns and delays. *The Quarterly Review of Biology*, 72, 253-274.
- Davis, R.B., Herreid li, C.F. & Short, H.L. (1962). Mexican free-tailed bats in Texas. *Ecological Monographs*, 32: 311-346.
- de Jong, J., Millon, L., Håstad, O., Victorsson, J. (2021). Activity Pattern and Correlation between Bat and Insect Abundance at Wind Turbines in South Sweden. *Animals*, 11(11): 3269.
- Erickson, J. L., West, S. D. (2002). The influence of regional climate and nightly weather conditions on activity patterns of insectivorous bats. *Acta Chiropterologica*, 4(1): 17 – 24.
- EOH Coastal & Environmental Services, (2015). Proposed Waaihoek Wind Energy Facility, Final Amended Environmental Impact Assessment Report, CES, East London.
- Festa, F., Ancillotto, L., Santini, L., Pacifici, M., Rocha, R., Toshkova, N., Razgour, O. (2023). Bat responses to climate change: a systematic review. *Biological Reviews*, 98(1), 19-33.



Frick, W. F., Stepanian, P. M., Kelly, J. F., Howard, K. W., Kuster, C. M., Kunz, T. H., & Chilson, P. B. (2012). Climate and weather impact timing of emergence of bats.

Jacobsen, N. H. G., And Du Plessis, E., (1976). Observations on the ecology and biology of the Cape fruit bat *Rousettus aegyptiacus leachi* in the eastern Transvaal. *South African Journal of Science*, 72:270-273.

Gilbert, N., & Raworth, D. A. (1996). Insects and temperature—a general theory. *The Canadian Entomologist*, 128(1), 1-13.

Herselman, J.C. & Norton, P.M. (1985). The distribution and status of bats (Mammalia: Chiroptera) in the Cape Province. *Animals of the Cape Provincial Museums*, 16: 73-126.

Johnson, G. D., Erickson, W. P., Stickland, M. D., Shepherd, M. F., Shepherd, D. A. and Sarappo, S. A., (2003). Mortality of bats at a large-scale wind power development at Buffalo Ridge, Minnesota. *The American Midland Naturalist Journal* 150: 332-342

Kunz, T. H., Arnett, E. B., Erickson, W. P., Hoar, A. R., Johnson, G. D., Larkin, R. P., Strickland, M. D., Thresher, R. W., Tuttle, M. D., (2007). Ecological impacts of wind energy development on bats: questions, research needs, and hypothesis. *Frontiers in Ecology and the Environment* 5: 315-324.

Korine, C., Adams, R., Russo, D., Fisher-Phelps, M., & Jacobs, D. (2016). Bats and water: anthropogenic alterations threaten global bat populations. *Bats in the Anthropocene: Conservation of bats in a changing world*, 215-241.

Ladislav, M., Rutherford, M.C., (2006). The vegetation of South Africa, Lesotho and Swaziland, South African National Biodiversity Institute.

Laverty, T. M., & Berger, J. (2020). Do bats seek clean water? A perspective on biodiversity from the Namib Desert. *Biological Conservation*, 248, 108686.



Lynch, C. D. (1989). The mammals of the north-eastern Cape Province. Mem. Nas. Mus. Bloemfontein 25: 1-116.

Linton, D. M., & Macdonald, D. W. (2018). Spring weather conditions influence breeding phenology and reproductive success in sympatric bat populations. *Journal of Animal Ecology*, 87(4), 1080-1090.

Marais W.C. Animalia Zoological & Ecological Consultation, (2011). Proposed Haverfontein Wind Energy Project, Albert Luthuli Local Municipality: Bat (Chiroptera) Impact Assessment, Animalia Zoological & Ecological Consultation, Johannesburg, South Africa.

MacEwan, K., Aronson, J., Richardson, E., Taylor, P., Coverdale, B., Jacobs, D., ... & Richards, L. (2018). South African Bat Fatality Threshold Guidelines—ed 2. South African Bat Assessment Association. South African Bat Fatality Threshold Guidelines October.

MacEwan, K., Sowler, S., Aronson, J., & Lötter, C. (2020). South African best practice guidelines for pre-construction monitoring of bats at wind energy facilities. South African Bat Assessment Association.

Marais W.C. Animalia Zoological & Ecological Consultation, (2022). Bat Environmental Impact Assessment (EIA) Report For 12-Month Pre-construction Bat Monitoring For the proposed Mukondeleli Wind Energy Facility (WEF) Mpumalanga, South Africa.

Miller-Butterworth, C. M., Jacobs, D. S., & Harley, E. H. (2003). Strong population substructure is correlated with morphology and ecology in a migratory bat. *Nature*, 424(6945), 187-191.

Monadjem, A., Taylor, P. J., & Schoeman, M. C. (2020). Bats of southern and central Africa: a biogeographic and taxonomic synthesis. Wits University Press.

O'Farrell M.J., Bradley W.G. and Jones G.W. (1967). Fall and winter bat activity at a desert spring in southern Nevada. *South-western Naturalist*, 12, 163-171.



- Peng R.K., Sutton S.L. and Fletcher C.R. (1992). Spatial and temporal distribution patterns of flying Diptera. *Journal of Zoology, Lond.*, 228, 329-340.
- Pretorius, M., Broders, H., Seamark, E., & Keith, M. (2020). Climatic correlates of migrant Natal long-fingered bat (*Miniopterus natalensis*) phenology in north-eastern South Africa. *Wildlife Research*, 47(5), 404-414.
- Rachwald A. (1992). Habitat preference and activity of the noctule bat *Nyctalus noctula* in the Bialowieza primeval forest. *Acta Theriologica*, 37, 413-422.
- Rautenbach, I.L. 1982. Mammals of the Transvaal. Pretoria: Ecoplan.
- Schorr, R. A., Matthews, M. D., & Hoover, B. A. (2022). Finding bat roosts along cliffs: using rock climbing surveys to identify roosting habitat of bats. *Acta Chiropterologica*, 24(1), 167-176.
- Shortridge, G.C. (1934). The mammals of South West Africa. William Heinemann Ltd, London.
- Simmons, N. B., Seymour, K. L., Habersetzer, J. & Gunnell, G. F., (2008). Primitive Early Eocene bat from Wyoming and the evolution of flight and echolocation. *Nature*, 451, 818-821.
- Skinner, J.D. & Chimimba, C.T. (2005). The mammals of the Southern African
- Stepanian, P. M. & Wainwright, C. E. (2018). Ongoing changes in migration phenology and winter residency at Bracken Bat Cave. *Global Change Biology* 24(7), 3266–3275.
- Subregion. 3rd ed. University of Cambridge, Cambridge.
- Squires, K.A., Thurber, B.G., Zimmerling, J.R. and Francis, C.M. (2021). Timing and weather offer alternative mitigation strategies for lowering bat mortality at wind energy facilities in Ontario. *Animals*, 11(12), p.3503.



- Taylor, P. J., (2000). Bats of southern Africa, University of Natal Press, Pietermaritzburg.
- Van Cakenberghe V, Seamark E C. J. (eds) (2022) African Chiroptera Report 2022. AfricanBats NPC, Pretoria.
- Van der Merwe, M. (1994). Reproductive biology of the Cape serotine bat, *Eptesicus capensis*, in the Transvaal, South Africa. South African Journal of Zoology 29: 36-39.
- von Frenckell B, Barclay RMR (1987) Bat activity over calm and turbulent water.
- Wieser, D., Mixanig, H., Krainer, K., Bruckner, A., & Reiter, G. (2020). The importance of inland cliffs and quarries for bats. Acta Chiropterologica, 22(2), 391-402.
- Williams, T.C., Ireland, L.C. & Williams, J.M. (1973). High altitude flights of the free-tailed bat, *Tadarida brasiliensis*, observed with radar. Journal of Mammalogy, 54 (4): 807-821.
- Wilson, D. E., (2015). Bats in question: the Smithsonian answer book, Smithsonian Institution.
- WSP Group Africa (Pty) Ltd (2022). Camden I Solar Energy Facility Final Environmental Impact Assessment Report.
- WSP Group Africa (Pty) Ltd (2022). Camden I Wind Energy Facility Environmental Impact Assessment report.
- WSP Group Africa (Pty) Ltd (2022). Camden II Wind Energy Facility Final Environmental Impact Assessment Report.



Appendix 1: Specialist Qualifications







Appendix 2: Curriculum Vitae of bat specialist

Personal details	
Full Name	John Low de Vries
DOB	07-Nov-84
Nationality	South African
Marital Status	Married
Email	low@volantenvironmental.com
Phone	+27 82 323 5475
ID number	8 411 075 188 087
Education	
Completed	Degree and Institution
2002	Matric, Hoërskool Jeugland, Kempton Park, South Africa
2006	B. Sc Zoology, University of Pretoria, Pretoria, South Africa
2007	B. Sc (Hons) Zoology, University of Pretoria, Pretoria, South Africa
2014	PhD Zoology, University of Pretoria, Pretoria, South Africa
Key areas of expertise	
• Bat Specialist	Conducting surveys on bat diversity and abundance and research on bat ecology.
• Environmental Assessment Practitioner	Writing and collating Basic Assessment (BA) for proposed Wind Energy Facilities
Memberships & Certificates	
• SACNASP Registered Professional Natural Scientist in the field of Zoological Science - Registration Number: 124178	
• Bat Assessment Specialist with South African Bat Assessment Association (SABAA)	
Other Training	
• Multivariate statistical modelling (Cape Town, South Africa)	
• Bat handling and identification course (AfricanBats)	



<ul style="list-style-type: none"> Snake handling (Chameleon Village (South Africa)) ArcGis online course First Aid level 2 (Johannesburg, South Africa) 	
Publications	
Wood, M., de Vries, J.L. , Monadjem, A., Markotter, W. A critical review of factors influencing interspecific variation in home range size of bats. Mammal Review. <i>In submission</i>	
Markotter W, de Vries, J.L. , Paweska, J. 2022. Wing tattoos: A cost-effective and permanent method for marking bats. <i>In review</i>	
Geldenhuys, M., de Vries, J.L. , Dietrich, M., Mortlock, M., Epstein, J. H., Weyer, J., Paweska, J T., Markotter, W. Longitudinal surveillance of diverse coronaviruses within a <i>Rousettus aegyptiacus</i> maternal colony towards understanding viral maintenance and excretion dynamics. <i>In submission</i>	
Markotter, W., Coertse, J., de Vries, J.L. , Geldenhuys, M., Mortlock, M. 2020. Bat-borne viruses in Africa: A critical review. Journal of Zoology. 311:2. 77-98	
de Vries J.L. , Marneweck D, Dalerum F, Page-Nicholson S, Mills MGL, Yarnell RW, Sliwa A, Do Linh San E. 2016. A conservation assessment of <i>Proteles cristata</i> . In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.	
Dalerum F, Le Roux A, de Vries J.L. , Kamler JF, Page-Nicholson S, Stuart C, Stuart M, Wilson B, Do Linh San E. 2016. A conservation assessment of <i>Otocyon megalotis</i> . In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland, and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.	
Dalerum, F., de Vries, J.L. , Pirk, C.W.W., Cameron, E.Z. 2016. Spatial and temporal dimensions to the taxonomic diversity of arthropods in an arid grassland savannah. <i>Journal of Arid Environments</i> . 144. 21-30	
Kotze, R., Bennett, N., Cameron, E.Z., de Vries, J.L. , Marneweck, D.G., Pirk, C.W.W., Dalerum, F. 2012. Temporal patterns of den use suggest polygamous mating patterns in an obligate monogamous mammal. <i>Animal Behaviour</i> . 84. 1573-1578	
de Vries, J.L. , Pirk, C.W.W., Bateman, P.W., Cameron, E.Z., Dalerum, F. 2011. Extension of the diet of an extreme foraging specialist, the aardwolf (<i>Proteles cristata</i>). <i>African Zoology</i> . 6:1 194-196.	
de Vries, J. L. , Oosthuizen, M. K., Sichilima, A. M., Bennett, N. C. 2008. Circadian rhythms of locomotor activity in Ansell's mole-rat: are mole-rat's clocks ticking? <i>Journal of Zoology</i> . 276:4. 343-349	
Employment & work-related experiences	
2020 - present	Director and founder of Volant Environmental
2016 - present	Postdoctoral fellow, University of Pretoria
2015 - 2016	Postdoctoral fellow, NZG
2014 - 2015	Marion Island field assistant, University of Pretoria



2013	Documentary presenter, Oxford Scientific Films
2010 - 2011	Wildlife Education Trainer, Enviro- Insight
2010 - 2011	Game Raising Lecturer, Damelin Centurion
2009 - 2018	Lecturer and tutor, University of Pretoria
Conference Contributions	
Markotter W, de Vries, J.L. , Wood, M. 2022. Small scale movement of <i>Rousettus aegyptiacus</i> . International Bat Research Conference. Austin, Texas	
Infectious Diseases of Bats Symposium. Fort Collins, Colorado 2017. Body mass index of the Egyptian fruit bat, <i>Rousettus aegyptiacus</i> : An indicator of infection status. de Vries, J.L. , Dietrich, M., Paweska, J., Markotter, W.	
SASAS 2016. de Vries, J.L. , Jonker, M.L., Kriel, D., Kotze, A.K. The Tankwa goat: Phenotypically that different?	
De Beers Diamond Route Conference, 2010. de Vries, J.L. , Pirk, C.W.W., Bennett, N.C. Is the aardwolf a seasonally influenced optimal forager?	
Kimberley biodiversity research symposium, 2009. de Vries, J.L. , Bennett, N.C., Pirk, C.W.W., Dalerum, F., Cameron, E.Z. Den, and home range use of the aardwolf, <i>Proteles cristatus</i>	



Recent Project Experience

For further details please contact me directly at low@volantenvironmental.com

Time span	Nature of project	Capacity	Industry / Sector	Client / Developer	Country (Province)
2025-current	Maquassi ERA	Bat Specialist	Renewable Energy / Onshore Wind	AGV	South Africa (North West)
2025-current	Khangela WEF	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Northern Cape)
2025-current	Ishwati WEF	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Northern Cape)
2025-current	Umsinde WEF	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Northern Cape)
2024-current	Uvemvane WEF	Bat Specialist	Renewable Energy / Onshore Wind	ABO Energy South Africa	South Africa (Mpumalanga)
2024-current	Mordant WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Northern Cape)
2024	Castel WEF	Bat Specialist	Renewable Energy / Onshore Wind	Savannah (Pty) Ltd	South Africa (Northern Cape)
2024-current	Steeldrift WEF	Bat Specialist	Renewable Energy / Onshore Wind	EDF Renewables	South Africa (Mpumalanga)
2024	Deelkraal WEF	Bat Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Gauteng)
2024-current	Pretjiesberg WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Zutari	South Africa (Eastern Cape)
2024-2025	Mabele Emoyeni WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Sereti Green	South Africa (Free State)
2024-2025	Doringbaai South	Bat Specialist	Renewable Energy / Onshore Wind	WKN Windcurrent SA (Pty) Ltd	South Africa (Western Cape)
2023 - 2024	Unika WEF	Bat Specialist	Renewable Energy / Onshore Wind	Total Energies	Zambia (Eastern Province)
2023 - 2024	Pensulo WEF	Bat Specialist	Renewable Energy / Onshore Wind	Total Energies	Zambia (Central Zambia)



2023 - 2024	Rhenosterkop WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	AGV	South Africa (Northern Cape)
2023 - 2024	Hotazel WE	Bat and Bird Specialist	Renewable Energy / Onshore Wind	AGV	South Africa (Northern Cape)
2023 - 2024	Buffelsfontein SEF	Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Mpumalanga)
2023 - 2024	Stillfontein SEF	Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Mpumalanga)
2023 - 2024	Roodepoort SEF	Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Limpopo)
2023 - 2024	Kuske SEF	Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Limpopo)
2023 - 2024	Komati WEF and SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	WKN Windcurrent SA (Pty) Ltd	South Africa (Mpumalanga)
2023 - 2024	Three Provinces 1 SEF and WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Mpumalanga)
2023 - 2024	Three Provinces 2 SEF and WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Cainmani	South Africa (Mpumalanga)
2023 - 2024	Brakdam WEF	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2023 - 2024	Hartebees Skeur WEF	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2023 - 2024	Brakputs WEF	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2023 - 2024	Varsputs WEF	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2023 - 2025	Daggakraal WEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	EDF Renewables	South Africa (Mpumalanga)
2023 - 2024	Imvubo SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Nextec	South Africa (KZN)



2023 - 2024	Ingagne SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Nextec	South Africa (KZN)
2023 - 2024	Camden WEF	Bird Specialist	Renewable Energy / Onshore Wind	EDF Renewables	South Africa (Mpumalanga)
2023 - 2023	Steelpoort SEF	Bird Specialist	Renewable Energy / Onshore Wind	Jones and Wagener	South Africa (Limpopo)
2023 - 2023	Tournee SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	WKN Windcurrent SA (Pty) Ltd	South Africa (Mpumalanga)
2022 - 2023	Dubula SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	CEN	South Africa (Eastern Cape)
2022	Dubula Greenfields SEF	Bat and Bird Specialist	Renewable Energy / Onshore Wind	CEN	South Africa (Eastern Cape)
2022	Tuinfontein Scoping survey	Bat and Bird Specialist	Renewable Energy / Onshore Wind	Akuo Energy	South Africa (Northern Cape)
2022	WEF Desktop surveys	Bat Specialist	Renewable Energy / Onshore Wind	Oryx Power	South Africa (Mpumalanga, Northern Cape, Eastern Cape)
2022	Langberg WEF Bat Scoping Survey	Bat Specialist	Renewable Energy / Onshore Wind	Akuo Energy	South Africa (Northern Cape)
2022	Thand Tau Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Free State)
2022	Camden Bird Impact Assessment	Bird Specialist	Renewable Energy / Onshore Wind	EDF Renewables	South Africa (Mpumalanga)
2022	Hotazel WEF Scopin Survey	Bat Specialist	Renewable Energy / Onshore Wind	Jones and Wagener	South Africa (Northern Cape)
2022	Rhenosterkop WEF Scopin Survey	Bat Specialist	Renewable Energy / Onshore Wind	Jones and Wagener	South Africa (Western Cape)
2022- 2023	Doringbaai WEF Bat Impact assessment	Bat Specialist	Renewable Energy / Onshore Wind	WKN Windcurrent SA (Pty) Ltd	South Africa (Western Cape)
2022	Castle WEF walkthrough	Bat Specialist	Renewable Energy / Onshore Wind	Savannah (Pty) Ltd	South Africa (Northern Cape)



2021	Fraserburg raptor nest survey	Bird specialist	Renewable Energy / Onshore Wind	WKN Windcurrent SA (Pty) Ltd	Renewable Energy / Onshore Wind
2021-2022	Dordrecht Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	ACED (Pty) Ltd	South Africa (Eastern Cape)
2021 - 2022	Indwe Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Jones and Wagener	South Africa (Eastern Cape)
2021 - 2022	Waschbank Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Jones and Wagener	South Africa (Eastern Cape)
2022 - 2023	Gorachouqua Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2022 - 2023	Khoemana Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Northern Cape)
2021 - 2022	Dalmanutha Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Enertrag SA (Pty) Ltd	South Africa (Mpumalanga)
2020-2021	Bergvriervat Bat Impact Assessment	Bat Specialist	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Western Cape)
2020-2021	Botterblom Bat Impact Assessment	Bat Specialist Bird assistant	Renewable Energy / Onshore Wind	Genesis Eco-Energy Developments (Pty) Ltd	South Africa (Northern Cape)
2012	Dangerous snake removal	Herpetologist	Mining (Coal)	Anadarko	Mocimboa da Paia, Mozambique

Appendix C.7

VISUAL SSVR (INCLUDING FLICKER)



**VISUAL / LANDSCAPE SITE SENSITIVITY VERIFICATION REPORT FOR THE
PROPOSED DEVELOPMENT OF THE ABO UVEMVANE WIND ENERGY FACILITY 1
AND ASSOCIATED INFRASTRUCTURE, GAUTENG & MPUMALANGA PROVINCE**

Produced for:



WSP in Africa
Building 1, Maxwell Office Park, Magwa Crescent West,
Waterfall City, Midrand, 1685

Produced by:



Lourens du Plessis (PrGISc) t/a LOGIS
PO Box 384, La Montagne, 0184
M: 082 922 9019 E: lourens@logis.co.za W: logis.co.za

- May 2025 -

TABLE OF CONTENTS

LIST OF TABLES.....	ii
LIST OF MAPS.....	ii
LIST OF FIGURES	ii
DOCUMENT CONTROL	iii
DECLARATION	iv
1. STUDY APPROACH.....	5
1.1. Qualification and experience of the practitioner.....	5
1.2. Assumptions and limitations	5
1.3. Legal framework	6
1.4. Information base	6
1.5. Level of confidence	6
2. PROJECT DESCRIPTION.....	7
3. METHODOLOGY	9
4. THE AFFECTED ENVIRONMENT	10
5. SITE SENSITIVITY VERIFICATION	18
5.1. Sensitivities identified by the National Web-based Environmental Screening Tool	18
5.2. Sensitivity Buffers	19
5.3. Overall Visual Sensitivity.....	26
5.4. Results	28
6. CONCLUSION AND RECOMMENDATIONS	29
7. REFERENCES	31

LIST OF TABLES

Table 1: Level of confidence	7
Table 2: Site sensitivity features as per the DFFE Screening Tool	18
Table 3: Matrix to determine overall visual sensitivity of the receiving environment to the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure	28

LIST OF MAPS

Map 1: Shaded relief map of the study area	14
Map 2: Land cover/ broad land use patterns within the study area	15
Map 3: Location of the images taken during the site visit	16
Map 4: Location of the images relative to the site used within the report.....	17
Map 5: Proximity to roads and protected areas/ tourist attractions	22
Map 6: Proximity to inhabited residences, settlements, and towns.....	23
Map 7: Proximity to hydrological features.....	24
Map 8: Proximity to Steep slopes, prominent hills, ridges, and skylines.....	25
Map 9: Overall visual sensitivity of the proposed ABO Uvemvane WEF 1	27

LIST OF FIGURES

Figure 1: Illustration of the main components of a wind turbine	9
Figure 2: General topography of the site and study area	10
Figure 3: Rural character of the study area interspersed with commercial agricultural activities	10
Figure 4: Illustrating the land use and land cover occurring within the study area	11
Figure 5: Example of scattered homesteads and settlements found in and around the site	11
Figure 6: Looking over the site from the R23	12
Figure 7: View over the site from the R103.....	12
Figure 8: Existing power lines within the study area	12
Figure 9: Moderate to high visual quality of the study area	13
Figure 10: Relative landscape (wind) theme sensitivity as per the DFFE Screening Tool for the proposed ABO Uvemvane WEF 1	18
Figure 11: Relative flicker theme sensitivity as per the DFFE screening tool for the proposed ABO Uvemvane WEF 1	19

DOCUMENT CONTROL

Report Name:	Visual / Landscape Site Sensitivity Verification Report for the Proposed Development of the ABO Uvemvane Wind Energy Facility 1 and Associated Infrastructure, Gauteng & Mpumalanga Province
VIA & GIS Specialist:	LOGIS 531A Witogie Street, Die Wilgers, Pretoria Contact Person: Lourens du Plessis Tel: 082 922 9019 Email: lourens@logis.co.za Expertise: GPr GISc SAGC Reg no: GPr GISc 0147.
Report compiled by:	Nuleaf Planning and Environmental (Pty) Ltd 8A Trevor Street, Murrayfield, Pretoria, 0184 Contact Person: Tosca de Villiers Tel: 072 478 8856 Email: tosca@nuleafsa.co.za Expertise: MLARCH EAPASA Reg no: 2019/1582 SACLAP Reg. no: 20421
Co-author:	Contact Person: Bryony van Niekerk Tel: 074 818 9788 Email: bryony@nuleafsa.co.za Expertise: BSc Hons. EMA EAPASA Reg no: 2019/655
EAP:	WSP Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand, 1685 South Africa Contact Person: Ashlea Strong Tel: 082 786-7819 Email: Ashlea.Strong@wsp.com
Applicant:	ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd
Report date:	13 May 2025
Report number:	02

DECLARATION

I, **Lourens du Plessis**, as an independent consultant compiled this Scoping Visual Impact Assessment and declare that it correctly reflects the findings made at the time of the report's compilation. I further declare that I, act as an independent consultant in terms of the following:

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, will present the results and conclusion within the associated document to the best of my professional judgement.

A handwritten signature in dark ink, appearing to read 'L. du P.' with a stylized flourish.

Lourens du Plessis
Professional GISc Practitioner

1. STUDY APPROACH

1.1. Qualification and experience of the practitioner

Lourens du Plessis (t/a LOGIS) is a Professional Geographical Information Sciences (GISc) Practitioner registered with The South African Geomatics Council (SAGC) and specialises in Environmental GIS and Visual Impact Assessments (VIA).

Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modelling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, Environmental Management Frameworks, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects.

He holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the GisLAB (Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q-Data Consulting acquired the GisLAB, worked for GIS Business Solutions for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd as director and equal partner until December 2015. From January 2016 he worked for SMEC South Africa (Pty) Ltd as a technical specialist until he went independent and began trading as LOGIS in April 2017.

Lourens has received various awards for his work over the past two decades, including EPPIC Awards for ENPAT, a Q-Data Consulting Performance Award and two ESRI (Environmental Systems Research Institute) awards for Most Analytical and Best Cartographic Maps, at Annual International ESRI User Conferences. He is a co-author of the ENPAT atlas and has had several of his maps published in various tourism, educational and environmental publications.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

1.2. Assumptions and limitations

This Report has been prepared by LOGIS at the request of the WSP as the appointed Environmental Assessment Practitioner (EAP) on behalf of the Project Developer to provide them with an independent specialist assessment. Unless otherwise agreed by LOGIS in writing, LOGIS does not accept responsibility or legal liability to any person other than the Genesis for the contents of, or any omissions from, this Report.

To prepare this Report, LOGIS utilised only the documents and information provided by WSP or any third parties directed to provide information and documents by WSP. LOGIS has not consulted any other documents or information in relation to this Report, except where otherwise indicated.

The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. LOGIS reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field or pertaining to this investigation.

Although LOGIS exercises due care and diligence in rendering services and preparing documents, LOGIS accepts no liability, and WSP, by receiving this document, indemnifies LOGIS and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with the services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If this report is used as part of a main

report, the report in its entirety must be included as an appendix or separate section to the main report.

This assessment was undertaken during the planning stage of the project and is based on information available at that time.

1.3. Legal framework

The following legislation and guidelines have been considered in the preparation of this report:

- **The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):** This report is in line with Appendix 6 of NEMA: Environmental Impact Assessment (EIA) Regulations (2014, as amended) which details the minimum requirements a specialist report must contain for an Environmental Impact Assessment.
- **Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005):** This guideline was developed for use in the Western Cape, however in the absence of the development of any other guideline, this provides input for the preparation of visual specialist input into EIA processes. The guideline documents the requirements for visual impact assessment, typical issues that trigger the need for specialist visual input, the scope and extent of a visual assessment, information required, as well as the assessment and reporting of visual impacts and management actions.
- **Screening Tool as per Regulation 16 (1)(v) of the Environmental Impact Assessment Regulations, 2014 as amended:** a Screening report was generated for this proposed project, whereby a visual impact assessment was identified as one of the specialist studies that would be required.

1.4. Information base

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town.
- Chief Directorate National (CDN) Geo-Spatial Information, varying dates. *1:50 000 Topographical Maps and Data*.
- DFFE, 2018/2020. *National Land-cover Database 2018/2020 (NLC2018/2020)*.
- DFFE, 2022. *South African Protected Areas Database (SAPAD_OR_2022_Q2)*.
- JAXA, 2021. Earth Observation Research Centre. *ALOS Global Digital Surface Model (AW3D30)*.
- Google Earth Pro. *Up to date and recent satellite images*.
- Professional judgement based on experience gained from similar projects.
- Literature research on similar projects.
- Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA

Quality of the above information bases are rated as good and sufficient for the purposes of this assessment, in order to produce findings/ conclusions with high confidence. This assessment is also informed by a site visit and consideration of the context and site specific aspects that may be affected by the proposed development.

1.5. Level of confidence

Level of confidence¹ is determined as a function of:

- The information available, and understanding of the study area² by the practitioner:
 - **3:** A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.

¹ Adapted from Oberholzer (2005).

² The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.

- **2:** A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
- **1:** Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.
- The information available, understanding of the project and experience of this type of project by the practitioner:
 - **3:** A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
 - **2:** A moderate level of information and knowledge is available of the project and the visual impact assessor is moderately experienced in this type of project and level of assessment.
 - **1:** Limited information and knowledge is available of the project and the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

Table 1: Level of confidence

Information on the study area	Information on the project & experience of the practitioner			
		3	2	1
	3	9	6	3
	2	6	4	2
	1	3	2	1

The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is High:

- The information available, and understanding of the study area by the practitioner is rated as **3**
- The information available, understanding and experience of this type of project by the practitioner is rated as **3**

2. PROJECT DESCRIPTION

ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 1 (ABO Uvemvane WEF 1), a commercial wind energy generation facility comprising up to 33 turbines and with a total generation capacity of up to 240 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi Local Municipality within the Sedibeng District Municipality.

A development area (i.e., the full extent of the affected properties as well as beyond, where appropriate) has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected properties and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this report and assessed in terms of the suitability from a visual perspective.

It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the maximum development scenario for the proposed development.

The proposed facility would comprise the following (to be located within the proposed development footprint):

- Up to 33 turbines with the following maximum specifications:
 - Maximum hub height 180m
 - Maximum blade length 100m
 - Maximum rotor diameter 200m
 - Maximum capacity per turbine 10MW
 - A transformer at the base of each turbine
 - Concrete turbine foundations up to 1 ha each
 - Turbine, crane, and blade hardstands (included in the abovementioned 1 ha)
- Primary/main access roads as well as internal road reticulation (note that existing roads/disturbed areas would be used as far as possible, and for the proposed roads, a corridor of up to 12 m wide may be temporarily impacted upon during construction and be rehabilitated to up to 10 m wide after construction), inclusive of stormwater infrastructure where relevant.
- Temporary laydown areas/ construction compounds (includes concrete batching), totalling up to 25 ha, would be fenced with access control; and/or
- Battery Energy Storage System (BESS) to be located within the electrical infrastructure hub described under “associated infrastructure” below.

Associated infrastructure would include the following (to be located within the proposed development footprint):

- Associated internal electrical reticulation/ cabling (i.e., low- and medium voltage powerlines), underground as far as is feasible, and to run within the proposed road footprint/route as far as possible; and
- On-site electrical infrastructure hub consisting of:
 - On-site substation and associated infrastructure,
 - Additional step-up/ transformation/ collector/switchyard infrastructure,
 - Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) building/s, admin building/s, workshop/s, gatehouse/s, security building/s, control centre/s, office/s, visitor centre/s, warehouse/s, etc.),
 - May include the installation of a communications tower and lighting mast on site with a maximum height of 32 m and 25m respectively, and/or
 - BESS.

The proposed properties identified for the ABO Uvemvane WEF 1, and associated infrastructure are indicated on the maps within this report.

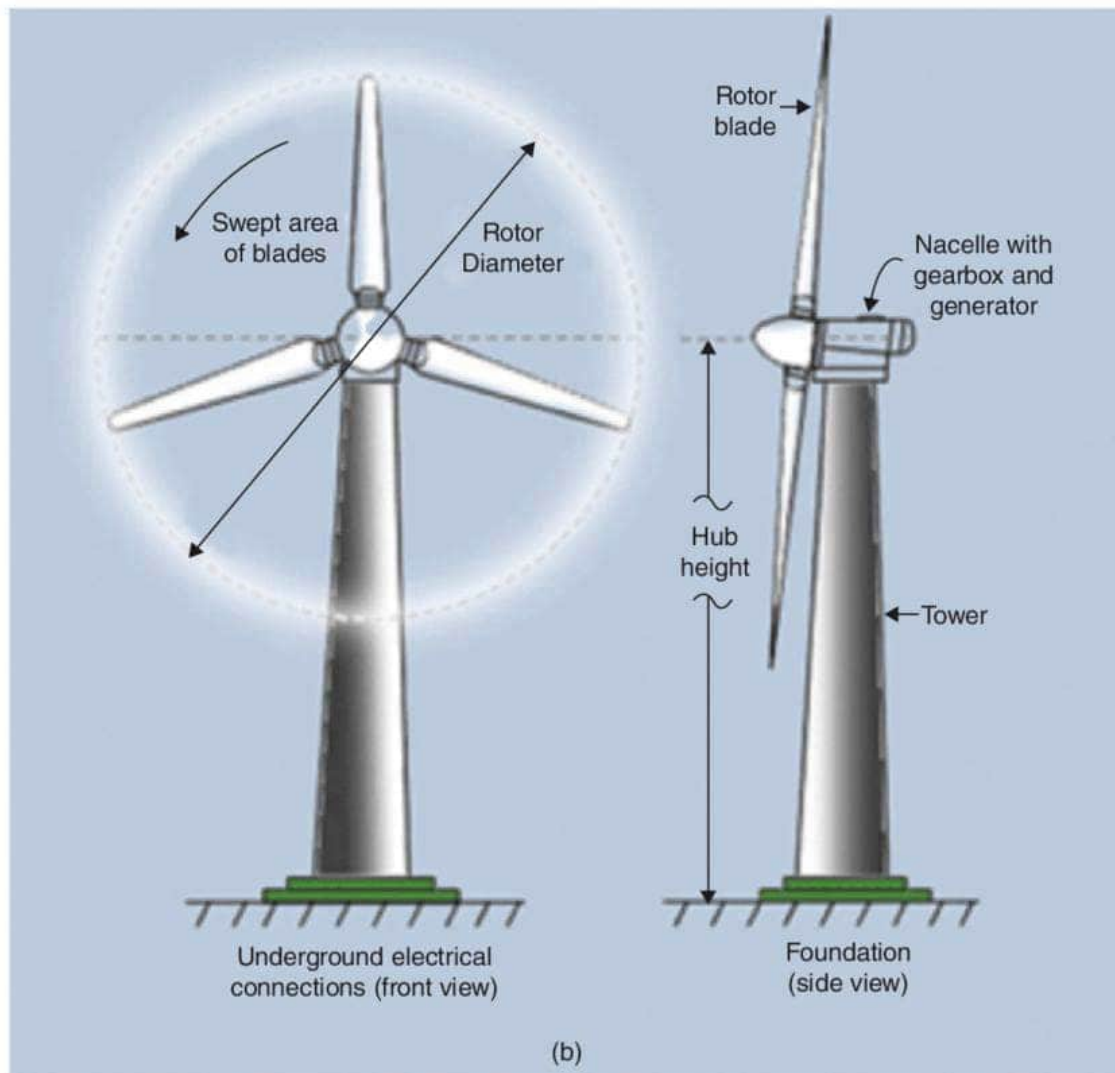


Figure 1: Illustration of the main components of a wind turbine³

3. METHODOLOGY

The site sensitivity verification was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area (extent of the maps below encompassing the proposed development site / WEF site boundary) was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

The approach utilised to identify potential issues related to the visual impact included the following activities:

- The creation of a detailed digital terrain model (DTM) of the potentially affected environment.
- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.
- The identification of sensitive receptors upon which the proposed development could have a potential visual impact.
- A site visit was undertaken on 28 November 2024 in order to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report. It should be noted that, from a visual perspective, the different seasons do not influence the results of the impact assessment, and as such regardless of the timing of the site visit, the level of confidence for the assessment and findings is high.

³ Illustration courtesy of Charlier, R & Thys, A. (2016). Wind Power—Aeole Turns Marine. 10.1002/9781119066354.ch7.

This report sets out to identify the possible visual impacts related to the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure, as well as offer potential no development areas, if required.

4. THE AFFECTED ENVIRONMENT

The proposed ABO Uvemvane WEF 1 and associated infrastructure approximately 9km west of the town of Balfour in the Mpumalanga Province in the Dipaleseng Local Municipality within the Gert Sibande District Municipality and approximately 14km south-east of the town Heidelberg in the Gauteng Province in the Lesedi Local Municipality within the Sedibeng District Municipality.

The study area, as per the extent of the maps below encompassing the proposed development site / WEF site boundary, occurs on land that ranges in elevation from approximately 1450m above sea level (a.s.l.) along the drainage lines and water courses (i.e. Suikerbosrant, Blesbokspruit, etc.) occurring in this area, to 1925m a.s.l. on the top of the hills associated within the Suikerbosrand Nature Reserve to the northwest of the site. The topography or terrain morphology of the region is broadly described as comprising of hill slopes and valleys with gentle to moderately undulating landscapes on the highveld plateau. The development site itself is located on land with an average elevation of between approximately 1525m – 1820 a.s.l, it contains representations of both the undulating valley landscapes as well as the hills associated with the study area. Refer to **Map 1** for the shaded relief/topography map of the study area.



Figure 2: General topography of the site and study area

The region has a largely rural character, interspersed with commercial agricultural activities (i.e. dryland, irrigated and livestock production activities), scattered human settlements and numerous protected areas. Settlements closest to the site are the town of Heidelberg to the northwest and Balfour to the east. Formal agricultural activities are mostly associated with the watercourses of the region including the Suikerbosrant and Blesbokspruit Rivers.



Figure 3: Rural character of the study area interspersed with commercial agricultural activities

The natural vegetation or land cover types of the region are described as Grassland interspersed with scattered areas of wetlands and includes small pockets of dense woodland, open woodland and exotic plantations. Refer to Error! Reference source not found..



Figure 4: Illustrating the land use and land cover occurring within the study area

Several prominent rivers and hydrological features occur within the study area. These include numerous wetlands, farm dams, numerous perennial spruits scattered throughout the study area including the Suikerbosrant and Blesbokspruit Rivers located in the northern portion of the study area, as well as the Vaal Dam to the southwest.



Figure 5: Example of scattered homesteads and settlements found in and around the site

The study area is densely populated to the north in the Gauteng Province with a population density of 67 people per km², however the more south you travel towards the Mpumalanga Province the study area is less populated with a population density of 16 people per km² within the local municipality. The most populated areas within the study area are the towns of Heidelberg and Nigel to the north, as well as Balfour and Grootvlei to a lesser extent located southeast of the site. Outside of these areas, there are isolated homesteads and scattered settlements throughout the study area. The study area particularly located south of Heidelberg and around the site itself is a known wedding venue and tourist destination.

The inhabited status of all homesteads within the proposed development site has been verified via a combination of desktop and on-site verification methods. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present and have therefore been removed as potential sensitive receptors within this report. However, it must be noted that these farmsteads do retain the potential to be affected visually should they ever become inhabited again in the future.

Access to the sites is via a network of national, arterial and secondary roads that branch off of either the national N3 to the west, or the arterial R103 to the west and the R23 to the east. The N3 is a national route in South Africa that connects Johannesburg and Durban, respectively South Africa's largest and third-largest cities. Johannesburg is the financial and commercial heartland of South Africa, while Durban is South Africa's key port and one of the busiest ports in the Southern Hemisphere. It is also a popular holiday destination. As a result, the N3 is a very busy

highway that transports a high volume of traffic especially during peak holiday times⁴. The N3 Toll Route Agency confirms that volumes can spike up to 2000-3500 vehicles per hour on peak days and that high (heavy) constitutes 1500 vehicles per hour in a particular direction⁵.



Figure 6: Looking over the site from the R23



Figure 7: View over the site from the R103

Other industrial infrastructure within the study area includes existing high voltage powerlines scattered throughout the study area, as well as numerous associated substations.



Figure 8: Existing power lines within the study area

⁴ Source: [https://en.wikipedia.org/wiki/N3_\(South_Africa\)](https://en.wikipedia.org/wiki/N3_(South_Africa))

⁵ Source: <http://www.n3tc.co.za/n3-toll-route-traffic-and-crash-data-provide-numerous-safety-clues/#:~:text=Traffic%20forecasts,per%20hour%20on%20peak%20days.>

There are numerous protected areas scattered throughout the study area⁶, located predominately in the northern and southern portions of the study area. None of the protected areas are found within the proposed development site itself. The closest protected areas are the Alice Glockner and Suikerbosrand Nature Reserves, which are located approximately 5.1km and 12.3km respectively, to the northwest of the site. The study area is also a popular tourist and wedding destination. Refer to **Map 1** for the locations of the protected areas within the study area relative to the proposed development site.

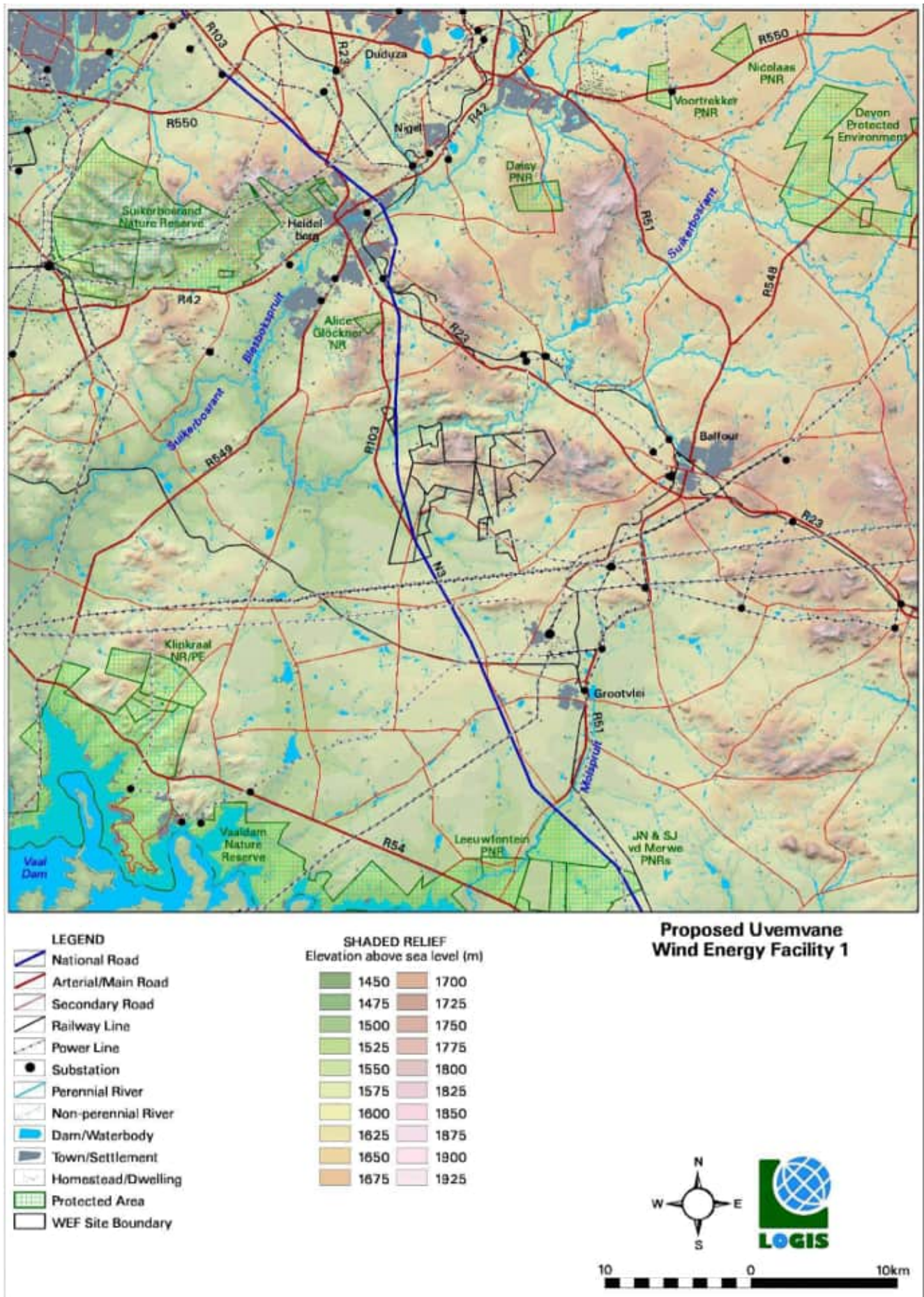
The greater environment with its wide open, predominately rural agricultural and undeveloped landscapes is considered to have a moderate to high visual quality.

Refer to **Map 3 and Map 4** for the location of the images taken during the site visit and the location of the images relative to the site used within the report

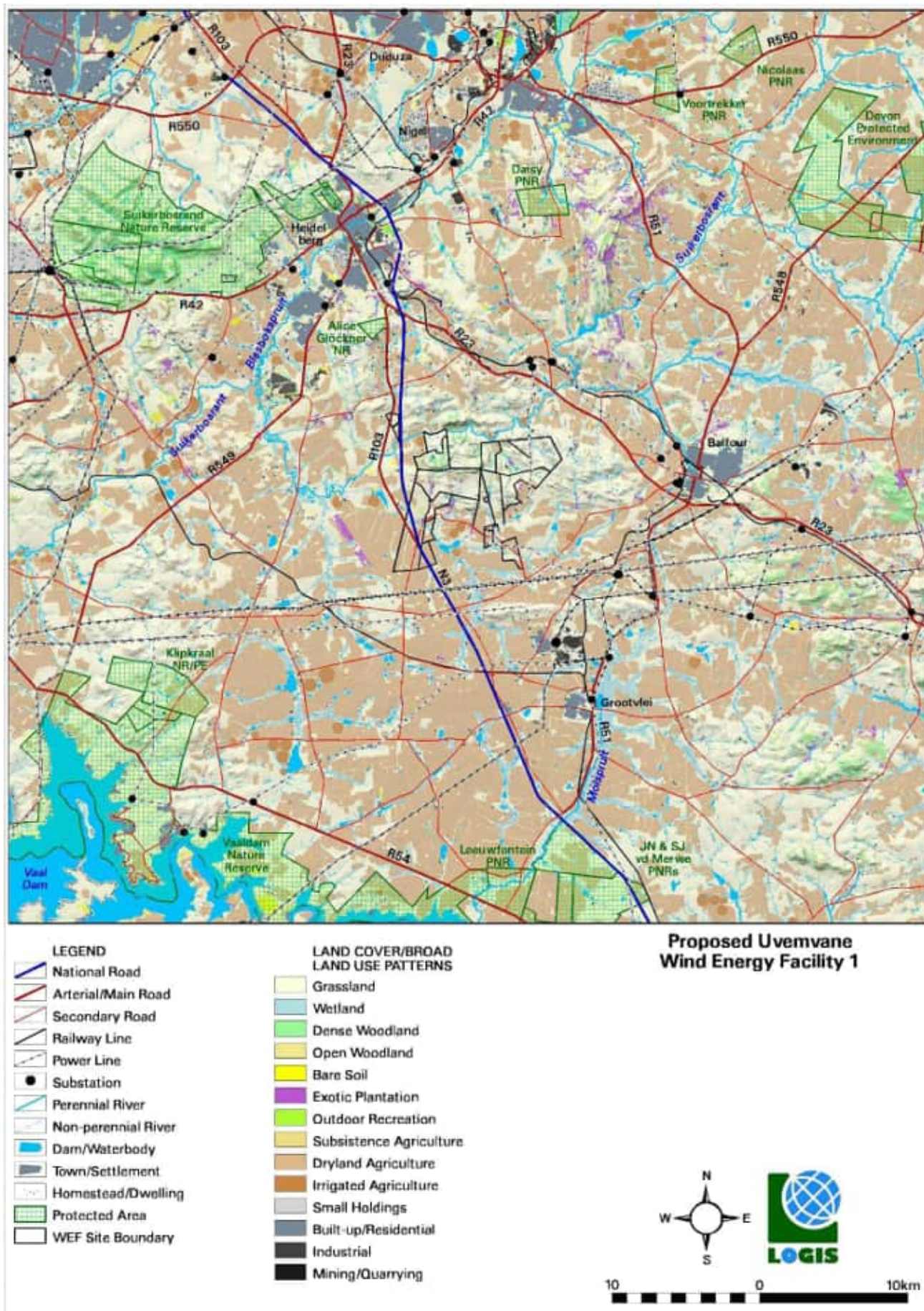


Figure 9: Moderate to high visual quality of the study area

⁶ The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.



Map 1: Shaded relief map of the study area



Map 2: Land cover/ broad land use patterns within the study area



Map 3: Location of the images taken during the site visit



Map 4: Location of the images relative to the site used within the report

5. SITE SENSITIVITY VERIFICATION

5.1. Sensitivities identified by the National Web-based Environmental Screening Tool

In accordance with GN 320 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool).

A screening report was compiled using the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool based on the assessed area for the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure. The Screening Report includes a 'Map of Relative Landscape (Solar) Theme Sensitivity', indicated in Figure 10 below.

The Screening Tool shows that the site for the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure is rated as having a **very high sensitivity** owing to the presence of the following:

Table 2: Site sensitivity features as per the DFFE Screening Tool

Sensitivity	Feature(s)
High	Slope between 1:4 and 1:10
High	Within 500 m of a river
Low	Slope less than 1:10
Medium	Between 4 and 6 km of a town or village
Medium	Between 5 and 10 km of a nature reserve, botanical garden or other protected area
Medium	Within 1000 m of a wetland
Very High	Mountain tops and high ridges
Very High	Slope more than 1:4
Very High	Within 250 m of a river

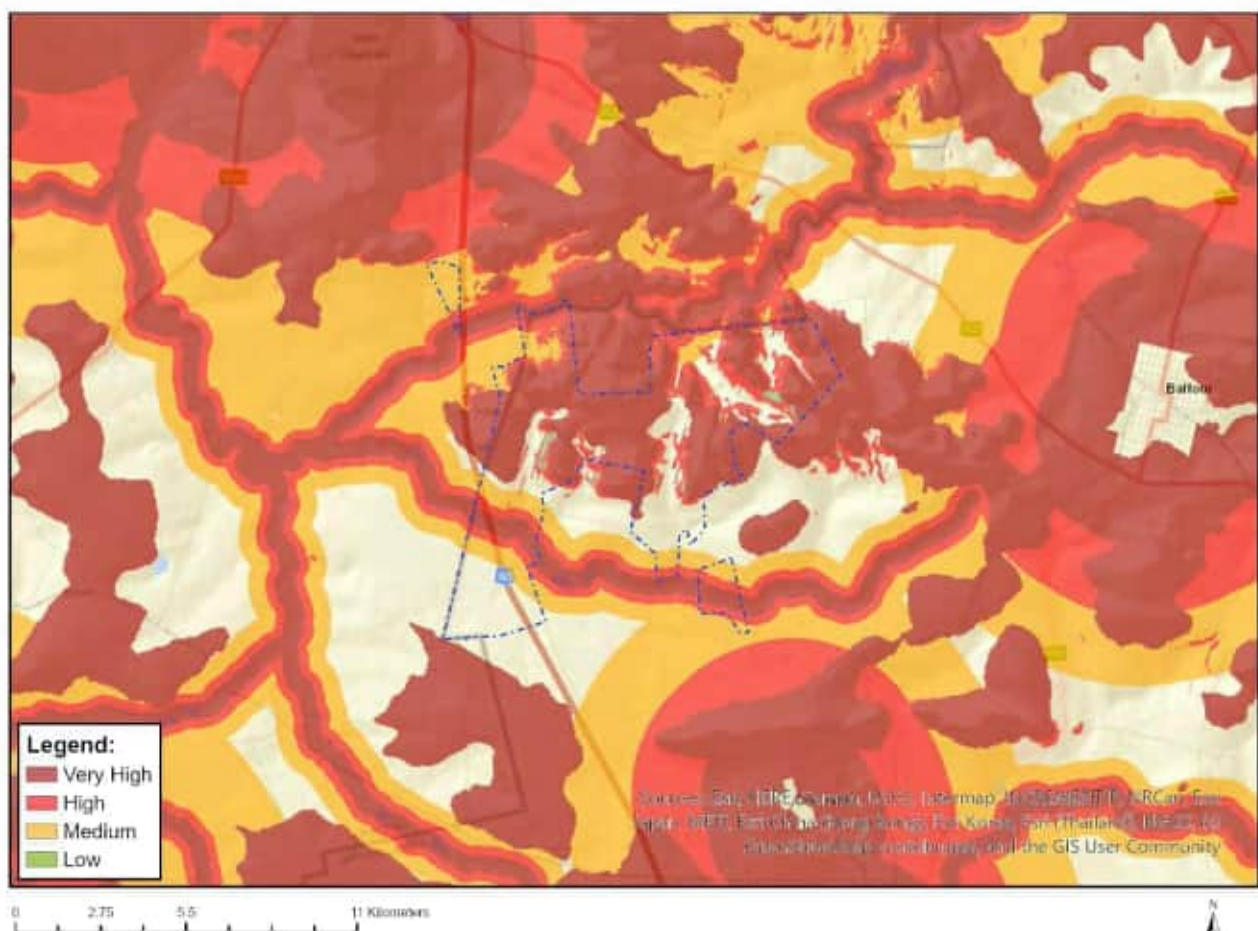


Figure 10: Relative landscape (wind) theme sensitivity as per the DFFE Screening Tool for the proposed ABO Uvemvane WEF 1

Similarly, the DFFE screening tool generated for the proposed ABO Uvemvane WEF 1 indicated that the facility has an overall sensitivity of **very high** relating to the visual aspects of Flicker Theme Sensitivity (potential temporarily or permanently inhabited residence). Refer to the Figure below.

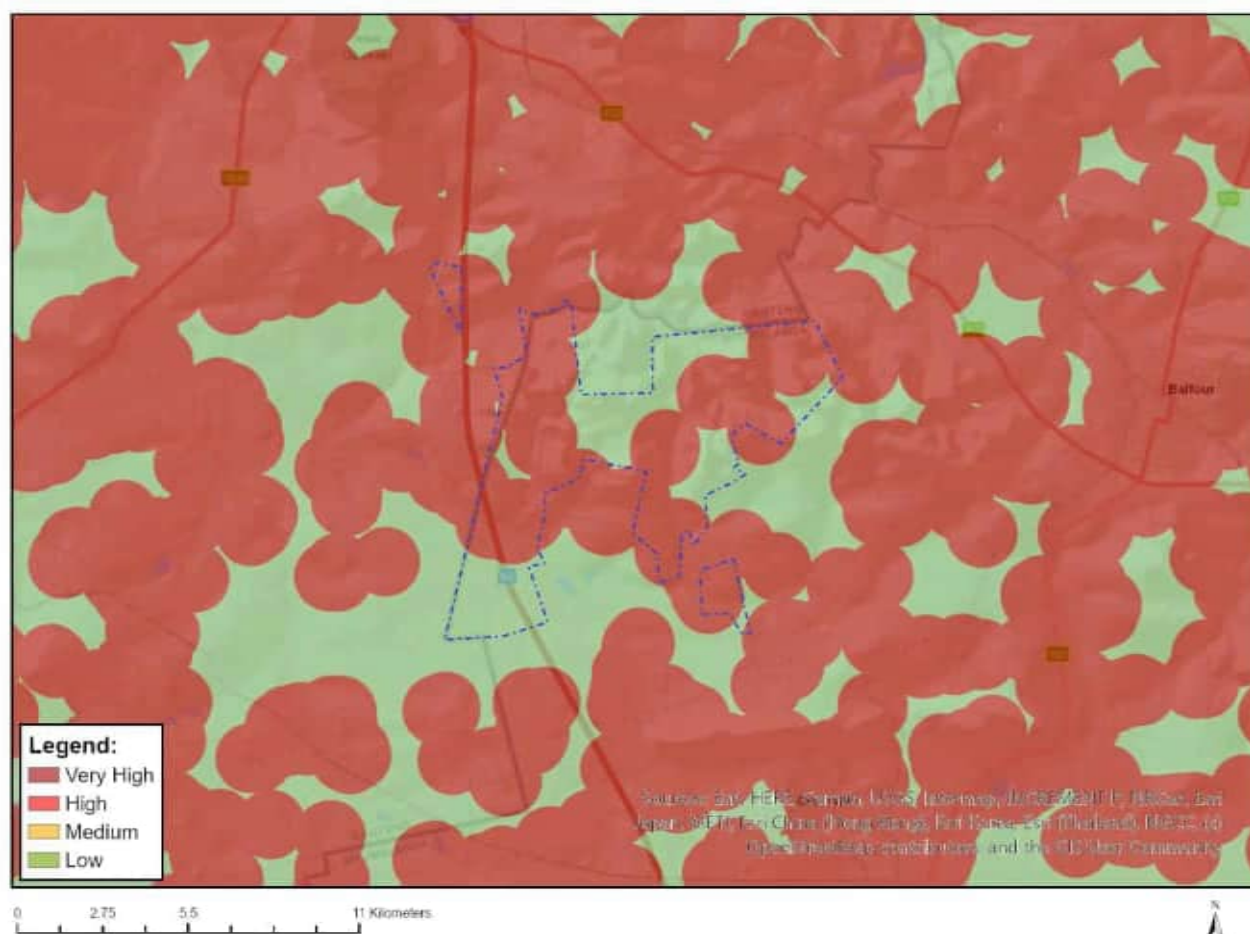


Figure 11: Relative flicker theme sensitivity as per the DFFE screening tool for the proposed ABO Uvemvane WEF 1

5.2. Sensitivity Buffers

The criteria for the identification of visually sensitive areas (scenic resources) and potential sensitive visual receptors, based on the buffers outlined by the Strategic Environmental Assessment (SEA) for wind and solar photovoltaic energy in South Africa (CSIR, 2015), are as follows:

Proximity to roads

Roads, especially scenic routes, are considered potential sensitive receptors whereby the travellers may be negatively impacted on by the exposure to the proposed WEF Infrastructure. In order to avoid encroachment of the infrastructure on public roads (especially in natural, rural and scenic areas), and thereby reducing the potential visual impact on road users and tourists, the following buffers are recommended:

- National / Scenic / Tourist roads– 1km buffer
- Arterial / Main roads – 500m buffer

Majority of the western portions of the ABO Uvemvane WEF 1 development site are located within the 1km buffer of the national N3 and the 500m buffer of the R103 Arterial / Main Road. It is recommended that no turbines be placed within these areas. Refer to **Map 5**.

Proximity to protected areas and tourist attractions

In order to avoid visual impacts on the wilderness character, experience, recreation amenity and tourism economy associated with many protected areas and tourist facilities, visual buffers are

recommended to be placed around these potential sensitive receptor sites. It is recommended that large scale WEF infrastructure should not be placed within the boundary of these identified or within the established buffer zones. The potential land use conflict between nature orientated tourism and the potential visual impacts associated with WEFs may be mitigated to some degree by adhering to the following exclusion zone buffers:

- National Parks – 5km buffer
- Nature Reserves – 3km buffer
- Private reserves and game farms – 1.5km buffer

Several protected areas are located within the study area, the closest of which is the Alice Glocker Nature Reserve which is located 5.1km northwest of the proposed development site. The proposed ABO Uvemvane WEF 1 development site is not located within any identified protected area buffers. Refer to **Map 5**.

Proximity to inhabited residences (homesteads), settlements and towns

Residences (homesteads), settlements, and towns including built-up residential areas are considered potential sensitive receptors whereby the residents may be negatively impacted on by the exposure to the proposed WEF Infrastructure. A 2km buffer is recommended for built-up / residential areas and a 1km buffer zone is recommended to reduce general observer proximity to infrastructure and avoid potential shadow flicker issues associated with wind turbines specifically on homesteads / farm dwellings.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located with the 1km buffer from a homestead or tourist accommodation. However, it must be noted that numerous homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern.

It is recommended that no turbines should be placed within 1km of any homesteads, unless otherwise agreed upon by the affected landowner. Proof of such agreement is required. Refer to **Map 6**.

Major rivers, water bodies, perennial rivers, and wetlands with scenic value

Rivers, dams, wetlands and pans often serve as visual features and provide visual relief in a landscape. As such, it is recommended that development along these features is avoided drainage by applying visual buffers of 250m for major/perennial rivers and dams and a 32m buffer for non-perennial streams.

Various non-perennial rivers, as well as dams are located within the proposed ABO Uvemvane WEF 1 site. While it is recommended that the proposed turbines are not placed within these buffers based on the recommendation of the Aquatic Specialist these buffers can be reduced to 50m for watercourses and 100m for wetlands. Refer to the Aquatic Report for more detail. Refer to **Map 7**.

Steep slopes, prominent hills, ridges, and skylines

Elevated terrain such as hills, ridges and mountains are considered to be scenic topographical features which are generally more exposed than areas with even or level slopes (e.g. plains). The placement of infrastructure on these elevated topographical units will increase the visual exposure (visibility) and prominence of the infrastructure within the landscape.

Note: The units "high mountains" and "mountains and tall hills" are derived from a terrain morphology map developed for the country (2011, MetroGIS). The map is based on the Terrain Morphology Map of South Africa, Lesotho and Swaziland (Kruger, G.P. 1983). The original map had six broad terrain morphological classes and 30 subdivisions. Even though it had large number of detailed subdivisions, it was developed at a very broad scale and the delineation of the units was similarly coarse and mainly applicable at a national scale.

The refined terrain morphological units were derived from a combination of inputs and analyses. They have as their basis in the South African Land Types, as supplied by the Agricultural Research Council (ARC), supplemented with a detailed slope analysis and an elevation range analysis.

*The Land Type units were merged with the slope analysis in order to determine the percentage of steep slopes (slope greater than 25% or 1:4 ratio) per Land Type. The result of this determines the level of undulation for each Land Type (i.e. whether it is flat, undulating or severely undulating). This analysis is then combined with the elevation ranges in order to determine the elevation of each land type unit above **ground/base** level (i.e. not sea level) in order to identify mountains and tall hills. Alternately, a considerable drop in base level would indicate prominent river valleys or gorges. Where needed, or in some cases where the land type units were too broadly delineated, the terrain morphological units were supplemented by manual interpretation and mapping.*

Five terrain morphological classes were identified:

- **High mountains** - Terrain morphological features with an elevation exceeding 400m above base level were indicated as high mountains. This height above base level may not be representative of international or even national standards for high mountains (i.e. comparative to mountains along the Drakensberg escarpment) but is intended as a regional perspective.
- **Mountains and tall hills** - Features with base elevation heights between 140m and 400m were indicated as mountains and tall hills.
- **Strongly undulating plains and hills** - *This terrain morphological unit includes land types where the percentage of steep slope (slope ratio greater than 1:4) makes up 25-50% of the unit, but where the elevation does not exceed 140m above base level.*
- **Undulating plains** - Undulating plains are land types where the terrain has a slope elevation of less than 5% (1:20 slope ratio). Undulating plains typically form the lowlands surrounding hills and ridges where the topography starts to even out.
- **Plains (and in some cases plains with pans)** - Plains are found where there is no discernible slope elevation within the Land Type unit. These areas are considered to be flat.

The placement of infrastructure on the below identified topographical units is as follows:

- Slopes > 25% – Very high sensitivity, No-go area
- High mountains – High sensitivity
- Mountains and tall hills – High sensitivity
- Strongly undulating plains and hills – Moderate sensitivity

A large section of the northeastern portion of the development site is located on the topographical features identified as mountains and tall hills with pockets of steep slopes (slopes greater than 1:4) found scattered throughout the site.

Without a turbine layout it cannot be determined whether any turbines will be located in the areas identified as steep slopes. However, development within the areas identified as steep slopes will not be supported from a visual perspective.

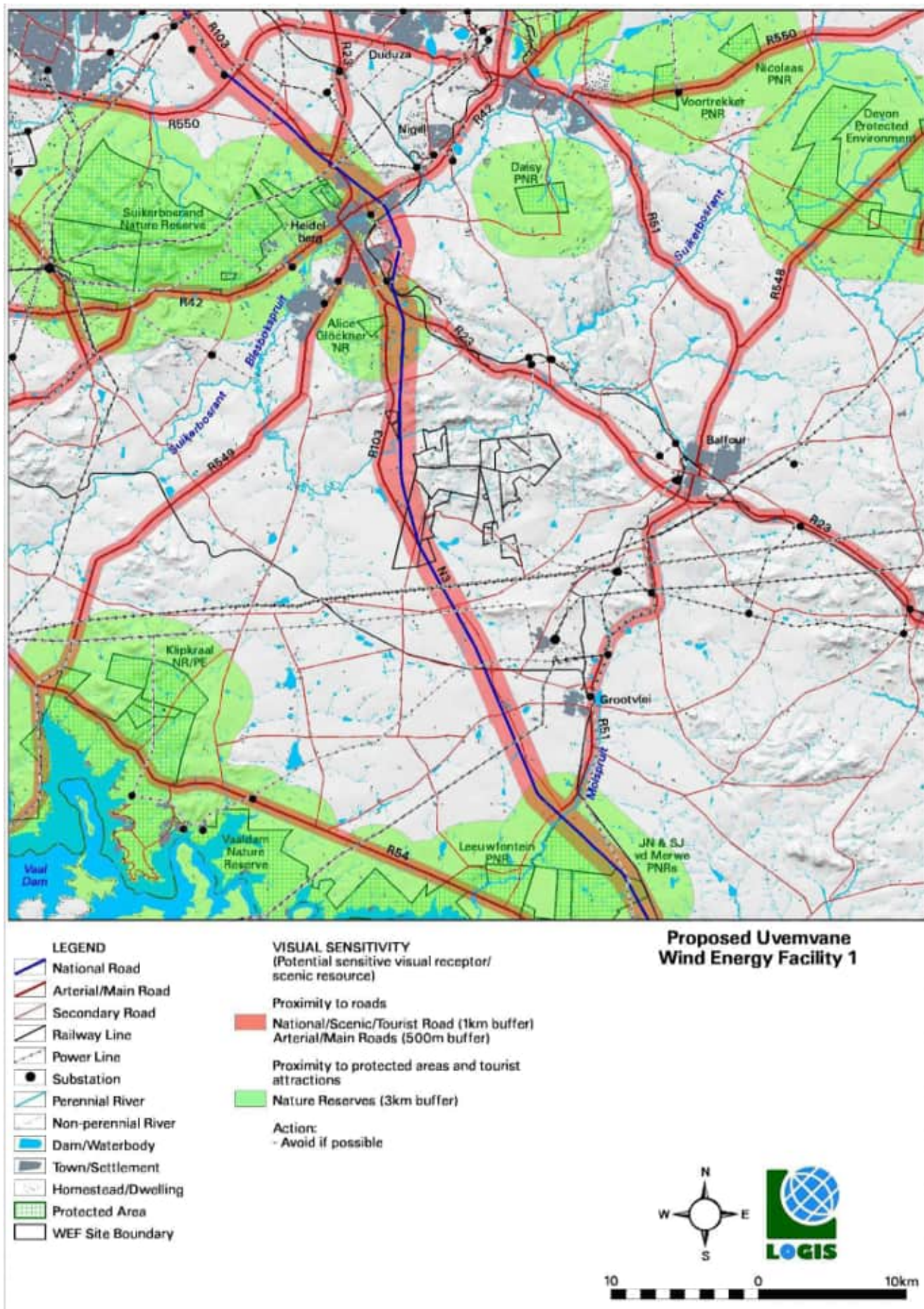
Additionally, it is recommended that turbines not be placed within the topographical feature areas identified as mountains and tall hills. The placement of the turbines within these areas is expected to exacerbate the visual exposure of the facility as a result of the elevated terrain, as well as have a visual impact on the scenic resources located within the study area. Refer to **Map 8**.

Identified cultural historical or heritage sites

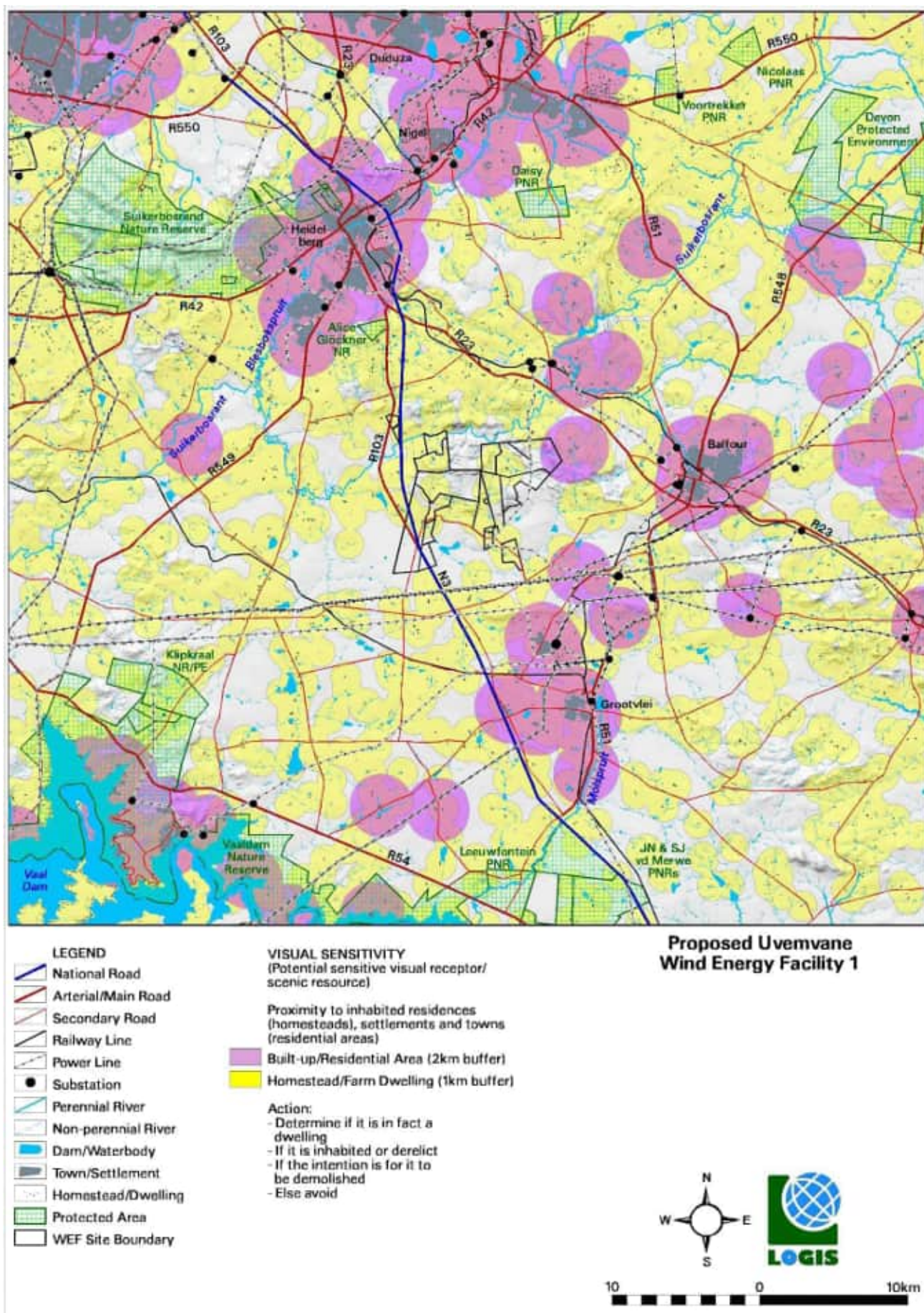
No infrastructure to be placed on or in close proximity (to be determined by the heritage specialist) of cultural historical sites in order to preserve the heritage and potential tourism value of the site.

Heritage sites have been found by the heritage specialist to occur on the site. Please refer to the Heritage Impact Assessment Report for more detail. Additionally, the greater region is a cultural landscape associated with ancient landscapes⁷.

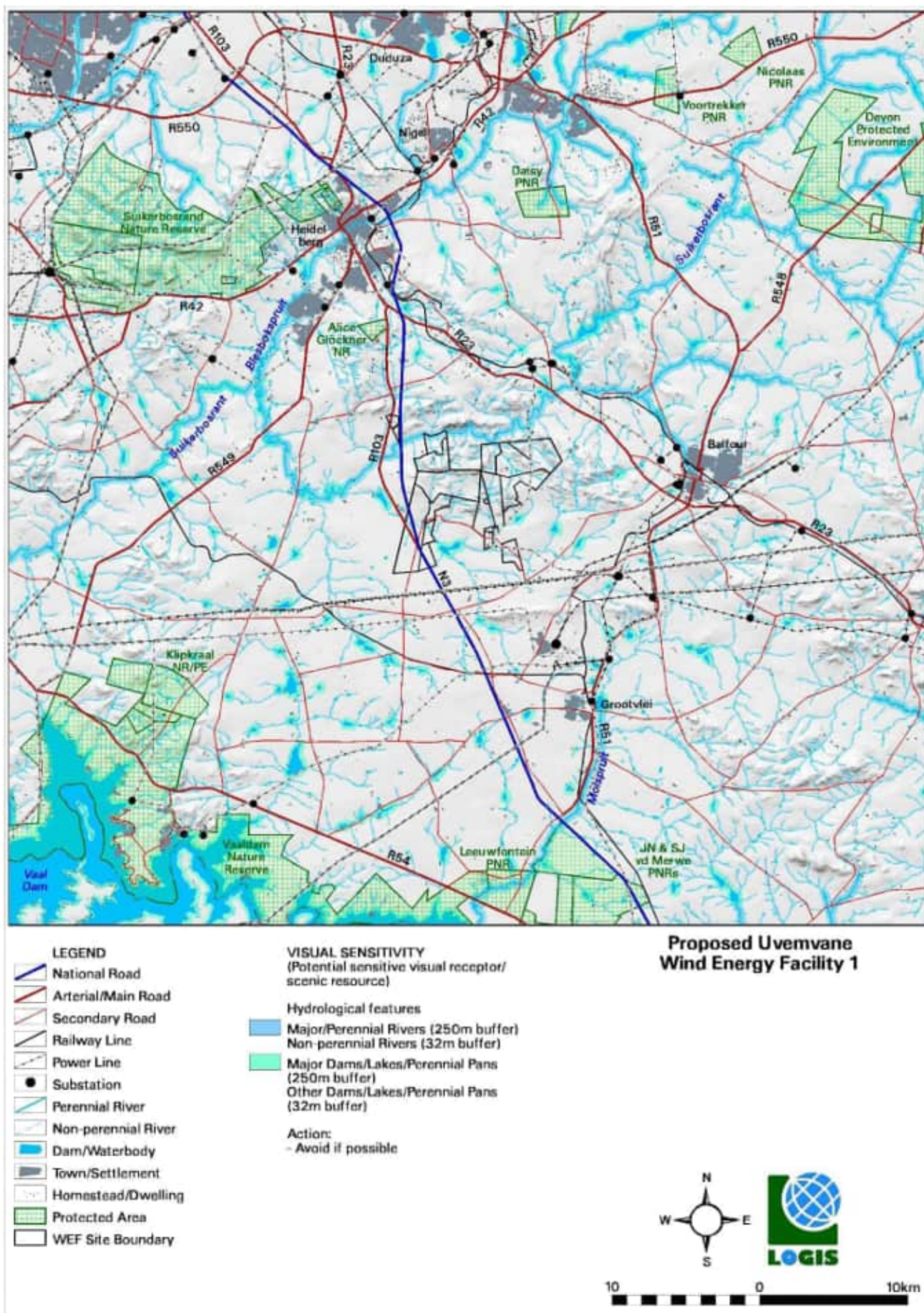
⁷ Source: <https://landscape-heritage-sa.yolasite.com/lhsa-the-landscape-map/>



Map 5: Proximity to roads and protected areas/ tourist attractions



Map 6: Proximity to inhabited residences, settlements, and towns



Map 7: Proximity to hydrological features

5.3. Overall Visual Sensitivity

In order to determine the visual impact of the proposed ABO Uvemvane WEF 1 site sensitivities were combined into one map. Refer to **Map 9**.

Based on this combined map, the following is applicable:

No-go areas

These are areas identified as having a **very high** visual impact significance and are in relation to areas that fall within the buffers associated with protected areas, coastal zones, and Viewshed Protection Zones (VPZs), as well as areas located on steep slopes (>25%) and high mountains. Where these areas are present, development in these areas must be avoided, even if all possible mitigation measures are applied.

Based on the above, scattered portions of the ABO Uvemvane WEF 1 site falls within a no-go area in relation to steep slopes, as can be seen on **Map 9****Error! Reference source not found..** The placement of turbines within these areas is to be avoided and won't be accepted from a visual perspective.

High Impact

These are areas identified as having a **high** visual impact significance and are in relation to areas that fall within the buffers associated with homesteads, residential areas, scenic routes, as well as areas located on mountains and tall hills. Where these areas are present, development in these areas is not recommended and must be avoided, if at all possible.

The following areas identified as high are located within the proposed ABO Uvemvane WEF 1 site; mountains and tall hills, inhabited residences / homesteads and built-up / residential areas.

Moderate Impact

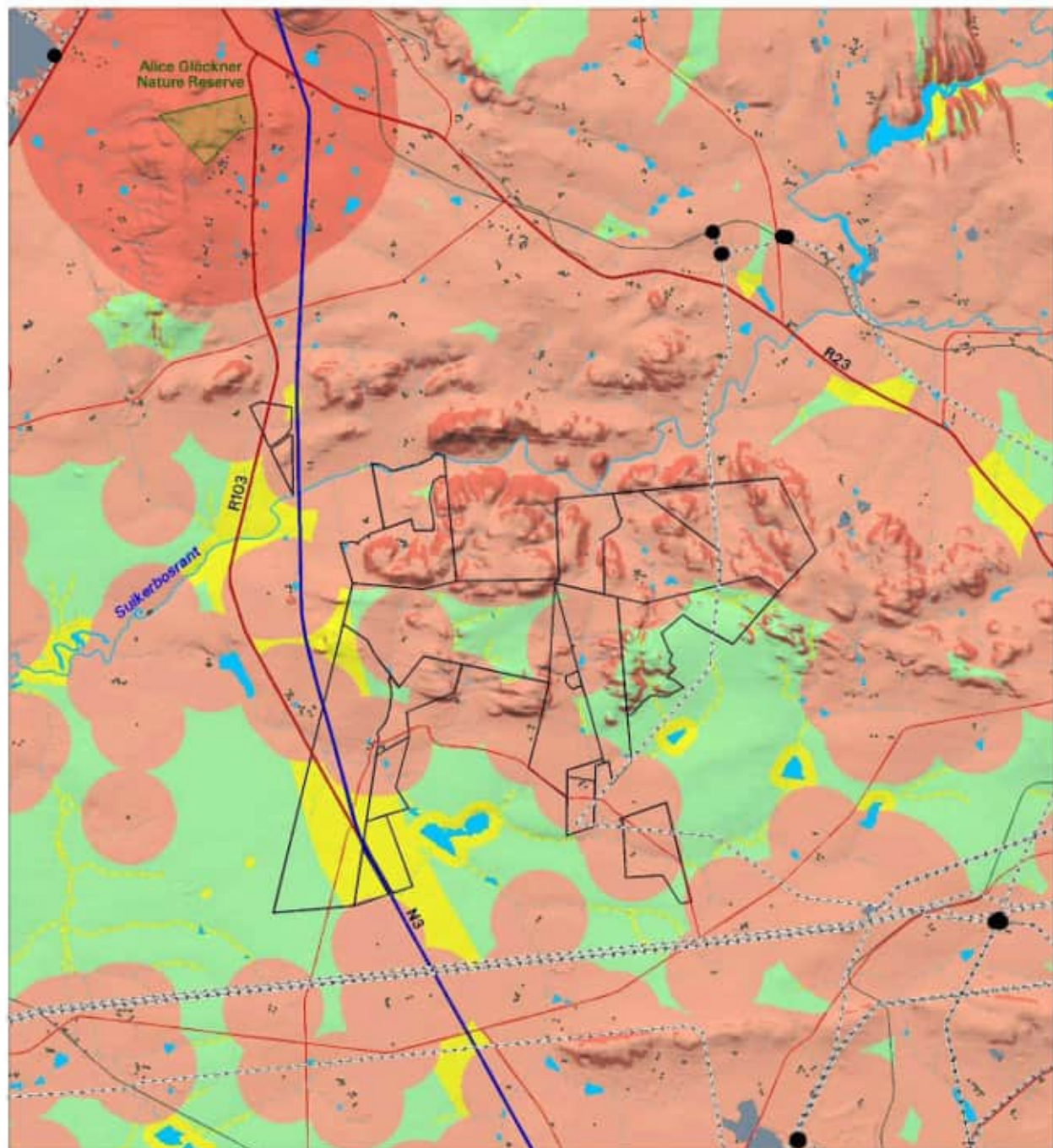
These are areas identified as having a **moderate** visual impact significance and are in relation to areas that fall within the buffers associated with roads and major hydrological features of scenic value (i.e. large dams, perennial rivers). These are areas that could be considered for development with a "tread-light" approach and minimum infrastructure development.

Moderate sensitivity areas identified located within the proposed ABO Uvemvane WEF 1 site include development within 1km of the national N3 road, as well as, the buffers associated with various hydrological features identified to be located on site.

Low Impact

These are areas identified as having a **low** visual impact significance and are areas not located within any identified buffers. Development may occur in these areas provided that mitigation measures are implemented.

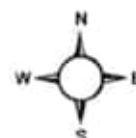
Scattered portions of the proposed site ABO Uvemvane WEF 1 site falls within this area. These would be ideal areas for the placement of turbines.



LEGEND	
	National Road
	Arterial/Main Road
	Secondary Road
	Railway Line
	Power Line
	Substation
	Perennial River
	Non-perennial River
	Dam/Waterbody
	Town/Settlement
	Homestead/Dwelling
	Protected Area
	WEF Site Boundary

VISUAL SENSITIVITY	
	No-Go Areas - Steep slopes (greater than 1:4) - Protected Area (3km buffer)
	High - Mountains and tall hills - Inhabited residences/homesteads (1km buffer) - Built-up/residential areas (2km buffer)
	Moderate - National road (1km buffer) - Arterial/main roads (500m buffer) - Major/perennial river (250m buffer) - Non-perennial rivers (32m buffer) - Major dams/lakes/perennial pans (250m buffer)
	Low

Proposed Uvemvane Wind Energy Facility 1



Map 9: Overall visual sensitivity of the proposed ABO Uvemvane WEF 1

5.4. Results

In order to **confirm and verify the current land use and visual sensitivity of the proposed project area** (receiving environment) to the proposed development as determined by the DFFE Screening Tool above, a site visit was undertaken, and the following matrix was utilized:

Table 3: Matrix to determine overall visual sensitivity of the receiving environment to the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
1.	Topographic features incl mountain ridges	Within 500m	Within 500m - 1km	Within 1 -2km	>2km
2.	Steep slopes	Slopes with more than 1:4	Slopes between 1:4 and 1:10	Slopes less than 1:10	Minimal Slope
3.	Major rivers, water bodies, perennial rivers and wetlands with scenic value	Within 250 m	Within 250- 500m	Within 500m – 1km	>1km
4.	Coastal zone	Within 1km	Within 1 - 2km	Within 2 – 4km	>4km
5.	Protected area: National Parks	Within 5km	Within 5 - 10km	Within 10 - 15km	>15km
6.	Protected areas: Nature Reserves	Within 3km	Within 3 – 5km	Within 5 – 10km	>10km
7.	Private reserves and game farms	Within 1.5km	Within 1.5 – 3km	Within 3 – 5km	>5km
8.	Cultural landscape	On the site itself	Within 500m	Within 500m – 1km	>1km
9.	Heritage Sites Grades i, ii and iii	On the site itself	Within 500m	Within 500m – 1km	>1km
10.	Towns and Villages	Within 2km	Within 2 – 4km	Within 4 – 6km	>6km
11.	Home/farmsteads	Within 5km	Within 5 - 10km	Within 10 - 20km	>20km
12.	National Roads	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
13.	Provincial/arterial roads	Within 500m	Within 500m - 1km	Within 1 - 3km	>3km
14.	Scenic routes	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
15.	Passenger rail lines	Within 500m	Within 500m – 1km	Within 1 – 3km	>3km
16.	Located with Renewable Energy Development Zone (REDZ)	No	-	-	Yes
17.	VAC	Low VAC	Moderate VAC	High VAC	Very High VAC
18.	Shadow Flicker	Yes - Occupied within 1km	Yes - Within 1km but not permanently occupied	Yes - Within 1km but uninhabited / derelict	No
19.	Visual Quality	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair amount of built infrastructure	Built infrastructure is dominant with little to no natural environment remaining
20.	Presence of existing infrastructure	Absent	Very low densities	Present in moderate quantities	High densities
	Total	High (56)			

Overall visual sensitivity rating:

- Low (0-20)
- Moderate (21-40)
- High (41-60)
- Very High (61-80)

Based on the above findings, as well as the site visit undertaken, it can be found that the **sensitivity of the visual receiving environment⁸** for the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure is **high**.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located within the 1km buffer from an occupied homestead or tourist accommodation. However, it must be noted that numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern. Based on this, as well as the site visit undertaken, where the occupation of the homesteads within the development site was verified, the **visual aspects of Flicker Theme Sensitivity** for the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure is confirmed to be **very high**.

6. CONCLUSION AND RECOMMENDATIONS

The greater environment with its wide open, predominately rural agricultural and undeveloped landscapes is considered to have a moderate to high visual quality.

The region has a largely rural character, interspersed with commercial agricultural activities (i.e. dryland, irrigated and livestock production activities), scattered human settlements and numerous protected areas. Settlements closest to the site are the town of Heidelberg to the northwest and Balfour to the east. The natural vegetation or land cover types of the region are described as Grassland interspersed with scattered areas of wetlands and includes small pockets of dense woodland, open woodland and exotic plantations.

Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low to moderate owing to the low growing vegetation grassland vegetation, however, the undulating and hilly topography aids in reducing the potential visual exposure to some degree.

The study area is densely populated to the north in the Gauteng Province with a population density of 67 people per km², however the more south you travel towards the Mpumalanga Province the study area is less populated with a population density of 16 people per km² within the local municipality. The most populated areas within the study area are the towns of Heidelberg and Nigel to the north, as well as Balfour and Grootvlei to a lesser extent located southeast of the site. Outside of these areas, there are isolated homesteads and scattered settlements throughout the study area. Homesteads, by virtue of their visually exposed nature, are considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas.

There are numerous protected areas scattered throughout the study area⁹, located predominately in the northern and southern portions of the study area. None of the protected areas are found within the proposed development site itself. The closest protected areas are the Alice Glockner and Suikerbosrand Nature Reserves, which are located approximately 5.1km and 12.3km respectively, to the northwest of the site. The study area is also a popular tourist and wedding destination.

A turbine layout was not available at the time of writing this report, therefore it is difficult to determine whether any of the turbines would be located within any identified sensitive visual

⁸ The matrix and sensitivity rating dealt with in this section of the report only confirms and verifies the sensitivity of the receiving environment to this specific type of development in comparison to the outcomes of the DFFE Screening Tool. It does not, however, determine the overall visual impact of the proposed development on the sensitive receptors likely to be exposed to the proposed facility.

⁹ The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.

buffers. The proposed site was found to be located within the following sensitive areas (recommended visual buffers):

- Majority of the western portions of the ABO Uvemvane WEF 1 development site are located within the 1km buffer of the national N3 and the 500m buffer of the R103 Arterial / Main Road.
- Numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern.
- Various hydrological features are located within the proposed ABO Uvemvane WEF 1 site.
- A large section of the northeastern portion of the development site is located on the topographical features identified as mountains and tall hills with pockets of steep slopes (slopes greater than 1:4) found scattered throughout the site.

The DFFE screening tool generated for the ABO Uvemvane WEF 1 indicated that the site has a very high sensitivity in terms of the Landscape (Wind) Theme Sensitivity, as well as very high sensitivity relating to the visual aspects of Flicker Theme Sensitivity (potential temporarily or permanently inhabited residence).

Based on the above findings, it can be found that the **sensitivity of the visual receiving environment** for the proposed ABO Uvemvane WEF 1 is in fact **high** due to the following:

- The presence of pockets of steep slopes on the proposed site.
- Low to moderate VAC of the receiving environment.
- Location of the site outside of a REDZ.
- Potential shadow flicker as a result of the numerous homesteads located within and adjacent to the site.
- High visual quality of the receiving environment.
- Mountains and tall hills located within the site extent.
- Location of the N3 national and R103 arterial / main roads directly adjacent to the site.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located within the 1km buffer from an occupied homestead or tourist accommodation. However, it must be noted that numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern. Based on this, as well as the site visit undertaken, where the occupation of the homesteads the development site was verified the **visual aspects of Flicker Theme Sensitivity** for the proposed ABO Uvemvane Wind Energy Facility 1 and associated infrastructure is confirmed to be **very high**.

Based on general best practice and the findings above, the following preliminary recommendations are suggested to be considered during the layout planning phase in order to mitigate the potential visual impacts:

- No turbines are placed on any steep slopes. Development within the areas identified as steep slopes will not be supported from a visual perspective.
- If possible, avoid and limit the placement of turbines on areas identified as mountains and tall hills. The placement of the turbines within these areas is expected to exacerbate the visual exposure of the facility as a result of the elevated terrain, as well as have a visual impact on the scenic resources located within the study area.
- It is recommended that no turbines be placed within the 1km buffer of the national N3 and the 500m buffer of the R103 Arterial / Main Road.
- No turbines should be placed within 1 km of any occupied homesteads or tourist accommodation facilities, unless otherwise agreed upon by the affected landowner. Proof of such agreement to be provided.
- It is recommended that the various buffers associated with the identified hydrological features located on site are avoided when placing turbines. While it is recommended that the proposed turbines are not placed within these buffers based on the recommendation of the Aquatic Specialist these buffers can be reduced to 50m for watercourses and 100m for wetlands.

7. REFERENCES

Council for Scientific and Industrial Research (CSIR), 2015. *The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa*.

DEADP, Provincial Government of the Western Cape, 2011. Guideline on Generic Terms of Reference for EAPS and Project Schedules.

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.

DEA, 2021. *South African Renewable Energy EIA Application (REEA) Database*.

Charlier, R & Thys, A. 2016. *Wind Power—Aeole Turns Marine*. 10.1002/9781119066354.ch7.

**VISUAL / LANDSCAPE SITE SENSITIVITY VERIFICATION REPORT FOR THE
PROPOSED DEVELOPMENT OF THE ABO UVEMVANE WIND ENERGY FACILITY 2
AND ASSOCIATED INFRASTRUCTURE, GAUTENG PROVINCE**

Produced for:



WSP in Africa
Building 1, Maxwell Office Park, Magwa Crescent West,
Waterfall City, Midrand, 1685

Produced by:



Lourens du Plessis (PrGISc) t/a LOGIS
PO Box 384, La Montagne, 0184
M: 082 922 9019 E: lourens@logis.co.za W: logis.co.za

- May 2025 -

TABLE OF CONTENTS

LIST OF TABLES.....	ii
LIST OF MAPS.....	ii
LIST OF FIGURES	ii
DOCUMENT CONTROL	iii
DECLARATION	iv
1. STUDY APPROACH.....	5
1.1. Qualification and experience of the practitioner.....	5
1.2. Assumptions and limitations	5
1.3. Legal framework	6
1.4. Information base	6
1.5. Level of confidence	6
2. PROJECT DESCRIPTION.....	7
3. METHODOLOGY	9
4. THE AFFECTED ENVIRONMENT	10
5. SITE SENSITIVITY VERIFICATION	18
5.1. Sensitivities identified by the National Web-based Environmental Screening Tool	18
5.2. Sensitivity Buffers	19
5.3. Overall Visual Sensitivity.....	27
5.4. Results	29
6. CONCLUSION AND RECOMMENDATIONS	30
7. REFERENCES	32

LIST OF TABLES

Table 1: Level of confidence	7
Table 2: Site sensitivity features as per the DFFE Screening Tool	18
Table 3: Matrix to determine overall visual sensitivity of the receiving environment to the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure	29

LIST OF MAPS

Map 1: Shaded relief map of the study area	14
Map 2: Land cover/ broad land use patterns within the study area	15
Map 3: Location of the images taken during the site visit	16
Map 4: Location of the images relative to the site used within the report.....	17
Map 5: Proximity to roads and protected areas/ tourist attractions	23
Map 6: Proximity to inhabited residences, settlements, and towns.....	24
Map 7: Proximity to hydrological features.....	25
Map 8: Proximity to Steep slopes, prominent hills, ridges, and skylines.....	26
Map 9: Overall visual sensitivity of the proposed ABO Uvemvane WEF 2	28

LIST OF FIGURES

Figure 1: Illustration of the main components of a wind turbine	9
Figure 2: General topography of the site and study area	10
Figure 3: Rural character of the study area interspersed with commercial agricultural activities	10
Figure 4: Illustrating the land use and land cover occurring within the study area	11
Figure 5: Example of scattered homesteads and settlements found in and around the site	11
Figure 6: Looking over the site from the R23	12
Figure 7: View over the site from the R103.....	12
Figure 8: Existing power lines within the study area	12
Figure 9: Moderate to high visual quality of the study area	13
Figure 10: Relative landscape (wind) theme sensitivity as per the DFFE Screening Tool for the proposed ABO Uvemvane WEF 2	18
Figure 11: Relative flicker theme sensitivity as per the DFFE screening tool for the proposed ABO Uvemvane WEF 2	19

DOCUMENT CONTROL

Report Name:	Visual / Landscape Site Sensitivity Verification Report for the Proposed Development of the ABO Uvemvane Wind Energy Facility 2 and Associated Infrastructure, Gauteng Province
VIA & GIS Specialist:	LOGIS 531A Witogie Street, Die Wilgers, Pretoria Contact Person: Lourens du Plessis Tel: 082 922 9019 Email: lourens@logis.co.za Expertise: GPr GISc SAGC Reg no: GPr GISc 0147.
Report compiled by:	Nuleaf Planning and Environmental (Pty) Ltd 8A Trevor Street, Murrayfield, Pretoria, 0184 Contact Person: Tosca de Villiers Tel: 072 478 8856 Email: tosca@nuleafsa.co.za Expertise: MLARCH EAPASA Reg no: 2019/1582 SACLAP Reg. no: 20421
Co-author:	Contact Person: Bryony van Niekerk Tel: 074 818 9788 Email: bryony@nuleafsa.co.za Expertise: BSc Hons. EMA EAPASA Reg no: 2019/655
EAP:	WSP Building 1, Maxwell Office Park, Magwa Crescent West, Waterfall City, Midrand, 1685 South Africa Contact Person: Ashlea Strong Tel: 082 786-7819 Email: Ashlea.Strong@wsp.com
Applicant:	ABO Energy South Africa(Pty) Ltd
Report date:	13 May 2025
Report number:	02

DECLARATION

I, **Lourens du Plessis**, as an independent consultant compiled this Scoping Visual Impact Assessment and declare that it correctly reflects the findings made at the time of the report's compilation. I further declare that I, act as an independent consultant in terms of the following:

- Do not have any financial interest in the undertaking of the activity, other than remuneration for the work performed in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Undertake to disclose, to the competent authority, any material information that has or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the National Environmental Management Act, 1998 (Act 107 of 1998);
- Based on information provided to me by the project proponent, and in addition to information obtained during the course of this study, will present the results and conclusion within the associated document to the best of my professional judgement.

A handwritten signature in dark ink, appearing to read 'L. du P.' with a stylized flourish.

Lourens du Plessis
Professional GISc Practitioner

1. STUDY APPROACH

1.1. Qualification and experience of the practitioner

Lourens du Plessis (t/a LOGIS) is a Professional Geographical Information Sciences (GISc) Practitioner registered with The South African Geomatics Council (SAGC) and specialises in Environmental GIS and Visual Impact Assessments (VIA).

Lourens has been involved in the application of Geographical Information Systems (GIS) in Environmental Planning and Management since 1990. He has extensive practical knowledge in spatial analysis, environmental modelling, and digital mapping, and applies this knowledge in various scientific fields and disciplines. His GIS expertise are often utilised in Environmental Impact Assessments, Environmental Management Frameworks, State of the Environment Reports, Environmental Management Plans, tourism development and environmental awareness projects.

He holds a BA degree in Geography and Anthropology from the University of Pretoria and worked at the GisLAB (Department of Landscape Architecture) from 1990 to 1997. He later became a member of the GisLAB and in 1997, when Q-Data Consulting acquired the GisLAB, worked for GIS Business Solutions for two years as project manager and senior consultant. In 1999 he joined MetroGIS (Pty) Ltd as director and equal partner until December 2015. From January 2016 he worked for SMEC South Africa (Pty) Ltd as a technical specialist until he went independent and began trading as LOGIS in April 2017.

Lourens has received various awards for his work over the past two decades, including EPPIC Awards for ENPAT, a Q-Data Consulting Performance Award and two ESRI (Environmental Systems Research Institute) awards for Most Analytical and Best Cartographic Maps, at Annual International ESRI User Conferences. He is a co-author of the ENPAT atlas and has had several of his maps published in various tourism, educational and environmental publications.

He is familiar with the "Guidelines for Involving Visual and Aesthetic Specialists in EIA Processes" (Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning) and utilises the principles and recommendations stated therein to successfully undertake visual impact assessments.

1.2. Assumptions and limitations

This Report has been prepared by LOGIS at the request of the WSP as the appointed Environmental Assessment Practitioner (EAP) on behalf of the Project Developer to provide them with an independent specialist assessment. Unless otherwise agreed by LOGIS in writing, LOGIS does not accept responsibility or legal liability to any person other than the Genesis for the contents of, or any omissions from, this Report.

To prepare this Report, LOGIS utilised only the documents and information provided by WSP or any third parties directed to provide information and documents by WSP. LOGIS has not consulted any other documents or information in relation to this Report, except where otherwise indicated.

The findings, recommendations and conclusions given in this report are based on the author's best scientific and professional knowledge, as well as the available information. This report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken. LOGIS reserve the right to modify aspects of the report including the recommendations if and when new information may become available from on-going research or further work in this field or pertaining to this investigation.

Although LOGIS exercises due care and diligence in rendering services and preparing documents, LOGIS accepts no liability, and WSP, by receiving this document, indemnifies LOGIS and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages, and expenses arising from or in connection with the services rendered, directly or indirectly by the use of the information contained in this document.

This report may not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If this report is used as part of a main

report, the report in its entirety must be included as an appendix or separate section to the main report.

This assessment was undertaken during the planning stage of the project and is based on information available at that time.

1.3. Legal framework

The following legislation and guidelines have been considered in the preparation of this report:

- **The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA):** This report is in line with Appendix 6 of NEMA: Environmental Impact Assessment (EIA) Regulations (2014, as amended) which details the minimum requirements a specialist report must contain for an Environmental Impact Assessment.
- **Guideline for Involving Visual and Aesthetic Specialists in EIA Processes (DEADP, Provincial Government of the Western Cape, 2005):** This guideline was developed for use in the Western Cape, however in the absence of the development of any other guideline, this provides input for the preparation of visual specialist input into EIA processes. The guideline documents the requirements for visual impact assessment, typical issues that trigger the need for specialist visual input, the scope and extent of a visual assessment, information required, as well as the assessment and reporting of visual impacts and management actions.
- **Screening Tool as per Regulation 16 (1)(v) of the Environmental Impact Assessment Regulations, 2014 as amended:** a Screening report was generated for this proposed project, whereby a visual impact assessment was identified as one of the specialist studies that would be required.

1.4. Information base

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from the Surveyor General, Surveys and Mapping in Mowbray, Cape Town.
- Chief Directorate National (CDN) Geo-Spatial Information, varying dates. *1:50 000 Topographical Maps and Data*.
- DFFE, 2018/2020. *National Land-cover Database 2018/2020 (NLC2018/2020)*.
- DFFE, 2022. *South African Protected Areas Database (SAPAD_OR_2022_Q2)*.
- JAXA, 2021. Earth Observation Research Centre. *ALOS Global Digital Surface Model (AW3D30)*.
- Google Earth Pro. *Up to date and recent satellite images*.
- Professional judgement based on experience gained from similar projects.
- Literature research on similar projects.
- Procedures for the Assessment and Minimum Criteria for Reporting on identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of NEMA

Quality of the above information bases are rated as Good and sufficient for the purposes of this assessment, in order to produce findings/ conclusions with high confidence. This assessment is also informed by a site visit and consideration of the context and site specific aspects that may be affected by the proposed development.

1.5. Level of confidence

Level of confidence¹ is determined as a function of:

- The information available, and understanding of the study area² by the practitioner:
 - **3:** A high level of information is available of the study area and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.

¹ Adapted from Oberholzer (2005).

² The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.

- **2:** A moderate level of information is available of the study area and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.
 - **1:** Limited information is available of the study area and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.
- The information available, understanding of the project and experience of this type of project by the practitioner:
 - **3:** A high level of information and knowledge is available of the project and the visual impact assessor is well experienced in this type of project and level of assessment.
 - **2:** A moderate level of information and knowledge is available of the project and the visual impact assessor is moderately experienced in this type of project and level of assessment.
 - **1:** Limited information and knowledge is available of the project and the visual impact assessor has a low experience level in this type of project and level of assessment.

These values are applied as follows:

Table 1: Level of confidence

Information on the study area	Information on the project & experience of the practitioner			
		3	2	1
	3	9	6	3
	2	6	4	2
	1	3	2	1

The level of confidence for this assessment is determined to be **9** and indicates that the author's confidence in the accuracy of the findings is High:

- The information available, and understanding of the study area by the practitioner is rated as **3**
- The information available, understanding and experience of this type of project by the practitioner is rated as **3**

2. PROJECT DESCRIPTION

ABO Uvemvane Wind Energy Facility 2 (Pty) Ltd proposes the development of ABO Uvemvane Wind Energy Facility 2 (ABO Uvemvane WEF 2), a commercial wind energy generation facility comprising up to 25 turbines and with a total generation capacity of up to 180 MWac in capacity, as well as associated infrastructure. The proposed WEF would be located 10 km south-east of the town of Heidelberg in the Gauteng Province in the Lesedi Local Municipality/ Midvaal Local Municipality within the Sedibeng District Municipality.

A development area (i.e., the full extent of the affected properties as well as beyond, where appropriate) has been identified for the proposed development. Within this identified development area, a development footprint has been defined in a manner which has considered the environmental sensitivities present on the affected properties and intentionally remains outside of highly sensitive areas. All affected properties in their entirety have been considered in this report and assessed in terms of the suitability from a visual perspective.

It is important to note at the outset that the exact specifications of the proposed project components will be determined during the detailed engineering design phase prior to construction (subsequent to the issuing of an EA, should such an authorisation be granted), but that the information provided below is seen as the maximum development scenario for the proposed development.

The proposed facility would comprise the following (to be located within the proposed development footprint):

- Up to 25 turbines with the following maximum specifications:
 - Maximum hub height 180m
 - Maximum blade length 100m
 - Maximum rotor diameter 200m
 - Maximum capacity per turbine 10MW
 - A transformer at the base of each turbine
 - Concrete turbine foundations up to 1 ha each
 - Turbine, crane, and blade hardstands (included in the abovementioned 1 ha)
- Primary/main access roads as well as internal road reticulation (note that existing roads/disturbed areas would be used as far as possible, and for the proposed roads, a corridor of up to 12 m wide may be temporarily impacted upon during construction and be rehabilitated to up to 10 m wide after construction), inclusive of stormwater infrastructure where relevant.
- Temporary laydown areas/ construction compounds (includes concrete batching), totalling up to 25 ha, would be fenced with access control; and/or
- Battery Energy Storage System (BESS) to be located within the electrical infrastructure hub described under “associated infrastructure” below.

Associated infrastructure would include the following (to be located within the proposed development footprint):

- Associated internal electrical reticulation/ cabling (i.e., low- and medium voltage powerlines), underground as far as is feasible, and to run within the proposed road footprint/route as far as possible; and
- On-site electrical infrastructure hub consisting of:
 - On-site substation and associated infrastructure,
 - Additional step-up/ transformation/ collector/switchyard infrastructure,
 - Auxiliary buildings (including, but not limited to, Operation and Maintenance (O&M) building/s, admin building/s, workshop/s, gatehouse/s, security building/s, control centre/s, office/s, visitor centre/s, warehouse/s, etc.),
 - May include the installation of a communications tower and lighting mast on site with a maximum height of 32 m and 25m respectively, and/or
 - BESS.

The proposed properties identified for the ABO Uvemvane WEF 2, and associated infrastructure are indicated on the maps within this report.

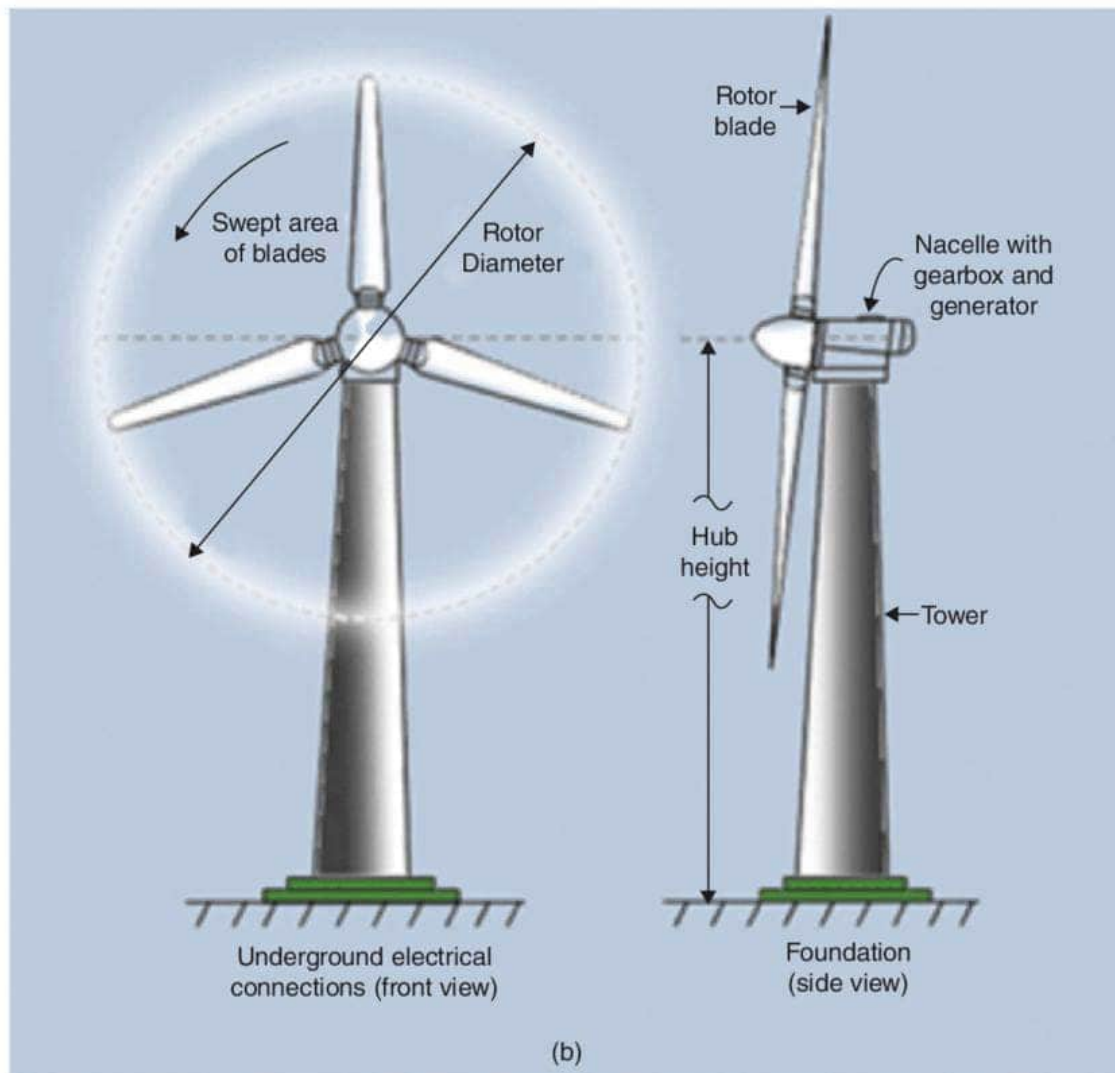


Figure 1: Illustration of the main components of a wind turbine³

3. METHODOLOGY

The site sensitivity verification was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed development. A detailed Digital Terrain Model (DTM) for the study area (extent of the maps below encompassing the proposed development site / WEF site boundary) was created from 5m interval contours from the National Geo-spatial Information data supplied by the Department: Rural Development and Land Reform.

The approach utilised to identify potential issues related to the visual impact included the following activities:

- The creation of a detailed digital terrain model (DTM) of the potentially affected environment.
- The sourcing of relevant spatial data. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc.
- The identification of sensitive receptors upon which the proposed development could have a potential visual impact.
- A site visit was undertaken on 28 November 2024 in order to verify the results of the spatial analyses and to identify any additional site-specific issues that may need to be addressed in the VIA report. It should be noted that, from a visual perspective, the different seasons do not influence the results of the impact assessment, and as such regardless of the timing of the site visit, the level of confidence for the assessment and findings is high.

³ Illustration courtesy of Charlier, R & Thys, A. (2016). Wind Power—Aeole Turns Marine. 10.1002/9781119066354.ch7.

This report sets out to identify the possible visual impacts related to the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure, as well as offer potential no development areas, if required.

4. THE AFFECTED ENVIRONMENT

The proposed ABO Uvemvane WEF 2 and associated infrastructure approximately 10 km south-east of the town of Heidelberg in the Gauteng Province in the Lesedi Local Municipality/ Midvaal Local Municipality within the Sedibeng District Municipality.

The study area, as per the extent of the maps below encompassing the proposed development site / WEF site boundary, occurs on land that ranges in elevation from approximately 1450m above sea level (a.s.l.) along the drainage lines and water courses (i.e. Suikerbosrant, Blesbokspruit, etc.) occurring in this area, to 1925m a.s.l. on the top of the hills associated within the Suikerbosrand Nature Reserve to the northwest of the site. The topography or terrain morphology of the region is broadly described as comprising of hill slopes and valleys with gentle to moderately undulating landscapes on the highveld plateau. The site itself is located on land with an average elevation of between approximately 1525m – 1820 a.s.l, it contains representations of both the undulating valley landscapes as well as the hills associated with the study area. Refer to **Map 1** for the shaded relief/topography map of the study area.



Figure 2: General topography of the site and study area

The region has a largely rural character, interspersed with commercial agricultural activities (i.e. dryland, irrigated and livestock production activities), scattered human settlements and numerous protected areas. Settlements closest to the site are the town of Heidelberg to the northwest and Balfour to the east. Formal agricultural activities are mostly associated with the watercourses of the region including the Suikerbosrant and Blesbokspruit Rivers.



Figure 3: Rural character of the study area interspersed with commercial agricultural activities

The natural vegetation or land cover types of the region are described as Grassland interspersed with scattered areas of wetlands and includes small pockets of dense woodland, open woodland and exotic plantations. Refer to Error! Reference source not found..



Figure 4: Illustrating the land use and land cover occurring within the study area

Several prominent rivers and hydrological features occur within the study area. These include numerous wetlands, farm dams, numerous perennial spruits scattered throughout the study area including the Suikerbosrant and Blesbokspruit Rivers located in the northern portion of the study area, as well as the Vaal Dam to the southwest.



Figure 5: Example of scattered homesteads and settlements found in and around the site

The study area is densely populated to the north in the Gauteng Province with a population density of 67 people per km², however the more south you travel towards the Mpumalanga Province the study area is less populated with a population density of 16 people per km² within the local municipality. The most populated areas within the study area are the towns of Heidelberg and Nigel to the north, as well as Balfour and Grootvlei to a lesser extent located southeast of the site. Outside of these areas, there are isolated homesteads and scattered settlements throughout the study area. The study area particularly located south of Heidelberg and around the site itself is a known wedding venue and tourist destination.

The inhabited status of all homesteads within the proposed development site has been verified via a combination of desktop and on-site verification methods. It stands to reason that farmsteads that are not currently inhabited will not be visually impacted upon at present and have therefore been removed as potential sensitive receptors within this report. However, it must be noted that these farmsteads do retain the potential to be affected visually should they ever become inhabited again in the future.

Access to the sites is via a network of national, arterial and secondary roads that branch off of either the national N3 to the west, or the arterial R103 to the west and the R23 to the east. The N3 is a national route in South Africa that connects Johannesburg and Durban, respectively South Africa's largest and third-largest cities. Johannesburg is the financial and commercial heartland of South Africa, while Durban is South Africa's key port and one of the busiest ports in the Southern Hemisphere. It is also a popular holiday destination. As a result, the N3 is a very busy

highway that transports a high volume of traffic especially during peak holiday times⁴. The N3 Toll Route Agency confirms that volumes can spike up to 2000-3500 vehicles per hour on peak days and that high (heavy) constitutes 1500 vehicles per hour in a particular direction⁵.



Figure 6: Looking over the site from the R23



Figure 7: View over the site from the R103

Other industrial infrastructure within the study area include existing high voltage powerlines scattered throughout the study area, as well as numerous associated substations.



Figure 8: Existing power lines within the study area

⁴ Source: [https://en.wikipedia.org/wiki/N3_\(South_Africa\)](https://en.wikipedia.org/wiki/N3_(South_Africa))

⁵ Source: <http://www.n3tc.co.za/n3-toll-route-traffic-and-crash-data-provide-numerous-safety-clues/#:~:text=Traffic%20forecasts,per%20hour%20on%20peak%20days>.

There are numerous protected areas scattered throughout the study area⁶, located predominately in the northern and southern portions of the study area. None of the protected areas are found within the proposed development site itself. The closest protected areas are the Alice Glockner and Suikerbosrand Nature Reserves, which are located approximately 2.7km and 10.8km respectively, to the northwest of the site. The study area is also a popular tourist and wedding destination. Refer to **Map 1** for the locations of the protected areas within the study area relative to the proposed development site.

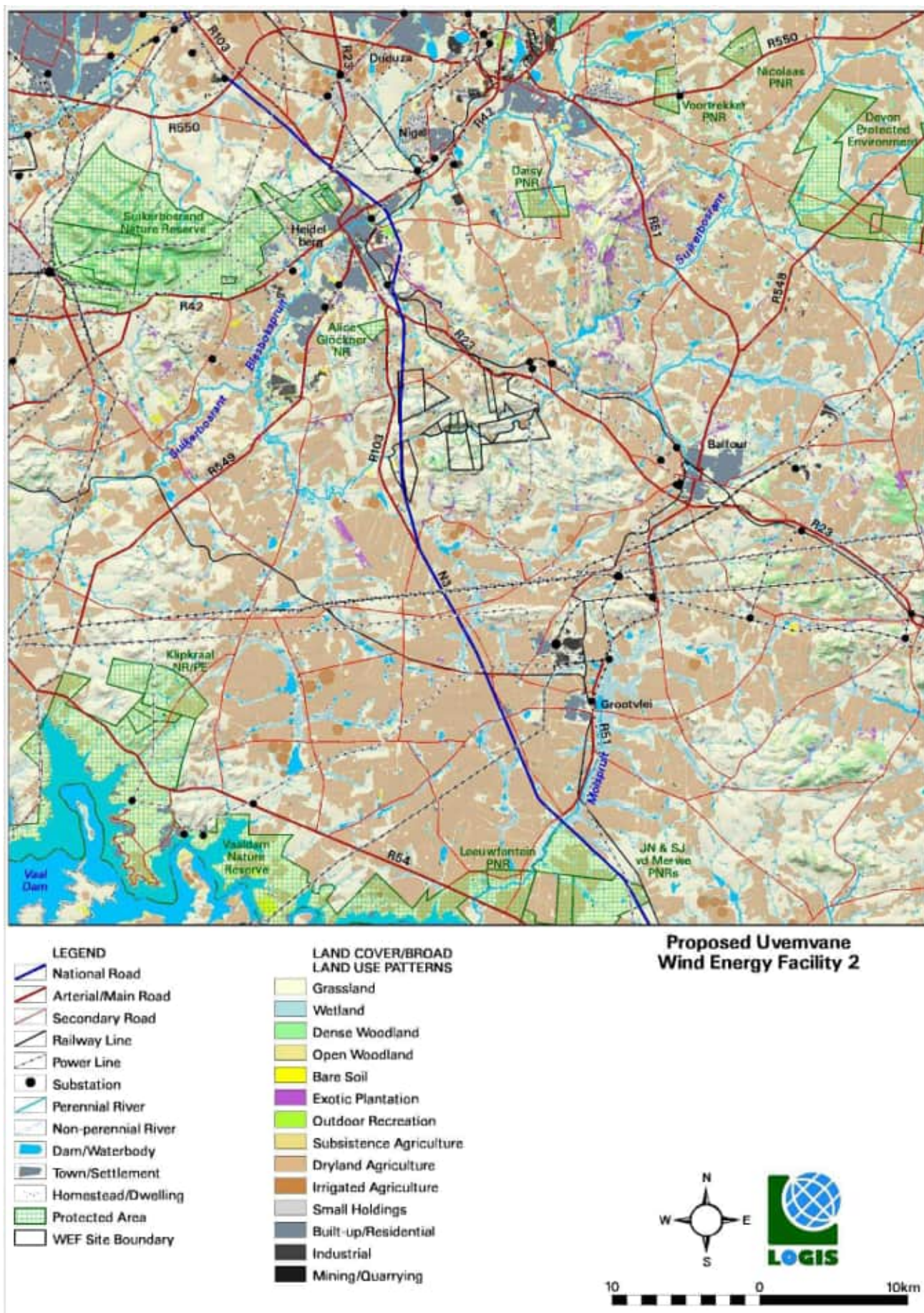
The greater environment with its wide open, predominately rural agricultural and undeveloped landscapes is considered to have a moderate to high visual quality.

Refer to **Map 3 and Map 4** for the location of the images taken during the site visit and the location of the images relative to the site used within the report

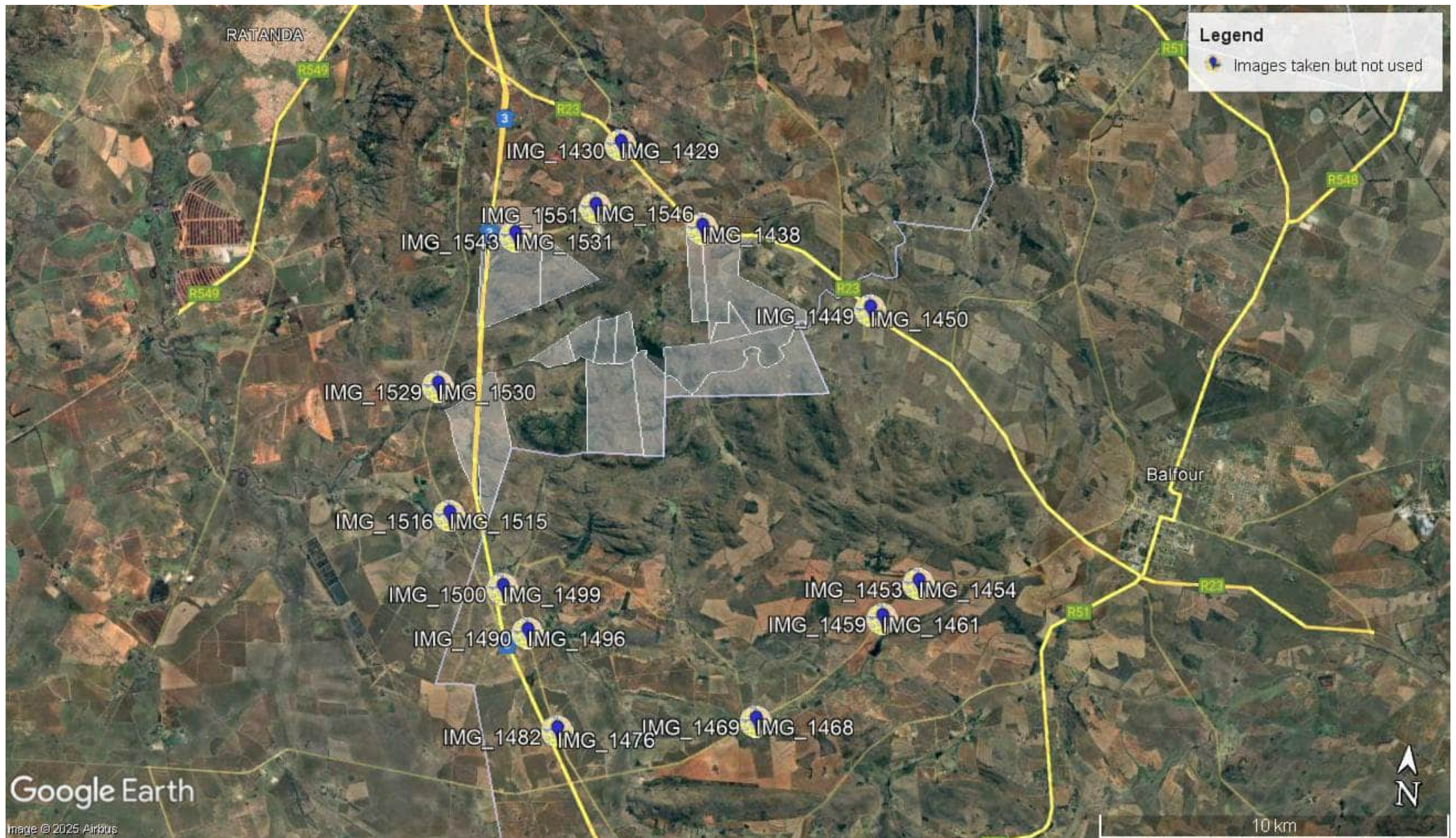


Figure 9: Moderate to high visual quality of the study area

⁶ The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.



Map 2: Land cover/ broad land use patterns within the study area



Map 3: Location of the images taken during the site visit



Map 4: Location of the images relative to the site used within the report

5. SITE SENSITIVITY VERIFICATION

5.1. Sensitivities identified by the National Web-based Environmental Screening Tool

In accordance with GN 320 (20 March 2020) of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool).

A screening report was compiled using the Department of Forestry, Fisheries, and the Environment (DFFE) Screening Tool based on the assessed area for the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure. The Screening Report includes a 'Map of Relative Landscape (Solar) Theme Sensitivity', indicated in Figure 10 below.

The Screening Tool shows that the site for the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure is rated as having a **very high sensitivity** owing to the presence of the following:

Table 2: Site sensitivity features as per the DFFE Screening Tool

Sensitivity	Feature(s)
High	Slope between 1:4 and 1:10
High	Between 3 and 5 km of a nature reserve, botanical garden or other protected area
High	Within 500 m of a river
Low	Slope less than 1:10
Medium	Between 4 and 6 km of a town or village
Medium	Between 5 and 10 km of a nature reserve, botanical garden or other protected area
Medium	Within 1000 m of a wetland
Very High	Mountain tops and high ridges
Very High	Slope more than 1:4
Very High	Within 3 km of a nature reserve, botanical garden or other protected area
Very High	Within 250 m of a river

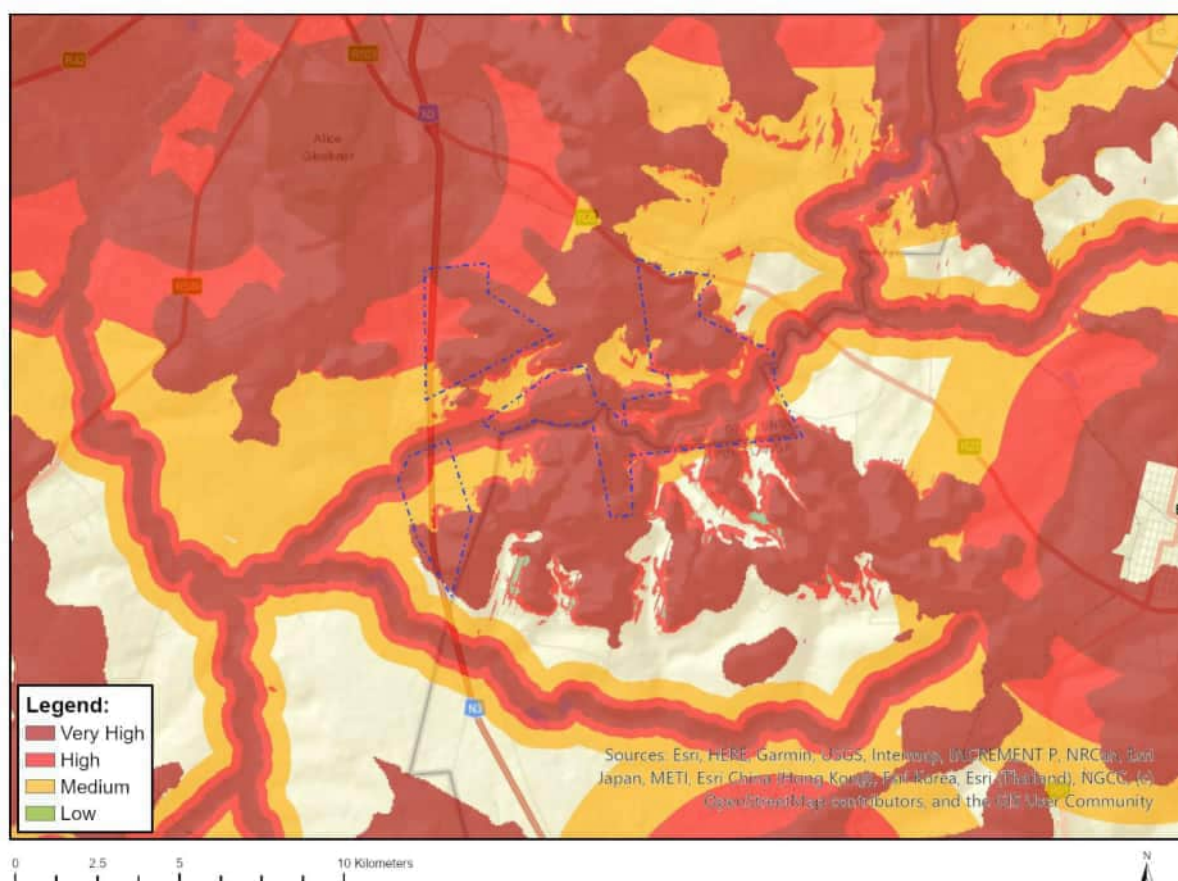


Figure 10: Relative landscape (wind) theme sensitivity as per the DFFE Screening Tool for the proposed ABO Uvemvane WEF 2

Similarly, the DFFE screening tool generated for the proposed ABO Uvemvane WEF 2 indicated that the facility has an overall sensitivity of **very high** relating to the visual aspects of Flicker Theme Sensitivity (potential temporarily or permanently inhabited residence). Refer to the Figure below.

Figure 11: Relative flicker theme sensitivity as per the DFFE screening tool for the proposed ABO Uvempvane WEF 2

The criteria for the identification of visually sensitive areas (scenic resources) and potential sensitive visual receptors, based on the buffers outlined by the Strategic Environmental Assessment (SEA) for wind and solar photovoltaic energy in South Africa (CSIR, 2015), are as follows:

Roads, especially scenic routes, are considered potential sensitive receptors whereby the travellers may be negatively impacted on by the exposure to the proposed WEF Infrastructure. In order to avoid encroachment of the infrastructure on public roads (especially in natural, rural and scenic areas), and thereby reducing the potential visual impact on road users and tourists, the following buffers are recommended:

Majority of the western portions of the ABO Uvemvane WEF 2 development site are located within the 1km buffer of the national N3 and the 500m buffer of the R103 Arterial / Main Road.

Proximity to protected areas and tourist attractions

In order to avoid visual impacts on the wilderness character, experience, recreation amenity and tourism economy associated with many protected areas and tourist facilities, visual buffers are recommended to be placed around these potential sensitive receptor sites. It is recommended that large scale WEF infrastructure should not be placed within the boundary of these identified or within the established buffer zones. The potential land use conflict between nature orientated tourism and the potential visual impacts associated with WEFs may be mitigated to some degree by adhering to the following exclusion zone buffers:

- National Parks – 5km buffer
- Nature Reserves – 3km buffer
- Private reserves and game farms – 1.5km buffer

Several protected areas are located within the study area⁷. Closest of these to the proposed development site is the Alice Glocker Nature Reserve located 2.7km northwest of the site. A very small portion of the ABO Uvemvane WEF 2 development site is located within the identified protected area buffer for the Alice Glocker Nature Reserve. It is recommended that no turbines be placed within this area. Refer to **Map 5**.

Proximity to inhabited residences (homesteads), settlements and towns

Residences (homesteads), settlements, and towns including built-up residential areas are considered potential sensitive receptors whereby the residents may be negatively impacted on by the exposure to the proposed WEF Infrastructure. A 2km buffer is recommended for built-up / residential areas and a 1km buffer zone is recommended to reduce general observer proximity to infrastructure and avoid potential shadow flicker issues associated with wind turbines specifically on homesteads / farm dwellings.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located with the 1km buffer from a homestead or tourist accommodation. However, it must be noted that numerous homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern.

It is recommended that no turbines should be placed within 1km of any homesteads, unless otherwise agreed upon by the affected landowner. Proof of such agreement is required. Refer to **Map 6**.

Major rivers, water bodies, perennial rivers, and wetlands with scenic value

Rivers, dams, wetlands and pans often serve as visual features and provide visual relief in a landscape. As such, it is recommended that development along these features is avoided drainage by applying visual buffers of 250m for major/perennial rivers and dams and a 32m buffer for non-perennial streams.

Various non-perennial rivers, as well as dams are located within the proposed ABO Uvemvane WEF 2 site. While it is recommended that the proposed turbines are not placed within these buffers based on the recommendation of the Aquatic Specialist these buffers can be reduced to 50m for watercourses and 100m for wetlands. Refer to the Aquatic Report for more detail. Refer to **Map 7**.

Steep slopes, prominent hills, ridges, and skylines

Elevated terrain such as hills, ridges and mountains are considered to be scenic topographical features which are generally more exposed than areas with even or level slopes (e.g. plains). The placement of infrastructure on these elevated topographical units will increase the visual exposure (visibility) and prominence of the infrastructure within the landscape.

Note: The units "high mountains" and "mountains and tall hills" are derived from a terrain morphology map developed for the country (2011, MetroGIS). The map is based on the Terrain

⁷ The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.

Morphology Map of South Africa, Lesotho and Swaziland (Kruger, G.P. 1983). The original map had six broad terrain morphological classes and 30 subdivisions. Even though it had large number of detailed subdivisions, it was developed at a very broad scale and the delineation of the units was similarly coarse and mainly applicable at a national scale.

The refined terrain morphological units were derived from a combination of inputs and analyses. They have as their basis in the South African Land Types, as supplied by the Agricultural Research Council (ARC), supplemented with a detailed slope analysis and an elevation range analysis.

*The Land Type units were merged with the slope analysis in order to determine the percentage of steep slopes (slope greater than 25% or 1:4 ratio) per Land Type. The result of this determines the level of undulation for each Land Type (i.e. whether it is flat, undulating or severely undulating). This analysis is then combined with the elevation ranges in order to determine the elevation of each land type unit above **ground/base** level (i.e. not sea level) in order to identify mountains and tall hills. Alternately, a considerable drop in base level would indicate prominent river valleys or gorges. Where needed, or in some cases where the land type units were too broadly delineated, the terrain morphological units were supplemented by manual interpretation and mapping.*

Five terrain morphological classes were identified:

- **High mountains** - Terrain morphological features with an elevation exceeding 400m above base level were indicated as high mountains. This height above base level may not be representative of international or even national standards for high mountains (i.e. comparative to mountains along the Drakensberg escarpment) but is intended as a regional perspective.
- **Mountains and tall hills** - Features with base elevation heights between 140m and 400m were indicated as mountains and tall hills.
- **Strongly undulating plains and hills** - *This terrain morphological unit includes land types where the percentage of steep slope (slope ratio greater than 1:4) makes up 25-50% of the unit, but where the elevation does not exceed 140m above base level.*
- **Undulating plains** - Undulating plains are land types where the terrain has a slope elevation of less than 5% (1:20 slope ratio). Undulating plains typically form the lowlands surrounding hills and ridges where the topography starts to even out.
- **Plains (and in some cases plains with pans)** - Plains are found where there is no discernible slope elevation within the Land Type unit. These areas are considered to be flat.

The placement of infrastructure on the below identified topographical units is as follows:

- Slopes > 25% – Very high sensitivity, No-go area
- High mountains – High sensitivity
- Mountains and tall hills – High sensitivity
- Strongly undulating plains and hills – Moderate sensitivity

A large portion of the development site is located on the topographical features identified as mountains and tall hills with pockets of steep slopes (slopes greater than 1:4) found scattered throughout the site.

Without a turbine layout it cannot be determined whether any turbines will be located in the areas identified as steep slopes. However, development within the areas identified as steep slopes will not be supported from a visual perspective.

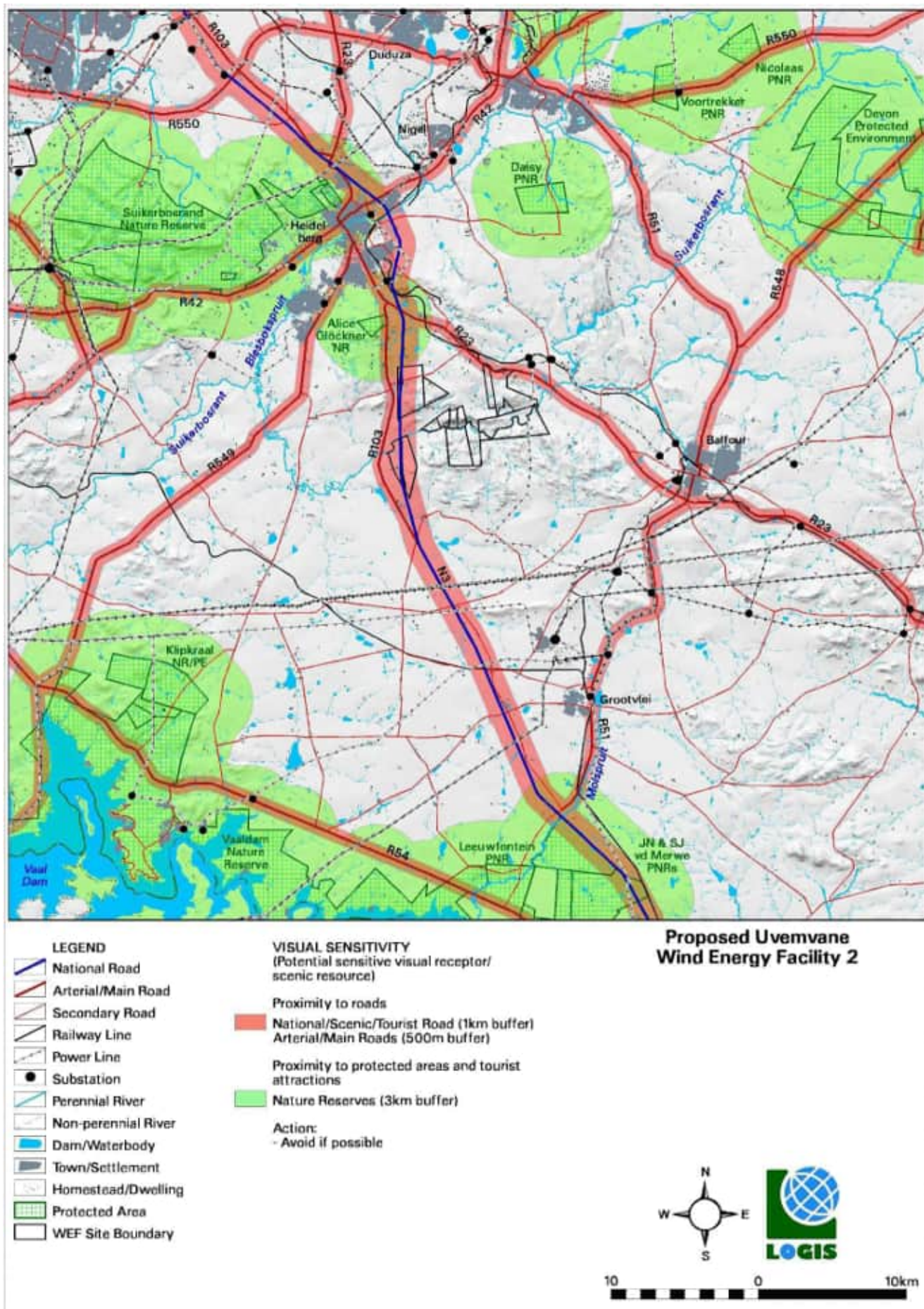
Additionally, it is recommended that turbines not be placed within the topographical feature areas identified as mountains and tall hills. The placement of the turbines within these areas is expected to exacerbate the visual exposure of the facility as a result of the elevated terrain, as well as have a visual impact on the scenic resources located within the study area. Refer to **Map 8**.

Identified cultural historical or heritage sites

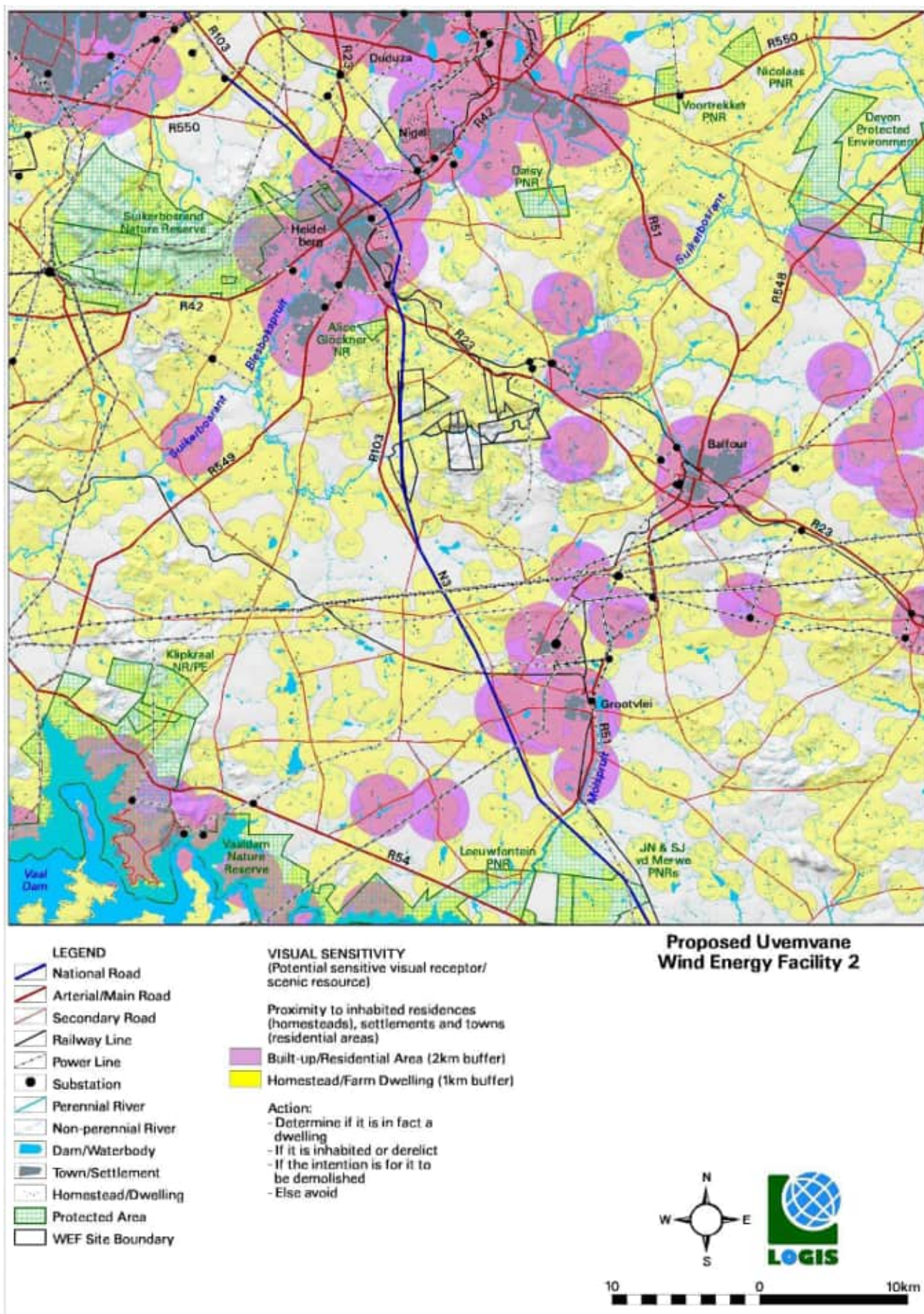
No infrastructure to be placed on or in close proximity (to be determined by the heritage specialist) of cultural historical sites in order to preserve the heritage and potential tourism value of the site.

Heritage sites have been found by the heritage specialist to occur on the site. Please refer to the Heritage Impact Assessment Report for more detail. Additionally, the greater region is a cultural landscape associated with ancient landscapes⁸.

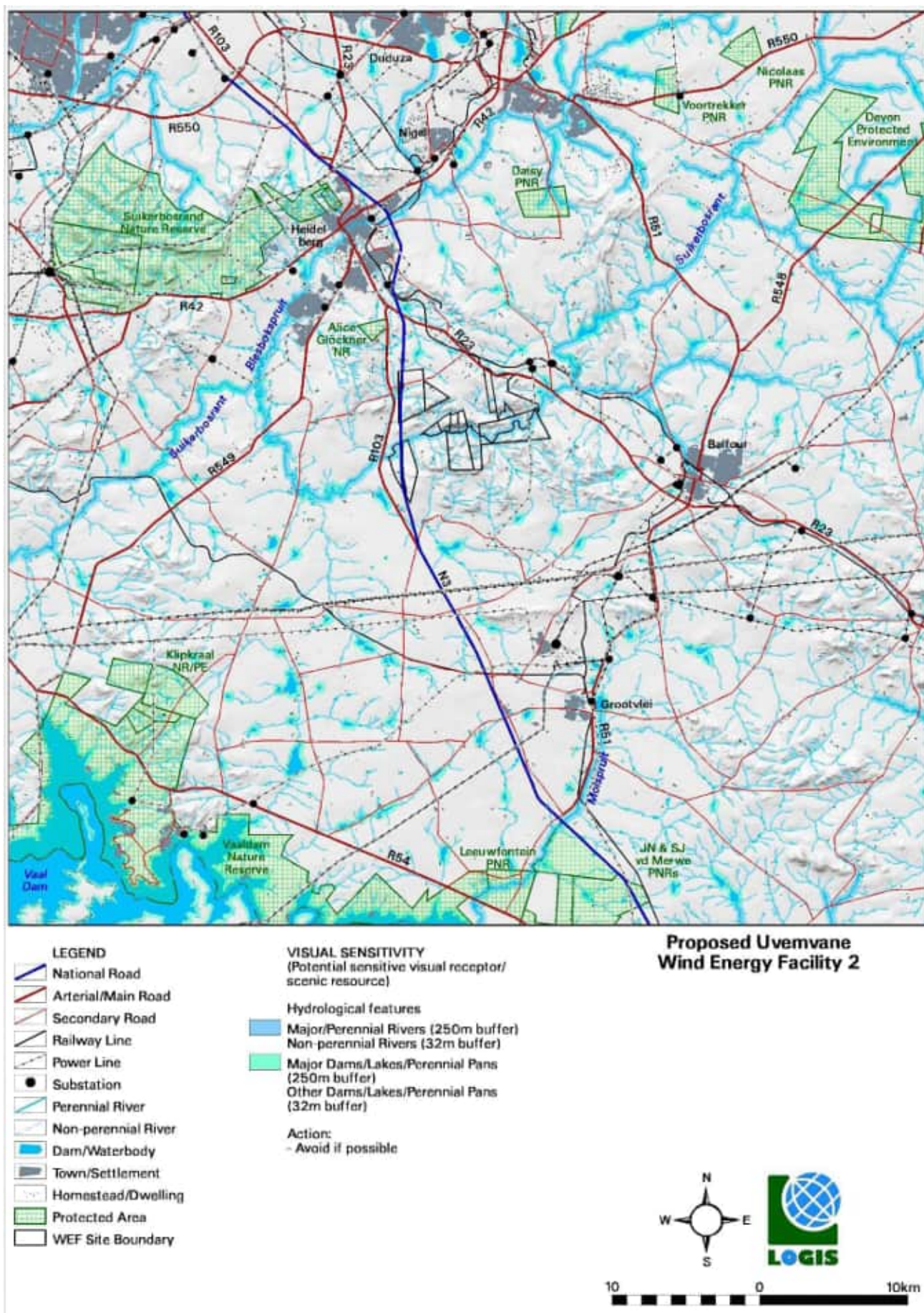
⁸ Source: <https://landscape-heritage-sa.yolasite.com/lhsa-the-landscape-map/>



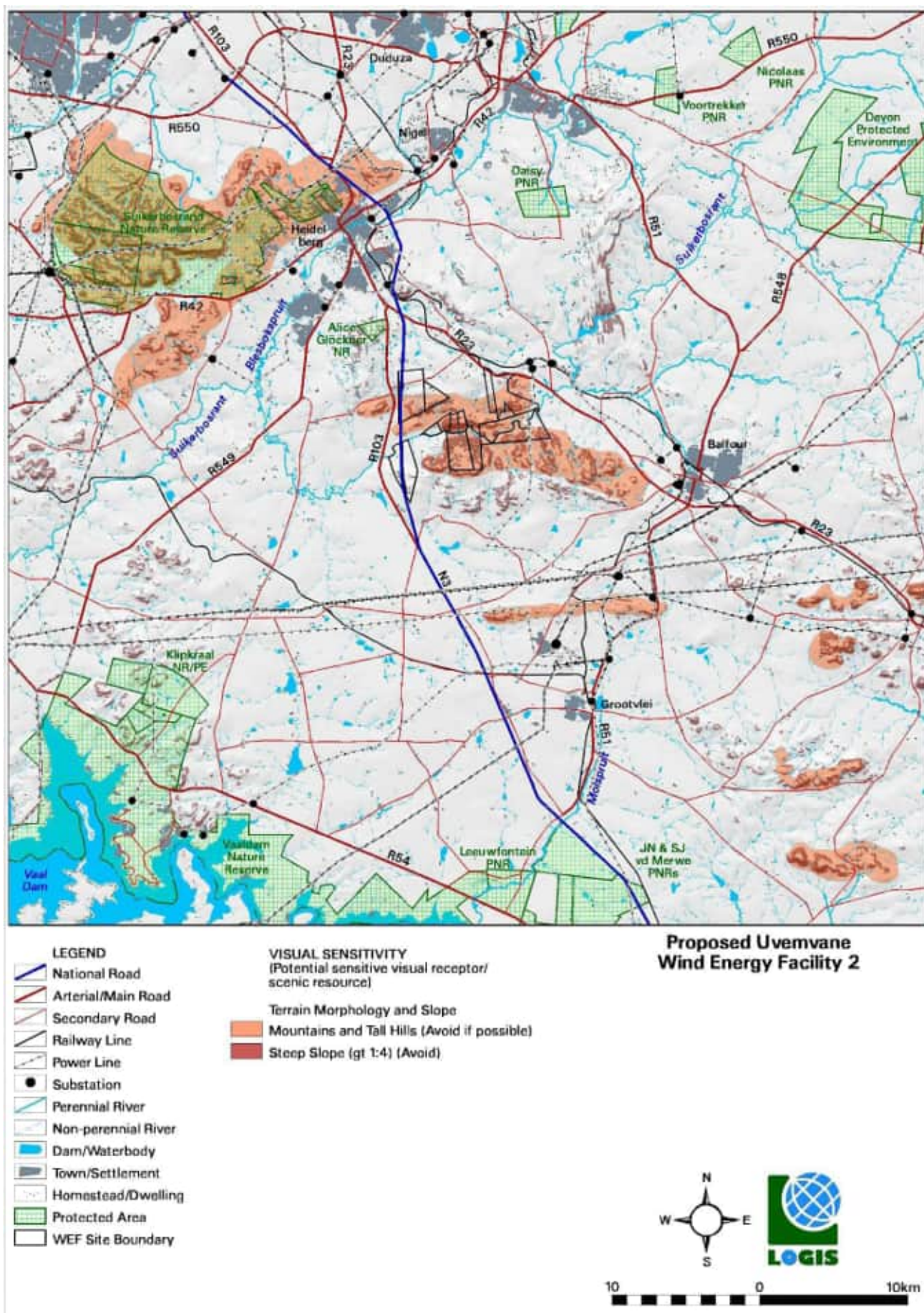
Map 5: Proximity to roads and protected areas/ tourist attractions



Map 6: Proximity to inhabited residences, settlements, and towns



Map 7: Proximity to hydrological features



Map 8: Proximity to Steep slopes, prominent hills, ridges, and skylines

5.3. Overall Visual Sensitivity

In order to determine the visual impact of the proposed ABO Uvemvane WEF 2 site sensitivities were combined into one map. Refer to **Map 9**.

Based on this combined map, the following is applicable:

No-go areas

These are areas identified as having a **very high** visual impact significance and are in relation to areas that fall within the buffers associated with protected areas, coastal zones, and Viewshed Protection Zones (VPZs), as well as areas located on steep slopes (>25%) and high mountains. Where these areas are present, development in these areas must be avoided, even if all possible mitigation measures are applied.

Based on the above, scattered portions of the ABO Uvemvane WEF 2 site falls within a no-go area in relation to steep slopes (>25%). Additionally, a very small portion of the northwestern corner of the proposed development site is located within the 3km protected area buffer associated with Alice Glockner Nature Reserve, as can be seen on **Map 8**Error! Reference source not found.. The placement of turbines within these areas is to be avoided and won't be accepted from a visual perspective.

High Impact

These are areas identified as having a **high** visual impact significance and are in relation to areas that fall within the buffers associated with homesteads, residential areas, scenic routes, as well as areas located on mountains and tall hills. Where these areas are present, development in these areas is not recommended and must be avoided, if at all possible.

The following areas identified as high are located within the proposed ABO Uvemvane WEF 2 site; mountains and tall hills, inhabited residences / homesteads and built-up / residential areas.

Moderate Impact

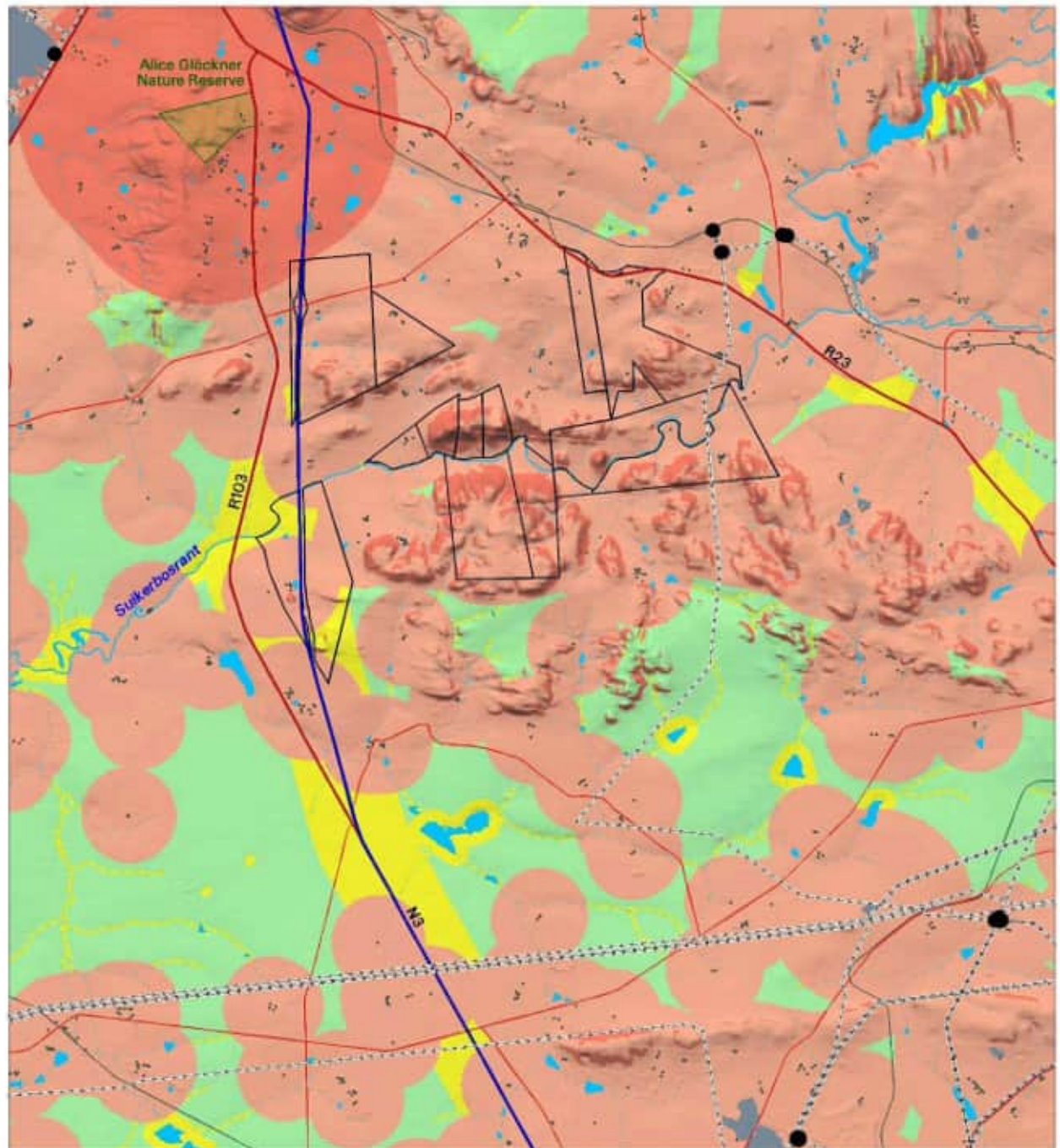
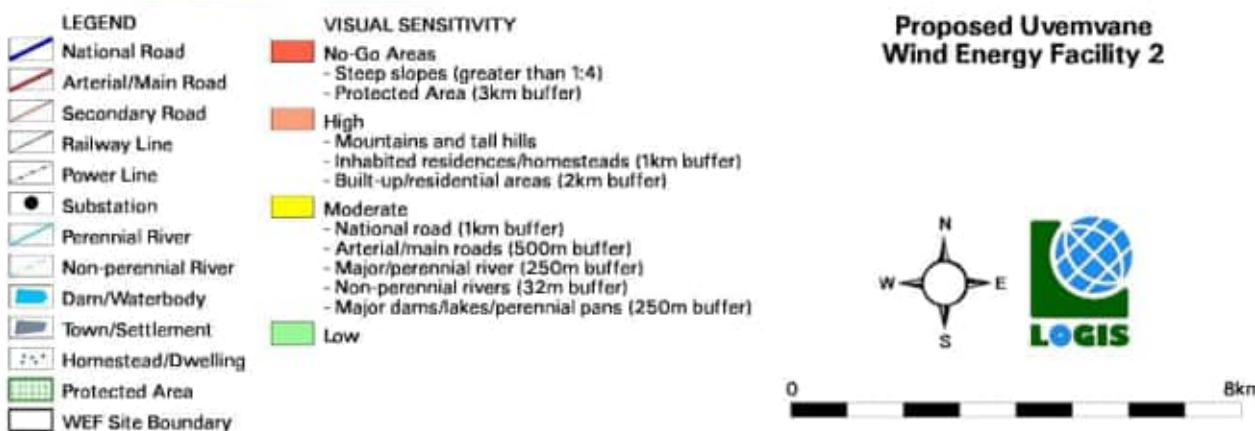
These are areas identified as having a **moderate** visual impact significance and are in relation to areas that fall within the buffers associated with roads and major hydrological features of scenic value (i.e. large dams, perennial rivers). These are areas that could be considered for development with a "tread-light" approach and minimum infrastructure development.

Moderate sensitivity areas identified located within the proposed ABO Uvemvane WEF 2 site include development within 1km of the national N3 road, as well as, the buffers associated with various hydrological features identified to be located on site.

Low Impact

These are areas identified as having a **low** visual impact significance and are areas not located within any identified buffers. Development may occur in these areas provided that mitigation measures are implemented.

No portion of the proposed site ABO Uvemvane WEF 2 site falls within these area.



Map 9: Overall visual sensitivity of the proposed ABO Uvemvane WEF 2

5.4. Results

In order to **confirm and verify the current land use and visual sensitivity of the proposed project area** (receiving environment) to the proposed development as determined by the DFFE Screening Tool above, a site visit was undertaken, and the following matrix was utilized:

Table 3: Matrix to determine overall visual sensitivity of the receiving environment to the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure

	Sensitive Receptor	Very High Sensitivity (4)	High Sensitivity (3)	Moderate Sensitivity (2)	Low Sensitivity (1)
1.	Topographic features incl mountain ridges	Within 500m	Within 500m - 1km	Within 1 -2km	>2km
2.	Steep slopes	Slopes with more than 1:4	Slopes between 1:4 and 1:10	Slopes less than 1:10	Minimal Slope
3.	Major rivers, water bodies, perennial rivers and wetlands with scenic value	Within 250 m	Within 250- 500m	Within 500m – 1km	>1km
4.	Coastal zone	Within 1km	Within 1 - 2km	Within 2 – 4km	>4km
5.	Protected area: National Parks	Within 5km	Within 5 - 10km	Within 10 - 15km	>15km
6.	Protected areas: Nature Reserves	Within 3km	Within 3 – 5km	Within 5 – 10km	>10km
7.	Private reserves and game farms	Within 1.5km	Within 1.5 – 3km	Within 3 – 5km	>5km
8.	Cultural landscape	On the site itself	Within 500m	Within 500m – 1km	>1km
9.	Heritage Sites Grades i, ii and iii	On the site itself	Within 500m	Within 500m – 1km	>1km
10.	Towns and Villages	Within 2km	Within 2 – 4km	Within 4 – 6km	>6km
11.	Home/farmsteads	Within 5km	Within 5 - 10km	Within 10 - 20km	>20km
12.	National Roads	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
13.	Provincial/arterial roads	Within 500m	Within 500m - 1km	Within 1 - 3km	>3km
14.	Scenic routes	Within 1km	Within 1 - 2.5km	Within 2.5 - 5km	>5km
15.	Passenger rail lines	Within 500m	Within 500m – 1km	Within 1 – 3km	>3km
16.	Located with Renewable Energy Development Zone (REDZ)	No	-	-	Yes
17.	VAC	Low VAC	Moderate VAC	High VAC	Very High VAC
18.	Shadow Flicker	Yes – Occupied within 1km	Yes - Within 1km but not permanently occupied	Yes - Within 1km but uninhabited / derelict	No
19.	Visual Quality	Natural environment intact with no built infrastructure	Natural environment intact with limited built infrastructure	Natural environment somewhat intact with fair amount of built infrastructure	Built infrastructure is dominant with little to no natural environment remaining
20.	Presence of existing infrastructure	Absent	Very low densities	Present in moderate quantities	High densities
	Total	High (58)			

Overall visual sensitivity rating:

- Low (0-20)

- Moderate (21-40)
- High (41-60)
- Very High (61-80)

Based on the above findings, as well as the site visit undertaken, it can be found that the **sensitivity of the visual receiving environment**⁹ for the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure is **high**.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located with the 1km buffer from an occupied homestead or tourist accommodation. However, it must be noted that numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern. Based on this, as well as the site visit undertaken, where the occupation of the homesteads within the development site was verified, the **visual aspects of Flicker Theme Sensitivity** for the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure is confirmed to be **very high**.

6. CONCLUSION AND RECOMMENDATIONS

The greater environment with its wide open, predominately rural agricultural and undeveloped landscapes is considered to have a moderate to high visual quality.

The region has a largely rural character, interspersed with commercial agricultural activities (i.e. dryland, irrigated and livestock production activities), scattered human settlements and numerous protected areas. Settlements closest to the site are the town of Heidelberg to the northwest and Balfour to the east. The natural vegetation or land cover types of the region are described as Grassland interspersed with scattered areas of wetlands and includes small pockets of dense woodland, open woodland and exotic plantations

Visual Absorption Capacity (VAC) of the receiving environment is deemed to be low to moderate owing to the low growing vegetation grassland vegetation, however, the undulating and hilly topography aids in reducing the potential visual exposure to some degree.

The study area is densely populated to the north in the Gauteng Province with a population density of 67 people per km², however the more south you travel towards the Mpumalanga Province the study area is less populated with a population density of 16 people per km² within the local municipality. The most populated areas within the study area are the towns of Heidelberg and Nigel to the north, as well as Balfour and Grootvlei to a lesser extent located southeast of the site. Outside of these areas, there are isolated homesteads and scattered settlements throughout the study area. Homesteads, by virtue of their visually exposed nature, are considered to be sensitive visual receptors. Residential receptors in natural contexts are more sensitive than those in more built-up contexts, due to the absence of visual clutter in these undeveloped and undisturbed areas.

There are numerous protected areas scattered throughout the study area¹⁰, located predominately in the northern and southern portions of the study area. None of the protected areas are found within the proposed development site itself. The closest protected areas are the Alice Glockner and Suikerbosrand Nature Reserves, which are located approximately 2.7km and 10.8km respectively, to the northwest of the site. The study area is also a popular tourist and wedding destination.

A turbine layout was not available at the time of writing this report, therefore it is difficult to determine whether any of the turbines would be located within any identified sensitive visual buffers. The proposed site was found to be located within the following sensitive areas (recommended visual buffers):

⁹ The matrix and sensitivity rating dealt with in this section of the report only confirms and verifies the sensitivity of the receiving environment to this specific type of development in comparison to the outcomes of the DFFE Screening Tool. It does not, however, determine the overall visual impact of the proposed development on the sensitive receptors likely to be exposed to the proposed facility.

¹⁰ The study area is defined as the extent of the maps outlined in this report, encompassing the proposed development site or WEF Site Boundary.

- Majority of the western portions of the ABO Uvemvane WEF 2 development site are located within the 1km buffer of the national N3 and the 500m buffer of the R103 Arterial / Main Road.
- A small section of the northeastern portion of the site is located within the 500m buffer of the R23 Arterial / Main Road.
- A very small portion of the ABO Uvemvane WEF 2 development site is located within the identified protected area buffer for the Alice Glocker Nature Reserve.
- Numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern.
- Various hydrological features are located within the proposed ABO Uvemvane WEF 2 site.
- A large section of the northeastern portion of the development site is located on the topographical features identified as mountains and tall hills with pockets of steep slopes (slopes greater than 1:4) found scattered throughout the site.

The DFFE screening tool generated for the ABO Uvemvane WEF 2 indicated that the site has a very high sensitivity in terms of the Landscape (Wind) Theme Sensitivity, as well as very high sensitivity relating to the visual aspects of Flicker Theme Sensitivity (potential temporarily or permanently inhabited residence). Based on the above findings, it can be found that the **sensitivity of the visual receiving environment** for the proposed ABO Uvemvane WEF 2 is in fact **high** due to the following:

- The presence of pockets of steep slopes on the proposed site.
- Low to moderate VAC of the receiving environment.
- Location of the site outside of a REDZ.
- Potential shadow flicker as a result of the numerous homesteads located within and adjacent to the site.
- High visual quality of the receiving environment.
- Mountains and tall hills located within the site extent.
- Proximity to a protected area.
- Location of the N3 national and R103 arterial / main roads directly adjacent to the site.

No turbine layout is available at this time and as such it cannot be said with certainty whether any turbines would be located with the 1km buffer from an occupied homestead or tourist accommodation. However, it must be noted that numerous occupied homesteads are located within the proposed development site and within close proximity, therefore shadow flicker impact may be of concern. Based on this, as well as the site visit undertaken, where the occupation of the homesteads the development site was verified the **visual aspects of Flicker Theme Sensitivity** for the proposed ABO Uvemvane Wind Energy Facility 2 and associated infrastructure is confirmed to be **very high**.

Based on general best practice and the findings above, the following preliminary recommendations are suggested to be considered during the layout planning phase in order to mitigate the potential visual impacts:

- No turbines are placed on any steep slopes. Development within the areas identified as steep slopes will not be supported from a visual perspective.
- If possible, avoid and limit the placement of turbines on areas identified as mountains and tall hills. The placement of the turbines within these areas is expected to exacerbate the visual exposure of the facility as a result of the elevated terrain, as well as have a visual impact on the scenic resources located within the study area.
- It is recommended that no turbines be placed within the 1km buffer of the national N3 and the 500m buffer of the R103 and R23 Arterial / Main Road.
- No turbines should be placed within 1 km of any occupied homesteads or tourist accommodation facilities, unless otherwise agreed upon by the affected landowner.
- It is recommended that no turbines be placed within the buffer associated with the Alice Glocker Nature Reserve. The placement of turbines within this area will not be supported from a visual perspective.
- It is recommended that the various buffers associated with the identified hydrological features located on site are avoided when placing turbines. While it is recommended that the proposed turbines are not placed within these buffers based on the recommendation of the Aquatic Specialist these buffers can be reduced to 50m for watercourses and 100m for wetlands.

7. REFERENCES

Council for Scientific and Industrial Research (CSIR), 2015. *The Strategic Environmental Assessment for wind and solar photovoltaic energy in South Africa*.

DEADP, Provincial Government of the Western Cape, 2011. Guideline on Generic Terms of Reference for EAPS and Project Schedules.

Oberholzer, B. (2005). Guideline for involving visual and aesthetic specialists in EIA processes: Edition 1.

DEA, 2021. *South African Renewable Energy EIA Application (REEA) Database*.

Charlier, R & Thys, A. 2016. *Wind Power—Aeole Turns Marine*. 10.1002/9781119066354.ch7.

Appendix C.8

NOISE SSVR



ABO Uvemvane Wind Energy Facility 1 (Pty) Ltd

NOISE REPORT FOR SITE SENSITIVITY VERIFICATION

**for the
proposed Uvemvane Wind Energy Facility 1
near Belfour, Gauteng and Mpumalanga Province**



Study done for:



Prepared by:



P.O. Box 2047, Garsfontein East, 0060
Tel: 012 – 004 0362, Fax: 086 – 621 0292, E-mail: info@eares.co.za