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UMSINDE WIND FARM FACILITY

SOCIAL IMPACT ASSESSMENT

ADDENDUM LETTER

FEBRUARY 2018

1. INTRODUCTION

Arcus Consultancy Services was appointed by Windlab Developments South Africa (Pty) Ltd as the lead consultants to manage the Environmental Impact Assessment (EIA) process for the establishment of Phase 1 and 2 of the proposed Umsinde Emoyeni Wind Energy Facility (WEF) and associated infrastructure located ~ 30 km north-east Murraysburg in the Western Cape Province. The majority of the site is located within the Beaufort West Local Municipality within the Western Cape Province. However, a small section of the site is located within the Ubuntu Local Municipality, which is located within the Northern Cape Province.

Tony Barbour Environmental Consulting and Research was appointed by Arcus Consultancy Services to undertake a specialist Social Impact Assessment (SIA) as part of an Environmental Impact Assessment (EIA) process. The SIA for proposed Umsinde Wind Energy Facility (WEF) Phase 1 and 2 was submitted to Arcus in December 2015 (Barbour, December 2015).

The Department of Environmental Affairs in September 2017 rejected a Final EIR on procedural grounds.

The proponent (Windlab) took this as an opportunity to update the proposed Phase 1 and 2 layouts which were significantly reduced to 70 turbine placements. The new layout takes into account data from an additional year of Verreaux's eagle monitoring as well as updated bat and visual datasets. The amended layouts are outlined below.

This Addendum Report comments on the Amended Layout 2 for Phase 1 and 2, with specific reference to the relevance of the findings of the SIA undertaken for the original layout for the Umsinde Wind Energy Facility (WEF) Phase 1 and 2 as assessed in the December 2015 SIA (Barbour, December 2015).

2. AMMENDED LAYOUT

The number of proposed wind turbines was initially reduced from 98 (original proposal) to 55 per phase (Revised Layout 1: Phase 1 and 2). Revised Layout 1 was subsequently reduced to 35 turbines per phase (Revised Layout 2: Phase 1 and 2). While the number of turbines has been reduced the envisaged output will remain unchanged, namely 140 MW. This will be achieved by establishing higher-capacity wind turbines.

Revised Layout 2 was developed after the site visit undertaken by Schalk van der Merwe (21-24 January 2018). The observations and interviews during the site visit were based on the layout associated with Revised Layout 1 (55 wind turbines per phase). A summary of the key findings from the site visit is contained Annexure A. A brief comment on the differences between Revised Layout 1 and 2 (Phase 1 and 2) is provided below.

Phase 1: Revised Layout 1 vs 2
The number of turbines has been decreased from 55 (Revised Layout 1) to 35 (Revised Layout 2), a reduction of 20 wind turbines. The development area remains essentially the same. The outer limit of the development area has only increased with regard to one turbine, and only by ~400 m (Revision 2, turbine 8). In more instances the outer limited has shrunken a few hundred meters due to turbines associated with Revised Layout 1 being removed. In most instances however, the outermost locations have remained identical. Proposed site access remains unchanged.

The land owners who would potentially be directly affected by Revised Layout 2 remain the same as those affected by Revised Layout 1. The same local receptors such as farmsteads and local roads would remain affected and over similar distances. However, the number of turbine density has decreased. This is likely to reduce the potential visual impact on the areas sense of impacts. The key findings and assessment of issues based on Revised Layout 1 remain unchanged (See Annexure A).

Phase 2: Revised Layout 1 vs 2
The number of turbines has been decreased from 55 (Revised Layout 1) to 35 (Revised Layout 2), a reduction of 20 wind turbines. The development area remains essentially the same. The locations of the outermost turbines have remained essentially unchanged from Revised Layout 1, or have been reduced in some instances, the most significant of which is the reduction of turbines on Farm 28/RE. This has reduced the outer north-western limit by ~1.9 km. The majority of turbines located in closest proximity to potentially sensitive established and envisaged tourism activities (Badsfontein, Bakensklip, Klipplaat) have remained unchanged. Proposed site access remains unchanged.

The land owners who would potentially be directly affected by Revised Layout 2 remain the same as those affected by Revised Layout 1. The same local receptors such as farmsteads and local roads would remain affected and over similar distances. However, the number of turbines has decreased. This is likely to reduce the potential visual impact on the areas sense of impacts. The key findings and assessment of issues based on Revised Layout 1 remain unchanged (See Annexure A).

3. SUMMARY OF KEY FINDINGS

The key findings of the December 2015 SIA (Barbour, 2015) were summarised under the following sections:

- Fit with policy and planning;
- Construction phase impacts;
- Operational phase impacts;
- Cumulative Impacts;
- Decommissioning phase impacts;
- No-development option.

Comment on the relevance of the findings in terms of Revised Layout 2 for Phase 1 and 2 are provided below.

3.1.1 Fit with policy and planning

The findings of the review of the relevant policies and documents pertaining to the energy sector indicated that the renewable energy was supported at a national and provincial level. However, the provincial and local policy and planning documents also make reference to the importance of tourism and the region's natural resources. Care therefore needs to be taken to ensure that the development of large renewable energy projects, such as the proposed facility, does not impact on the region's natural resources and the tourism potential of the Province.

This finding remains valid for Revised Layout 2 for Phase 1 and 2.

3.1.2 Construction phase impacts

The key social issues associated with the construction phase include:

Potential positive impacts
- Creation of employment and business opportunities, and the opportunity for skills development and on-site training;
- Benefits associated with providing technical advice on wind energy to local farmers and municipalities;
- Improved cell phone reception.

Potential negative impacts
- Impacts associated with the presence of construction workers on site and in the area;
- Influx of job seekers to the area;
- Increased safety risk to farmers, risk of stock theft and damage to farm infrastructure associated with presence of construction workers on the site;
- Increased risk of veld fires;
- Impact of heavy vehicles, including damage to roads, safety and dust;
- Potential loss of productive farmland associated with construction-related activities.

The findings of the SIA (Barbour, December 2015) indicated that the significance rating for all of the potential negative impacts with mitigation was **Low Negative**. All of the potential negative impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented. However, in order to effectively mitigate the impact of construction workers on the local community of Murraysburg will require the implementation of an effective training and skills development programme prior to the implementation of the construction phase aimed at maximising the employment opportunities for local residents during the construction phase. In the absence of such

a programme the impact of construction workers on the local community of Murraysburg was assessed to be **Medium Negative**.

Table 1 summarizes the findings of the 2015 SIA assessment of impacts associated with the Construction Phase.

Table 1: Summary of social impacts during the construction phase

Impact	Significance No Mitigation	Significance With Mitigation/Enhancement
Creation of employment and business opportunities	Low (Positive)	High (Positive)
Benefits associated with providing technical advice to local farmers and municipalities	N/A	Low (Positive)
Improved cell-phone coverage	Low (Positive)	Low (Positive)
Presence of construction workers and potential impacts on family structures and social networks	Medium (Negative for community as a whole)	Low (Negative for community as a whole)
Influx of job seekers	Low (Negative)	Low (Negative)
Safety risk, stock theft and damage to farm infrastructure associated with presence of construction workers	Low (Negative impact)	Very-Low (Negative impact)
Increased risk of veld fires	Medium (Negative)	Low (Negative)
Impact of heavy vehicles and construction activities	Medium (Negative)	Low (Negative)
Loss of farmland	Low (Negative)	Very Low (Negative)

Comment on implication of Revised Layout 2 (Phase 1 and 2) on significance ratings for Construction Phase

Revised Layout 2 will result in the number of wind turbines associated with each Phase (Phase 1 and 2) being reduced from 98 to 35, a reduction of 63 turbines (64%). This reduction will have implications for the potential impacts associated with the number of employment opportunities created and the risks posed by construction workers to local communities and social networks.

Due to the reduced number of employment opportunities, the significance will change from ***High Positive*** to ***Medium Positive***. The reduced number of construction workers will potential reduce the pressure in finding accommodation in Murraysburg and also the potential risk to the local community. The overall significance with mitigation will however remain Low.

Despite the reduced number of employment opportunities the potential benefits for local communities is confirmed by the findings of the Overview of the Independent Power Producers Procurement Programme (IPPPP) undertaken by the Department of

Energy, National Treasury and DBSA (30 September 2016). The study found that employment opportunities created during the construction phase of the projects implemented to date had created 61% more jobs than anticipated. The study also found that significantly more people from local communities were employed during construction than was initially planned. In this regard the expectation for local community participation was 6 771 job years. To date 15 215 job years have been realised (i.e. 125% greater than initially planned). Black South African citizens, youths and rural or local communities have been the major beneficiaries during the construction phases, as they respectively represent 80%, 41% and 52% of total job opportunities created by IPPs to date.

The remainder of the significance ratings for Revised Layout 2 for Phase 1 and 2 remain valid. All of the potential negative social impacts can therefore be effectively mitigated if the recommended mitigation measures are implemented.

3.1.3 Operational phase impacts

The key social issues affecting the operational phase include:

Potential positive impacts

- Creation of employment and business opportunities. The operational phase will also create opportunities for skills development and training;
- Benefits associated with the establishment of a Community Trust;
- The establishment of infrastructure to generate renewable energy.

The 2016 IPPP Overview (30 September 2016) notes that to date (across 6 bid windows) a total contribution of R19.3 billion has been committed to Socio-economic Development (SED) initiatives linked to Community Trusts. Of this total commitment, R15.2 billion has been specifically allocated to local communities where the IPPs operate. The Green Jobs study (2011), found that the case for wind power is enhanced by the positive effect on rural or regional development. In this regard wind farms located in rural areas create an opportunity to benefit the local and regional economy through the creation of jobs and tax revenues. The findings of a thesis by Tait (2012) indicated that the distributed nature of renewable energy generation can induce a more geographically dispersed pattern of development. As a result renewable energy sites can be highly suited to rural locations with otherwise poor potential to attract local inward investment thus able to target particularly vulnerable areas. In her conclusion Tait notes that thesis found positive evidence for the establishment of community benefit schemes in the wind sector in South Africa.

Potential negative impacts

- The visual impacts and associated impact on sense of place;
- Potential impact on tourism.

The findings of the SIA indicated that the key affected property in terms of potential visual impacts is Badsfontein Farm owned by Mr Izak van der Merwe. In this regard Badsfontein is also impacted by the wind turbines associated with the Ishwati Emoyeni WEF to the north of the farm. If the wind turbines associated with the Umsinde Emoyeni WEF are located in such a way as they are not visible from Badsfontein Farm the significance rating will be **Low Negative**.

Table 2 summarises the significance of the impacts associated with the operational phase.

Table 2: Summary of social impacts during operational phase

Impact	**Significance No Mitigation**	**Significance With Mitigation/Enhancement**
Creation of employment and business opportunities	Low (Positive)	Medium (Positive)
Establishment of Community Trust	Medium (Positive)	High (Positive)
Promotion of renewable energy projects	Medium (Positive)	Medium (Positive)
Visual impact and impact on sense of place	High (Negative)	Medium (Negative)
Impact on tourism	Medium	Low

Comment on implication of Revised Layout 2 (Phase 1 and 2) on significance ratings for Operational Phase

Revised Layout 2 will result in the number of wind turbines associated with each Phase (Phase 1 and 2) being reduced from 98 to 35, a reduction of 63 turbines (64%) per phase. This reduction will have implications for the potential impacts associated with the number of employment opportunities created. Due to the reduced number of employment opportunities, the significance will change from **Medium** to **Low Positive.**

The remainder of the significance ratings for Revised Layout 2 for Phase 1 and 2 remain valid. It should however be noted that none of the affected property owners interviewed indicated that they were concerned about the potential visual impacts associated with the wind turbines.

Comment on potential impact on property values

The potential impact of the proposed WEF on property values was raised as a concern during the site visit in January 2018. A literature review was undertaken by the author as part of an SIA for a WEF in 2017. It should be noted that the review does not constitute a property evaluation study and merely seeks to comment on the potential impact of wind farms on property values based on the findings of studies undertaken overseas. In total five articles were identified and reviewed namely:

- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;
- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- Ben Hoen, Jason P. Brown, Thomas Jackson, Ryan Wiser, Mark Thayer and Peter Cappers (August 2013): A Spatial Hedonic Analysis of the Effects of Wind Energy Facilities on Surrounding Property Values in the United States. Ernest Orlando Lawrence Berkeley National Laboratory.

The literature reviewed was based on an attempt by the author to identify what appear to be "academically and or scientifically" based studies that have been undertaken by reputable institutions post 2010. The most comprehensive study appears to the study by Gibbons (2014), which found that "averaging over wind farms of all sizes" the price reduction was around 5-6% within 2km, falling to less than 2% between 2 and 4km, and less than 1% by 14km which is at the limit of likely visibility. While the focus of the Gibbons study was on residential properties it does indicate that the larger the distance the less the impact. The findings of the Urbis (2016) study indicate that "wind farms may not significantly impact rural properties used for agricultural purposes".

Based on the outcome of the Urbis study (2016) the authors were of the opinion that wind farms may not significantly impact rural properties used for agricultural purposes. In conclusion, the authors of the Urbis study found that appropriately located wind farms within rural areas, removed from higher density residential areas, are unlikely to have a measurable negative impact on surrounding land values.

Based on the findings of the literature review the potential impact of the proposed Umsinde Phase 1 and Phase 2 WEF Revised Layout 2 on the property values in the area is likely to be low.

Comment on potential impact on tourism

The potential impact of the proposed WEF on future eco-tourism facilities was raised as a concern during the site visit in January 2018. A review of international literature in the impact of wind farms on tourism was undertaken as part of an SIA for another WEF in 2017. Three articles were reviewed, namely:

- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
- Glasgow Caledonian University (2008). The economic impacts of wind farms on Scottish tourism. A report prepared for the Scottish Government
- Regeneris Consulting (2014). Study into the Potential Economic Impact of Wind Farms and Associated Grid Infrastructure on the Welsh Tourism Sector

The research by Aitchison (2012) found that that previous research from other areas of the UK has demonstrated that wind farms are very unlikely to have any adverse impact on tourist numbers (volume), tourist expenditure (value) or tourism experience (satisfaction) (Glasgow Caledonian University, 2008; University of the West of

England, 2004). In addition, to date, there is no evidence to demonstrate that any wind farm development in the UK or overseas has resulted in any adverse impact on tourism. In conclusion, the findings from both primary and secondary research relating to the actual and potential tourism impact of wind farms indicate that there will be neither an overall decline in the number of tourists visiting an area nor any overall financial loss in tourism-related earnings as a result of a wind farm development.

In addition, all of the studies that have sought to predict impact have demonstrated that any negative impact of wind farms on tourism will be more than outweighed by the increase in tourists that are attracted by wind farms, by the increase in employment brought about by the development of wind farms and/or by the continuing growth of tourism. The study by the Glasgow Caledonian University (2008) found that only a negligible fraction of tourists will change their decision whether to return to Scotland as a whole because they have seen a wind farm during their visit. The study also found that 51.0% of respondents indicated that they thought wind farms could be tourist attractions. In this regard the visitor centre at the Whitelee Wind Farm in east Ayrshire Scotland run by ScottishPower Renewables has become one of the most popular 'eco-attractions' in Scotland, receiving 200 000 visitors since it opened in 2009.

The study by Regeneris Consulting (2014) found that there was no evidence that wind farms would deter tourists from traveling along designated visitor or tourists routes. The study indicated that small minorities of visitors would be encouraged, whilst others would be discouraged. Overall, however, there was no evidence to suggest that there would be any significant change in visitor numbers using these routes to reach destination elsewhere. The study also found that in more sensitive locations the potential negative effect on visitor numbers may still be low overall, but in some circumstances could be moderate. The greatest concern exists amongst areas and businesses closest to wind farms and appealing to visitor markets most sensitive to changes in landscape quality.

Based on the findings of the literature review there is limited evidence to suggest that the proposed Umsinde Phase 1 and WEF Revised Layout 2 would have a significant impact on the tourism in the area. The findings of the review also indicate that wind farms do not impact on tourist routes.

3.1.4 *Cumulative impacts*

The proposed Ishwati Emoyeni WEF is located immediately to the west of the proposed Umsinde Emoyeni WEF site. The SIA (December 2015) noted that the potential for cumulative impacts associated with combined visibility (whether two or more solar facilities will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more renewable energy facilities along a single journey, e.g. road or walking trail) is therefore high. However, due to the proximity of the two sites the WEFs could be viewed as a single large WEF as opposed to two separate WEFs. While viewing these WEFs as a single large facility, as opposed to separate facilities, does not necessarily reduce the overall visual impact on the scenic character of the area, it does reduce the potential cumulative impact on the landscape. Viewing each of the proposed WEFs as a single, large WEF eliminates the cumulative impacts associated with combined visibility (whether two or more wind farms will be visible from one location) and sequential visibility (e.g. the effect of seeing two or more wind farms along a single journey, e.g. road or walking trail). This therefore reduces the potential cumulative impact of the WEFs on the landscape. The proximity of the WEFs also has the benefit of concentrating the visual impacts on the areas sense of place in to one area as

opposed to impacting on a number of more spread out areas. Despite this the significance was rated as **Medium Negative** with mitigation.

However, the potential impact of wind energy facilities on the landscape is an issue that does need to be considered, specifically given South African's strong attachment to the land and the growing number of wind facility applications. With regard to the area, a number of WEFs have been proposed in the Western Cape Province. The Environmental Authorities should therefore be aware of the potential cumulative impacts when evaluating applications.

The findings of the SIA (December 2015) also notes that in addition to the potential negative impacts, the establishment of the proposed WEF and other renewable energy projects in the area also has the potential to create a number of socio-economic opportunities for the town of Murraysburg and the BWLM, which, in turn, will result in a positive social benefit. The positive cumulative impacts include creation of employment, skills development and training opportunities, creation of downstream business opportunities. This benefit is rated as **High Positive** with enhancement.

Comment on implication of Revised Layout 2 (Phase 1 and 2) on cumulative impacts

Revised Layout 2 will result in the number of wind turbines associated with each Phase (Phase 1 and 2) being reduced from 98 to 35, a reduction of 63 turbines (64%). The reduced number of wind turbines will reduce the visual impacts associated with Phase 1 and 2, which, in turn, is also likely to reduce the potential for cumulative impacts. However, despite this the significance rating is likely to remain **Medium Negative**.

4. KEY FINDINGS AND CONCLUSIONS

The findings of the SIA (Barbour December 2015) indicated that the development of the proposed Umsinde Emoyeni WEF (Phase 1 and 2) would create employment and business opportunities for the local economy, specifically during the construction phase. However, for the community of Murraysburg and other local towns in the area to benefit from these opportunities will require the implementation of an effective training and skills development programme prior to the commencement of the construction phase and a commitment from the proponent to achieve local employment targets for low and semi-skilled jobs. The establishment of a Community Trust would also benefit the local community. Local community shareholding in the project is a requirement of the REIPPPP and this often takes the form of a community trust, the exact machinations of how the community will be granted ownership will be decided once the project is bid. This would either take the form of a "free-carry" type arrangement whereby the community is granted shares or in the form of debt that would be repaid with dividends received. The proposed development also represented an investment in clean, renewable energy infrastructure, which, given the challenges created by climate change, represents a positive social benefit for society as a whole.

The SIA also noted that the potential visual impacts associated with the proposed Umsinde Emoyeni WEF (Phase 1 and 2) could be effectively addressed by ensuring that no wind turbines are visible from the Farm Badsfontein. In addition, the recommendations contained in the VIA should be implemented.

Based on these findings the SIA recommended that the Umsinde Emoyeni WEF (Phase 1 and 2) be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the SIA and VIA Report.

Revised Layout 2 for Phase 1 and 2 will result in the total number of wind turbines being reduced from 98 for each Phase (original proposal) to 35 for each phase. The total number of wind turbines associated with Phase 1 and 2 will therefore be 70 as opposed to 196. This represents a significant reduction. While the reduction in wind turbines will reduce the number of employment opportunities associated with the construction and operational phase, it will also reduce the visual and cumulative impacts of the proposed Umsinde Phase 1 and 2 WEF on the areas sense of place. This is regarded as an overall improvement.

The recommendations contained in the December 2015 SIA (Barbour, December 2015) therefore remain valid, namely that the establishment of the Umsinde Emoyeni WEF (Phase 1 and 2 Revised Layout 2) be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the SIA (December 2015) and VIA Report.

ANNEXURE A

Annexure A contains a summary of the key findings from the site visit to the study area undertaken by Schalk van der Merwe from 21-24 January 2018. As indicated above, the observations during the site visit were informed by Revised Layout 1 for Phase 1 and 2.

REVISED LAYOUT 1: PHASE 1[1]

The number of turbines was reduced by 43 (44%), namely from 98 to 55 (see footnote 1). The envisaged output will remain unchanged, namely 140 MW. This will be achieved by utilizing higher capacity wind turbines. The wind turbine specifications are outlined in Table 1.

Table 1: Changes in turbine specifications from the original proposal to Revised Layout 1 for Phase 1

COMPONENT	2016	2018	CHANGE
Output	140 MW	140 MW	Unchanged
Turbine capacity	1.5 – 4.5 MW	1.5 – 4.5 MW	Unchanged
Hub height max	140 m	135 m	4 m lower hub height
Rotor diameter max	130 m	150 m	10 m longer rotor diameter

Based on information provided, the turbine development footprint has contracted slightly compared to the previous layout proposal (Figure 1). With the exception of two turbines previously proposed on a portion of Middelvlei (Mr Kayne Kingwill), essentially the same properties and land owners remain affected. The majority of 55 turbines associated with Revised Layout 1 are located in the same location associated with original proposal. The overall density has however been reduced by 55 turbines. As indicated above, the number of wind turbines has been reduced to 35 in terms of Revised Layout 2. This represents a further reduction in overall density.

Site Access

Site access is still proposed off the Witteklip Road (R63 to Richmond) via Witteklip Farm (32/2). The proposed Phase 1 site access is located ~17 km north of the R63. Only the initial ~8 km of the Witteklip Road north of the R63 is tarred (Photograph 1). No farm yards would be affected by the access road or other internal Phase 1 project roads. All properties taking access off this portion of the Witteklip Road have access to their properties via alternative roads, e.g. via the Swaelkrans Road, or internal farm roads. Phase 2 would be accessed from two points off the Swaelkrans Road and affect a different set of land owners. Phase 2 is discussed below.

[1] As indicated in the Addendum Letter, the site visit and interaction with stakeholders was based on Revised Layout 1, which involved a reduction from 98 to 55 wind turbines. Revised Layout 2 involved the subsequent reduction from 55 to 35 wind turbines.

Photograph 1: Witteklip road looking south from near the proposed Phase 1 access point.

The proposed onsite substation location and 132 kV transmission (Tx) line route (to the still to be constructed Ishwati Emoyeni substation) remains unchanged from the original proposal. The transmission line route is the subject of a separate environmental application to the DEA and is not assessed in this report.

Site context

The Phase 1 (Revised Layout 1) development area and immediate surrounds are located in a completely rural area. The terrain is hilly, and the vegetation consists of natural Karoo veld. Apart from gravel roads, Telkom lines and Eskom distribution lines, no service-industrial infrastructure is located in the Phase 1 study area.

Farmsteads are typically located in valleys, flanked by one or more large hills. Large trees are limited to plantings of poplars, willows, pears, conifers and others near farmsteads. The settlement pattern is sparse, with farmsteads located kilometres apart. Not all farmsteads are permanently inhabited. All properties are primarily used for extensive grazing. Stock farming operations provide limited employment opportunities, but some permanent employment is typically associated with study area operations. Worker households typically reside in accommodation adjacent to the farm yard on main farms.

The local veld and associated grazing resource largely consists of bossiesveld mixed with grassveld. This allows for year-round utilisation of the grazing resource. The bossiesveld component is crucial to operations during the dry winter season. The local veld's carrying capacity is around 6 hectares to one small stock unit such as sheep and goats. And 24 hectares to one large stock unit such as cattle or horses. Properties are therefore large, often consisting of a number of farms. Some owners also rent adjacent or nearby land for additional grazing. Cropping activities are limited to small-scale plantings of a few hectares of fodder crops for own use, typically on land adjacent to

farmsteads. Operations typically rely on a combination of surface water storage dams and groundwater resources.

Murraysburg currently sees little dedicated tourism traffic (Hattingh – pers. comm). A number of establishments in and around town offer accommodation, but few offer meals. Murraysburg town itself has no restaurants or large shops, the nearest being in Graaff-Reinet 90 km away. There may therefore be catering opportunities for local contractors during the construction phase.

Tourism activities and facilities in the immediate Phase 1 study area are currently limited to two cottages on Grootplaas along the R63 ~9.4 km to the south of the nearest proposed Phase 1 turbine. Grootplaas is a working stock farm, and the cottages mainly caters to passing traffic on the Graaff-Reinet route, with occupation very intermittent (Judy Butterworth – pers. comm).

The only established eco-tourism/ Karoo sense of place tourism facility in the broader study area seems to be located on Badsfontein Guest Farm. Badsfontein farm is located 13.9 km and further away from the Phase 1 development area. Badsfontein is accessed directly off the Richmond Road. The owners of adjacent Bakensklip and near-adjacent Klipplaat are also currently contemplating diversifying into eco-tourism-based accommodation facilities on their properties (Marais, van Heerden – pers. comm). An established self-catering guest accommodation facility is located to the south of Badsfontein on Brookfield farm. The nearest Phase 1 turbine would be located ~26 km east of the Brookfield farmstead.

Directly affected land owners

The Phase 1 layout would affect five properties (cadastral units) belonging to four different land owners (Table 2). As indicated, all four land owners were also affected by the previous layout. None of the Phase 1 land owners are affected by Phase 2 turbines.

Table 2: Directly affected Phase 1 land owners and properties

OWNER	MAIN FARM	SITE PROPERTIES	SIZE (ha)[2]
Mr Geoff Kingwill	Grand View	Witteklip 32/2	2 688.10
		Klein Driefontein 152/1	1 585.07
Mr Daniel Retief	Phillipskraal	De Hoop 30/RE	1 119.60
Mr Percy Reynolds	Groot Driefontein	Driefontein 26/2	4 072.02
Mr Andrew Wallis	Springfontein	De Hoop 30/4	695.04

With the exception of Groot Driefontein (26/2), none of the relevant properties are inhabited (Figure 2). The farm yard and labourer's houses on the relevant portion of Groot Driefontein are not located in significant proximity to any proposed turbines (~ 10.8 km).

All five properties are used for extensive stock farming. With the exception of Groot Driefontein, all the relevant properties are essentially stock posts of larger farming operations based nearby. The only structures located on any the properties are on Groot Driefontein, which are located more than 10 km from the nearest turbines.

[2] Property sizes from Western Cape Department of Agriculture Cape Farm Mapper EGIS database: https://gis.elsenburg.com/apps/cfm/#.

No issues were raised by any of the relevant owners with regard to the proposed Revised Layout 1 for Phase 1. All identified potential impacts on local security, ones on local gravel roads, and an increased veld fire risk as key issues which would require adequate management during the construction and operational phases. A short overview of the relevant properties is provided below.

Witteklip 32/2 and Klein Driefontein 152/1 (Mr Geoff Kingwill)

Witteklip 32/2 (2 688.1 ha) and Klein Driefontein 152/1 (1585.07 ha) belong to Soldaatkop Estates, which is owned by Mr Geoff Kingwill. Mr Kingwill's farming operation is based on Grand View farm, located ~10 km to the south. Grand View's operations is based on extensive livestock farming, and includes sheep, goats and cattle.

The two site properties as well as Witteklip 32/5 adjacent to the east of Witteklip 32/2 (not part of the Umsinde site) are used as stock posts. Stock is rotated between camps, but the grazing resource is utilised year-round, so the properties are stocked year-round. Only occasional hunting takes place on the properties, and is limited to shooting for own use by the owner or his friends.

No dedicated employment is associated with the site properties. Staff is deployed from Grand View on an as-needed basis. Grand View currently provides tenured employment to 7 households, all living on Grand View. No structures are located on either of the two site properties. A house, shearing shed and outbuildings are located on the non-site portion of Witteklip (32/5). The house is currently used for storage and the shearing shed only used in shearing season. The owner envisages renovating the house for tourist accommodation, benefiting from its relative proximity to the R63 and Witteklip Road (Geoff Kingwill – pers. comm).

The proposed development area associated with Phase 1 (Revised Layout 1) is located in the northern and north-western portions of the properties. The proposed Umsinde WEF substation and an ~1.8 portion of the 132 kV Tx line would be located on Klein Driefontein 152/1 (not part of this assessment). Phase 1 site access off the Witteklip road is proposed near the northern boundary of Witteklip 32/2. The access road would not impact on the access road to the farm yard on Witteklip 32/5.

The owner has indicated that he has no concerns or issues with any of the proposed infrastructure. The house on Witteklip 32/5 would be screened by broken terrain from the turbine development area located 3km and further to the north of the house (Geoff Kingwill – pers. comm).

De Hoop 30/RE (Mr Daniel Retief)

De Hoop 30/RE (1 119.6 ha) belongs to Mr Daniel Retief. Mr. Retief lives on Phillipskraal Farm near the intersection of the Swaelkrans and Witteklip roads ~6.5 km to the north of the De Hoop property (Photograph 2). De Hoop is used exclusively as grazing land in Phillipskraal's extensive stock farming operations. De Hoop is used throughout the year. No structures are located on De Hoop 30/RE. Infrastructure is limited to stock watering points and associated infrastructure.

No dedicated employment is associated with the De Hoop property. Five permanently employed households live on Phillipskraal, near the main house (Photograph 3). The small herd of 20 Springbok on De Hoop is not hunted (Retief – pers. comm).

A total of 15 turbines are proposed on De Hoop, affecting mainly the south-western portion of the property. The existing access road to De Hoop off the Witteklip road would not be affected by the proposed Phase 1 access road. Phillipskraal farm yard is located 5.8 km north of the nearest proposed turbine, and given the broken topography, turbines are unlikely to be prominently visible from Phillipskraal (Retief – pers. comm).

Photograph 2: Phillipskraal farmstead along the Swaelkrans Road

Photograph 3: Labourers' houses on Phillipskraal

Driefontein 26/2 (Mr Percy Reynolds)

Driefontein 26/2 (4 072.02) is one of three properties comprising Groot Driefontein Farm. Adjacent Driefontein 26/3 (3 819.56 ha) and Driefontein 26/10 (111.3 ha) also form part of the Umsinde WEF site, but turbines are only proposed on Driefontein 26/2. The Groot Driefontein farm yard complex is also located on 26/2 (Photograph 4).

Photograph 4: Groot Driefontein farmstead and outbuildings along the Swaelkrans road

Groot Driefontein is owned by Groot Driefontein Trust (Mr Percy Reynolds). Mr Reynolds and his family live on Groot Driefontein. The operation employs 5 tenured households. The labourer's houses are located adjacent to the Groot Driefontein farm yard (Photograph 5). The three properties are farmed as a unit. Operations are based on cattle, sheep and goats. The grazing is used year-round. Only occasional hunting takes place on the properties, and is limited to shooting for own use by the owner or his friends (Reynolds, pers. comm).

The Umsinde Tx line would traverse the northernmost portion of 26/2 over a distance of ~3.5 km. The distance to the nearest turbine is ~750 m, which means that essentially the same portion of the property would have affected by both. Existing access to Groot Driefontein off the Swaelkrans road would not be impacted by Phase 1 activities.

The nearest Phase 1 turbines would be located ~10.7 km to the north-east of the farm yard cluster on Groot Driefontein. The nearest turbines located on Groot Driefontein itself would be located even slightly further, namely 11.3 km away. This, coupled to the broken topography, means that the turbines would not be visible from any areas deemed sensitive by the owner. The turbine development area is hilly, and more difficult to farm (Reynolds – pers. comm).

Photograph 5: Labourers' houses and kraal on Groot Driefontein

De Hoop 30/4 (Mr Andrew Wallis)

De Hoop 30/4 (695.04), and De Hoop 30/1 (2 683.71 ha) adjacent to its north, constitute Springfontein Farm. 30/1 also forms part of the Umsinde WEF site, but infrastructure is only proposed on 30/4. The Springfontein farm yard complex is located in the northernmost portion of 30/1, approximately 6.6 km north of the nearest proposed Phase 1 (Revised Layout 1) turbines. Structures on Springfontein are limited to those associated with the farm yard. No structures are therefore located on the development portion of Springfontein.

Springfontein is owned by Springfontein Trust (Mr Andrew Wallis). Mr Wallis and his family live on Springfontein. Operations currently employ 1 farm labourer household. Labourers' housing is located adjacent to the Springfontein farm yard (Photograph 6). Operations are based on stock farming, mainly sheep. De Hoop 30/4 is used purely for grazing. Hunting on Springfontein is limited to the occasional culling of Springbok by the owner or his friends (Wallis – pers. comm).

Photograph 6: Labourers' houses on Springfontein

Revised Layout 1, Phase 1 turbines would be 6.6 km and further away from the Springfontein farmstead. Due to the broken terrain, the owner does not anticipate that the turbines would be visible from the farm yard (Wallis – pers. comm). Current access to Springfontein off the Swaelkrans road and the access road to De Hoop 30/4 off the Witteklip road would not be affected by Revised Layout 1: Phase 1 activities.

Distance to receptors

As indicated above, the study area is rural in nature, and predominantly consists of natural veld used year-round for grazing by small stock and cattle. The settlement pattern is relatively sparse, with inhabited farmsteads typically located near local public roads. Staff housing is as a rule located adjacent to the farm werf. A significant number of properties are essentially stock posts serving parent operations based elsewhere in the Murraysburg – Graaff-Reinet area. Some owners farm their properties from the relevant towns, but nevertheless typically visit their properties on a regular basis. No tourism activities are currently associated within the immediate study area. The local gravel roads are mainly used by local farmers, and carry little if any dedicated tourism traffic.

Figure 3 below provides an overview of key receptors such as farmsteads and roads which are located within an 8 km radius from the nearest proposed Revised Layout Phase 1 turbines[3].

[3] This distance is used by some visual specialists (e.g. SiVest on Mainstream's current applications for the Phezukamoya and San Kraal WEFs near Noupoort) as a rough indication of the distance at which 150 m tall turbine structures typically cease to have significant visual impacts.

In order to gain a better understanding of potential cumulative impacts, an 8 km radius is also indicated from Phase 2 outer turbine locations.

A prominent range of large hills (Bulberg, Soldaatkop, Leeukop, Middelberg, etc.) is located to the east of the Revised Layout 1 Phase 1 site. Properties located to the east of this range are effectively screened from visual and road impacts.

Eight farm yards are located within an 8 km radius of Phase 1 turbines (Table 3). All eight properties are primarily used for stock farming, and utilised throughout the year. No tourism-based activities or facilities are currently associated with any of these properties.

Of the eight properties, only three (Hartebeesfontein, Phillipskraal and Springfontein) are permanently inhabited. The distance to the nearest turbines ranges from 4.8 km (Hartebeesfontein) to 6.6 km (Springfontein). Witteklip, the only property for which the owner envisages potential tourism accommodation facilities is located ~3 km to south of the nearest proposed Phase 1 turbine. All the relevant owners have indicated that distance and local topography are likely to result in minimal if any visual intrusion or adverse impacts on sense of place (Geoff Kingwill, Hesselink, Retief, Wallis – pers. comm).

Table 3: Key receptors within an 8 km radius from Phase 1 and 2 turbines

RECEPTOR	PH 1 TURBINE	PH 2 TURBINE	COMMENT
Hartebeesfontein	4.8 km	2.1 km	Inhabited by owner and staff
Kapoksfontein	2.7 km	1.8 km	Uninhabited stock post
Matjiesfontein	7.2 km	>8 km	Uninhabited stock post
Phillipskraal	5.8 km	6.4 km	Inhabited by owner and staff
Skanskraal	4.8 km	>8 km	Uninhabited stock post
Springfontein	6.6 km	4.6 km	Inhabited by owner and staff
Swaelkrantz	7 km	1.8 km	Uninhabited stock post
Witteklip	3 km	>8 km	Uninhabited stock post
Swaelkrans road	4.4 km	670m	Used mainly by local farmers
Witteklip road	520 m	5.3 km	Links R63 and Richmond

Of the eight farm yards located within 8 km of Phase 1 turbines, five are also located within an 8 km radius of proposed Revised Layout 1 Phase 2 turbines, namely Hartebeesfontein, Phillipskraal, Springfontein Kapoksfontein and Swaelkrans. As indicated, only the former three are inhabited. The relevant owners of all five properties expressed no concerns with regard to potential cumulative impacts.

Turbines would be located within an 8 km radius of the Witteklip Road over a distance of ~21.6 km of the road. An ~11.2 km portion of is located within 8 km of both Phase 1 and Phase 2 turbines (Revised Layout 1). The nearest Phase 1 turbines would be located 520 m from the road, and the furthest 8.9 km. However, the bulk of the Witteklip Road is a gravel road and no major tourism traffic is associated with the road. Phase 1 turbines may also be visible from portions of the Swaelkrans Road. Current road use is essentially limited to the 8 owners of the farms accessed from the road.

The Witteklip Road serves as an alternative to users of the Swaelkrans Road, and vice versa. As indicated, construction traffic would not impact on any established access road or farm yard.

The nearest established eco-tourism-based operation to Revised Layout 1, Phase 1 appears to be located on Badsfontein Farm to the west of the Umsinde site. The farm yard complex on Badsfontein is located ~24 km from the nearest proposed Phase 1 turbine (Revised Layout 1). The neatest Phase 1 turbine to Badsfontein's boundary (Farm 26/8) is located ~13.9 km to the east. The access road to Badsfontein (Richmond Road) is located ~21 km to the west of the nearest proposed turbine. It would therefore appear that that the potential visual impact and associated sense of place impacts on Badsfontein would be limited. This would however have to be confirmed by the findings of the VIA. As the Richmond road would not be impacted by construction traffic, no impacts on the road or dust and noise impacts on Badsfontein farm yard would occur.

REVISED LAYOUT 1: PHASE 2[4]

The number of turbines was reduced by 43 (44%), namely from 98 to 55 (see footnote 1). The envisaged output will remain unchanged, namely 140 MW. This will be achieved by utilizing higher capacity wind turbines. The wind turbine specifications are outlined in Table 4.

Table 4: Changes in turbine specifications from the original proposal to Revised Layout 1 for Phase 2

COMPONENT	2016	2018	CHANGE
Output	140 MW	140 MW	Unchanged
Turbine capacity	1.5 – 4.5 MW	1.5 – 4.5 MW	Unchanged
Hub height max	140 m	135 m	4 m lower hub height
Rotor diameter max	130 m	150 m	10 m longer rotor diameter

The number of turbines for the Revised Layout 1: Phase 2 was reduced by 43 (44%), namely from 98 to 55. The envisaged output remains unchanged, namely 140 MW, but there will be a greater emphasis on higher-capacity turbines in the mix.

Based on the information provided the footprint associated with the Revised Layout 1 for Phase 2 has contracted compared to the previous layout proposal, particularly towards the north-east and south-west (Figure 4). More than half of the currently proposed turbine locations have remained unchanged from the previous proposal. Three fewer property owners are affected in the current layout. In this regard, turbines on Hartebeesfontein (Mr Percy Reynolds), Springfontein (Mr Andrew Wallis) and Klipplaat (Dr A Marais) have fallen away.

Site access

Site access for the revised layout is still proposed off the Swaelkrans Gravel road via two Witteklip farm (32/2) (Photograph 7). Three access points are proposed off the Swaelkrans Road, two on Swaelkrans farm (28/RE), and one on Hartebeesfontein (28/2).

[4] As indicated in the Addendum Letter, the site visit and interaction with stakeholders was based on Revised Layout 1, which involved a reduction from 98 to 55 wind turbines. Revised Layout 2 involved the subsequent reduction from 55 to 35 wind turbines.

Photograph 7: Swaelkrans road turnoff from the R63

The proposed onsite substation location and 132 kV transmission (Tx) line route (to the still to be constructed Ishwati Emoyeni substation) remains unchanged from original proposal. The transmission line route is the subject of a separate environmental application to the DEA and is not assessed in this report.

Revised layouts have also been developed for Phase 1 (Revised Layout 1 and 2). The number of turbines, envisaged output and turbine specifications for Umsinde Phase 1 are identical to those for Phase 2. Phase 1 would be accessed from the Witteklip Road (R63-Richmond) and affects a different set of land owners.

Site context

The Phase 2 (Revised Layout 1 and 2) development area and immediate surrounds are located in a completely rural area. The terrain is hilly, and the vegetation consists of natural Karoo veld. Apart from gravel roads, Telkom lines and Eskom distribution lines, no service-industrial infrastructure is located in the Phase 2 study area.

Farmsteads are typically located in valleys, flanked by one or more large hills. Large trees are limited to plantings of poplars, willows, pears, conifers and others near farmsteads. The settlement pattern is sparse, with farmsteads located kilometres apart. Not all farmsteads are permanently inhabited. All properties are primarily used for extensive grazing. Stock farming operations provide limited employment opportunities, but some permanent employment is typically associated with study area operations. Worker households typically reside in accommodation adjacent to the farm yard on main farms.

The local veld and associated grazing resource largely consists of bossiesveld mixed with grassveld. This allows for year-round utilisation of the grazing resource. The bossiesveld component is crucial to operations during the dry winter season. The local veld's carrying capacity is around 6 hectares to one small stock unit such as sheep and goats (24 hectares to one large stock unit such as cattle or horses). Properties are therefore large, often consisting of a number of farms. Some owners also rent adjacent or nearby land for additional grazing. Cropping activities are limited to small-scale plantings of a few hectares of fodder crops for own use, typically on land adjacent to farmsteads. Operations typically rely on a combination of surface water storage dams and groundwater resources.

Murraysburg currently sees little dedicated tourism traffic (Hattingh – pers. comm). A number of establishments in and around town offer accommodation, but few offer meals. Murraysburg town itself has no restaurants or large shops, the nearest being in Graaff-Reinet 90 km away.

Tourism activities and facilities in the immediate Phase 1 study area are currently limited to two cottages on Grootplaas along the R63 ~13.7 km to the south of the nearest proposed Phase 2 turbine. Grootplaas is a working stock farm and the cottages mainly cater to passing traffic on the Graaff-Reinet route, with occupation very intermittent (Judy Butterworth – pers. comm).

The only established eco-tourism/ Karoo sense of place tourism facility in the broader study area seems to be located on Badsfontein Guest Farm. Badsfontein farm (outer boundary) is located 5.3 km and further away from the Phase 2 turbine development area. The farm house complex is located ~ 15.4 km from the nearest proposed turbine. Badsfontein is accessed directly off the Richmond Road.

The owners of adjacent Bakensklip and Klipplaat (both part of the broader Umsinde WEF site) are also considering developing eco-tourism-based accommodation facilities on their properties (Marais, van Heerden – pers. comm). An established self-catering guest accommodation facility is located to the south of Badsfontein on Brookfield Farm. The nearest Phase 1 turbine would be ~18.6 km north-east of the Brookfield farmstead.

Directly affected land owners

The Phase 2 Revised Layout 1 development area would affect four properties (cadastral units) belonging to two different land owners (Figure 5 and Table 5). The relevant properties and owners were also affected by the previous Phase 2 layout proposal. Neither of the owners is affected by turbine locations associated with the proposed Phase 1 Revised Layout 1.

Table 5: Directly affected Phase 2 land owners and properties

OWNER	MAIN FARM	SITE PROPERTIES	SIZE (ha)[5]
Alwyn van der Merwe Trust	Farmed as part of Hartebeesfontein	Swavel Kranse 28/RE	2 159.10
		De Hoop 30/2	1 835.80
		Klipplaat 109/6	No data
Mr Martin Hesselink	Hartebeesfontein	Swavel Kranse 28/2	1 498.04

Swavel Kranse 28/RE (2 159.1 ha) and Driefontein 26/4 (1 037.66 ha) adjacent to its south constitute Hartebeesfontein Farm. The properties are owned by the Trouberg Trust (Mr. Martin Hesselink). In addition, he also leases Houtkloof 29/1 (1143.15 ha) and De Hoop 30/3 (1 024.51 ha) from the Alwyn P van der Merwe Trust. The properties have been leased out to Mr Hesselink for over ten years and the owners have entrusted Mr Hesselink to speak on their behalf with regard to matters relating to the WEF. All the relevant properties form part of the broader Umsinde WEF Phase 2 Revised Layout 1 site.

All the relevant properties are currently farmed as part of a larger farming operation based on Hartebeesfontein. The Hartebeesfontein farmstead is located on Driefontein 26/4, approximately 2.1 km to the south of the nearest Phase 2 Revised Layout 1 turbine (Photograph 8). Mr Hasselink and his family live on the property. The farming operation employs 3 tenured households on a permanent basis. Two seasonal workers are also employed over summer. The farm workers' houses are located adjacent to the Hartebeesfontein farm yard (Photograph 9). Two farm houses are located on the van der Merwe properties, namely on Swaelkrans and Kapoksfontein. Both dwellings are vacant, the former being used during very sporadic visits by the owners, and the latter for storage (Photograph 10). The labourers' houses on the properties are uninhabited.

Farming operations are based on intensive grazing by sheep, goats and cattle. The mixed veld allows for year-round use of the grazing resource. When water supplies allow, small areas of fodder are cropped for own use. All cropping areas are associated with farmsteads. No tourism activities or facilities are located on any of the site properties. Hunting is restricted to very occasional episodes by the owner or his friends for own use (Hesselink – pers. comm).

[5] Property sizes from Western Cape Department of Agriculture Cape Farm Mapper EGIS database: https://gis.elsenburg.com/apps/cfm/#.

Photograph 8: Phillipskraal farmstead along the Swaelkrans road

Photograph 9: Labourers' housing on Hartebeesfontein

Photograph 10: The uninhabited Swaelkrans farmstead

The proposed turbine locations would affect portions of the relevant properties used exclusively for extensive grazing. Due to limited water supplies, the cropping potential of these properties is limited, and essentially restricted to areas around the three farm yard complexes. As indicated, only the Hartebeesfontein farm yard complex is currently inhabited. The yard is located in a twisting valley and is flanked by large hills which provide natural screening for wind turbines. The owner has indicated that he would however have no objection if some any turbines were to be visible from the Hartebeesfontein farmstead (Hesselink – pers. comm).

The Swaelkrans Road passes through the Hartebeesfontein farm yard approximately 20 m west of the farm house and 120 m east of the nearest labourer's house. All three proposed Phase 2 access points off the Swaelkrans Road are located to the north of the farmstead, between the Hartebeesfontein and Swaelkrans farmsteads. The Hartebeesfontein farm yard may therefore be exposed to noise and dust impacts during the construction phase, especially abnormal loads. The farm yards on Swaelkrans and Kapoksfontein are uninhabited and also located somewhat further from the road.

Potential cumulative impacts may occur due to portions of the proposed Umsinde WEF 132 kV Tx line also being proposed on portions of Hartebeesfontein and Swaelkrans. Approximately 4.6 km of the line would be located across Hartebeesfontein (Driefontein 26/4). The line will traverse the Swaelkrans Road ~650 m to the south of the Hartebeesfontein farmstead. The Tx line would also traverse one of the van der Merwe Trust properties, namely Klipplaat 109/6 over a distance of ~2.3 km. The relevant property is proposed to accommodate 10 Phase 2 Revised Layout 1 turbines, of which the nearest is located ~840 km to the north of the Tx line. Essentially the same portion of 109/6 would therefore be affected. The proposed Tx line would not be

located in meaningful proximity (namely >6.5 km) to the uninhabited farm yards on Swaelkrans and Kapoksfontein.

No issues were raised by Mr Hesselink with regard to the wind turbines locations associated with the Phase 2 Revised Layout 1 or associated infrastructure. Potential impacts on local security, ones on local gravel roads, and an increased veld fire risk were however identified as key issues which would require adequate management during the construction and operational phases. These issues were also identified as key concerns during the SIA for the original layout (Barbour, December 2015).

Distance to receptors

As indicated, the study area is rural in nature, and consists predominantly of natural veld used year-round for grazing by small stock and cattle. The settlement pattern is relatively sparse, with inhabited farmsteads typically located near local public roads. Staff housing is as a rule located adjacent to the farm werf. A significant number of properties function as stock posts serving parent operations based elsewhere in the Murraysburg – Graaff-Reinet area. Some owners farm their properties from the relevant towns, but nevertheless visit their properties on a regular basis. Limited tourism activities are currently associated in the area associated with Phase 2 Revised Layout 1 study area. The local gravel roads are mainly used by local farmers, and carry little tourism related traffic.

Figure 3 provides an overview of key receptors such as farmsteads and roads located within an 8 km radius from the nearest proposed Phase 2 Revised Layout 1 turbines[6]. In order to gain a better understanding of potential cumulative impacts, an 8 km radius is also indicated from Phase 1 outer turbine locations.

Ten farm yards are located within an 8 km radius of Phase 2 turbines (Table 6). All 10 properties are primarily used for stock farming, and utilised throughout the year. No tourism-based activities or facilities are associated with any of these properties. Of the ten properties, only three (Hartebeesfontein, Phillipskraal and Springfontein) are permanently inhabited. The distance to the nearest turbines for these properties ranges from 2.1 km (Hartebeesfontein) to 6.4 km (Phillipskraal). All three relevant owners have indicated that distance and local topography are likely to result in minimal if any visual intrusion or adverse impacts on sense of place (Hesselink, Retief, Wallis – pers. comm). Potential visual impacts where therefore not identified by the affected landowners.

[6] This distance is used by some visual specialists (e.g. SiVest on Mainstream's current applications for the Phezukamoya and San Kraal WEFs near Noupoort) as a rough indication of the distance at which 150 m tall turbine structures typically cease to have significant visual impacts.

Table 6: Key farmstead and public road receptors within an 8 km radius from Phase 2 and Phase 1 Revised Layout 1 turbines

Receptor	Phase 2 Turbines	Phase 1 Turbines	Comment
Bakensklip	7.6 km	>8 km	Uninhabited stock post
Hartebeesfontein	2.1 km	4.8 km	Inhabited by owner and staff
Kapoksfontein	1.8 km	2.7 km	Uninhabited stock post
Klipgat	5.8 km	>8 km	Uninhabited stock post
Klipplaat	4.6 km	>8 km	Uninhabited stock farm
Phillipskraal	6.4 km	5.8 km	Inhabited by owner and staff
Rusoord	7.4 km	>8 km	Uninhabited stock post
Springfontein	4.6 km	6.6 km	Inhabited by owner and staff
Swaelkrans	1.8 km	7 km	Uninhabited stock post
Windpoort	1.5 km	>8 km	Uninhabited stock farm
Swaelkrans road	670 m	4.4 km	Used mainly by local farmers
Witteklip road	5.3 km	520 m	Links R63 and Richmond

Of the eight farm yards located within 8 km of Phase 1 Revised Layout 1 turbines, five are also located within an 8 km radius of proposed Phase 2 Revised Layout 1 turbines, namely Hartebeesfontein, Phillipskraal, Springfontein Kapoksfontein and Swaelkrans. As indicated, only the former three are inhabited. The relevant owners of all five properties indicated that they had no concerns with regard to potential cumulative impacts.

Some of the Phase 2 Revised Layout 1 turbines would be located ~ 670 m from the Swaelkrans Road. Current road use is essentially limited to the 8 owners of the farms accessed from the road. The Witteklip Road serves as an alternative to users of the Swaelkrans Road, and vice versa. As indicated, the road traverses inhabited farm yards on Groot Driefontein, Hartebeesfontein, Springfontein and Phillipskraal. Dust, noise and traffic safety may therefore be issues during the construction phase. Phase 2 Revised Layout 1 turbines may also be visible from portions of the Witteklip Road. The nearest Phase 2 turbine would be located ~ 5.3 km from the road, and the furthest ~15 km away. However, as indicated, the bulk of the Witteklip Road is a gravel road, and there is limited tourism traffic associated with the road.

The nearest established eco-tourism-based operation to Phase 2 Revised Layout 1 appears to be located on Badsfontein Farm to the west of the Umsinde site. The farm yard complex on Badsfontein is located ~15.4 km from the nearest turbine associated with the proposed Phase 2 Revised Layout 1. The nearest turbine to Badsfontein's eastern farm boundary (Farm 26/8) would be located ~5.3 km from the boundary. Approximately half of Farm 26/8 falls within a 5.3-8 km radius of the nearest turbines. This portion of Badsfontein includes elevated areas from which Phase 2 Revised Layout 1 turbines may be visible. This visibility and distance to these turbines would need to be assessed as part of the VIA. The access road to Badsfontein Farm (Richmond Road) is located ~ 14 km to the west of the nearest proposed turbine. As the Richmond road would not be impacted by construction traffic, no impacts on the road or dust and noise impacts on Badsfontein farm yard would occur.

Two additional adjacent and near adjacent property owners to the Umsinde Phase 2 Revised Layout 1 development area have indicated that they have plans to develop eco-tourism-based accommodation on their properties. In this regard, the owner of Klipplaat has earmarked an area in the south-eastern portion of his property. The

relevant area is located ~1-2 km from proposed Phase 2 Revised Layout 1 turbines. Turbines would also flank the access road to Klipplaat (Marais, pers. comm).

The owner of Bakensklip has identified the river valley and area around the existing farm complex as suitable for tourism development and hunting operations. While the Phase 2 Revised Layout 1 turbines will be located ~ 7 km from the area, the nearest turbines are proposed ~2 km north-east Bakenklip's boundary. Potential impacts on sense of place would be compounded by the proposed Umsinde 132 kV line which would effectively bisect the property (van Heerden – pers. comm). Both properties form part of the broader Umsinde WEF site. No Phase 1 or 2 Revised Layout 1 turbines are however currently proposed on either, and the owners indicated that they were therefore compelled to seek alternative means of generating income from the properties (Marais, van Heerden – pers. comm).

SUMMARY OF KEY ISSUES AND CONCERNS

Phase 1: Revised Layout 1

Summary of key findings

- Key concerns raised pertain to impacts on gravel roads during the construction phase, and increased risks to security, stock theft and veld fires during both phases.
- None of the directly affected land owners have raised issues or concerns with regard to proposed turbine locations or internal roads and proposed access points.
- None of the directly adjacent land owners interviewed have raised issues or concerns with regard to proposed turbine locations or internal roads and proposed access points.
- Potential visual and sense of place impacts are likely to be key concerns for established tourism operations on Badsfontein Farm located along the Richmond Road to the west of the proposed Umsinde WEF Phase 1 (Revised Layout 1) development. Impacts are however more likely for Phase 2, and are discussed below.
- During the 2016 comment period the Karoo News Group and Mr Wayne Rubidge of Pam Golding Graaff-Reinet also raised issues with regard to potential negative impacts on local property prices. Neither responded to requests for a meeting during the current process.

Impact on local roads[7]

Access to the Phase 1 site is proposed off the Witteklip Road on Witteklip Farm. The Witteklip road provides a link between the R63 (Graaff-Reinet-Murraysburg road) and the town of Richmond ~70 km to the north. The turn-off from the R63 is located ~30 km to the east of Murraysburg. The proposed Phase 1 site access is located ~17 km north of the R63. Only the initial ~8 km of the road north of the R63 is tarred.

The Witteklip Road provides direct access to a number of stock posts and a few inhabited farms. Local road use is essentially associated with stock-farming operations, and generates low volumes of traffic most of the time. Peak volumes are associated with trucks moving stock between properties or to the market. Base traffic is associated with local farmers accessing goods and services in Murraysburg, Graaff-Reinet, or elsewhere.

[7] Impacts associated with construction traffic on local roads is addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

The portion of the Witteklip road between the R63 and the proposed site entrance provides direct access to stock posts on Schanskraal and Witteklip. Schanskraal can also be accessed directly from the R63 via Grootplaas, and Witteklip from the Swaelkrans road. Farms located to the north of the proposed access point which take primary access off the Witteklip road, such as Phillipskraal, Springfontein and Rhenosterfontein also have access to alternative road links to the R63, such as the Swaelkrans Road. Less direct, alternative access to all site and adjacent properties is therefore available during the construction phase.

Interviewees have indicated that the Witteklip road should be maintained throughout the construction period, and, at the end of construction, restored to a condition no worse than it had been prior to construction (Geoff Kingwill, Retief, Wallis – pers. comm).

In as far as possible, major construction traffic for Phases 1 and 2 (Revised Layout 1) should be timed not to coincide. This would ensure that the Swaelkrans Road remains open as an alternative route while the R63 is being used, and vice versa.

Increased security risk[8]

An increased risk to security, and specifically in terms of stock theft, was raised by all farmers interviewed. All study area properties are currently used for raising stock, including small-stock. All properties are stocked year-round. A number of properties are only used as stock posts, and have no permanent people presence. Interviewees indicated that stock theft was not currently a major problem in the study area. Incidents are mostly associated with camps along the R63 and Witteklip Road. The current situation is largely ascribed to the relative isolation of the area.

The concern is that this isolation would be compromised by the presence of outside construction workers, and continued accessibility to maintenance staff during the operational phase. The concern is not so much that WEF workers would directly engage in stock-theft, but that the layout and intimate workings of study area operations would now become known to large groups of outsiders. At least one farmer has however indicated that security measures which would be associated with the WEF could potentially benefit the local area (Wallis – pers. comm).

Key mitigation measures proposed by interviewees included security cameras, booms and patrols, including post-commissioning (Kayne Kingwill – pers. comm). As exposure to roads is a key factor, the developer may consider compensating farmers for de-stocking sensitive camps during the construction phase (Geoff Kingwill – pers. comm).

Increased veld fire risk[9]

The local veld and associated grazing resource largely consists of mixed bossiesveld and grassveld. This allows for year-round utilisation of the grazing resource. The bossiesveld component is crucial to operations during the dry winter season. Bossieveld may take a number of years to recover from veld fires. Fires are currently relatively rare in the study area, and almost exclusively restricted to lighting strikes affecting higher-lying areas (Jason, Judy and Micheal Butterworth, Geoff Kingwill, Reynolds, Wallis – pers. comm).

[8] Risks posed by construction workers to local farming operations is addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

[9] Increased risk of veld fires is addressed in the SIA undertaken in December 2015 (Barbour 2015)

Farmers are critically dependent on the grazing resource and any veld fire could have significant negative financial implications for affected farmers. This would include costs associated with buying in fodder and/ or renting grazing elsewhere, or opportunity costs associated with culling herds. Few if any study area farms are currently outfitted with fire-fighting equipment (Reynolds, pers. comm). Standard EMP measures to prevent and combat veld fires should be implemented. Investment in operational phase fire-fighting equipment could potentially benefit adjacent farmers without such equipment.

Visual and sense of place issues[10]

Visual and sense of place concerns were only raised with regard to turbines associated with the Phase 2 (Revised Layout 1) layout and the proposed 132 kV line which does not form part of this assessment.

All interviewees indicated that the proposed Phase 1 turbine locations (Revised Layout 1) would not affect any key vantage points or visually sensitive areas on their properties. Many also noted that potential impacts would be mitigated by the long distances to inhabited farmsteads and screening provided by the broken nature of the terrain (Jason, Judy and Michael Butterworth, Geoff Kingwill, Reynolds, Wallis – pers. comm).

The turbines are unlikely to be visible from the R63, but would be potentially visible from the Swaelkrans Road and prominently visible from the Witteklip Road. Neither of the two latter roads are currently associated with tourism-related activities or considered visually sensitive by local road users.

The nearest significant established eco-tourism related operation is located on Badsfontein Farm to the west of the Phase 1 site. The nearest proposed Phase 1 turbine (Revised Layout 1) to the farm house on Badsfontein is ~24 km away. The nearest turbine to Badsfontein's eastern boundaries is located ~13.9 km from the boundary. Phase 2 turbines are however somewhat closer, and may be potentially visible. The findings of the Visual Impact Assessment should be referred to.

Phase 2: Revised Layout 1

Key findings

- Key concerns raised pertain to impacts on gravel roads during the construction phase, increased risks to security, stock theft and veld fires during both phases (These issues were identified and assessed as part of the SIA undertaken in December 2018, Barbour, December 2015);
- None of the directly affected land owners raised concerns with regard to proposed turbine locations or internal roads and proposed access points;
- Two near-adjacent land owners – Mr Kobus van Heerden (Bakensklip), and Dr Marais (Klipplaat) raised concerns with regard to potential visual and sense of place impacts which may adversely impact potential future eco-tourism development on their properties;
- Potential visual and sense of place impacts are also likely to be key concerns for established tourism operations on Badsfontein Farm located along the Richmond Road to the west of the proposed Umsinde WEF Phase 2 Revised Layout 1 development.

[10] Visual and sense of place issues are addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

- During the 2016 comment period the Karoo News Group and Mr Wayne Rubidge of Pam Golding Graaff-Reinet raised concerns with regard to potential negative impacts on local property prices. Neither responded to requests for a meeting during the current process;
- With the approval of Mainstream's Ishwati WEF (~8 km north-west of nearest turbine on Umsinde Phase 2) in 2016 the potential of cumulative impacts has gained in probability. Cumulative impacts on properties such as Badsfontein and Bakensklip are potentially an issue.

Impact on local roads[11]

Access to the Phase 2 site is proposed off the Swaelkrans gravel road. The Swaelkrans road provides a link between the R63 (Graaff-Reinet-Murraysburg road) in the south, and the Witteklip road (R63 to Richmond) in the north-east. The turn-off from the R63 is located ~10 km to the east of Murraysburg.

The Swaelkrans road is almost exclusively used to access site-adjacent farms and stock posts and sees very limited traffic on a day-to-day basis. At present, only five permanently inhabited farms take access off the road, namely Middelvlei, Groot Driefontein, Hartebeesfontein, Springfontein and Phillipskraal. Of these, the farm yards of the four last ones are located adjacent to the road. Dust, noise and traffic safety impacts may potentially occur during the construction phase. In addition, the road also provides access to uninhabited farms such as Windpoort, Klipplaat and Swaelkrans.

In as far as possible, major construction traffic for Phases 1 and 2 should be timed not to coincide. This would ensure that the R63 remains open as an alternative route while the Swaelkrans road is being used, and vice versa.

Interviewees also indicated that the road should be maintained throughout the construction period, and, at the end of construction, restored to a condition no worse than it had been prior to construction (Retief, Wallis – pers. comm).

Increased security risk[12]

An increased risk to security, specifically in terms of stock theft, was raised by all farmers interviewed. All study area properties are currently used for raising stock, including small-stock. All properties are stocked year-round. A number of properties are only used as stock posts and have no permanent people presence.

Interviewees indicated that stock theft was not currently a major problem in the study area. Incidents are mostly associated with camps along the R63 and Witteklip Road, with properties along the Swaelkrans Road largely unaffected. The current situation is largely ascribed to the relative isolation of the area, and a relatively stable people presence associated with tenured stock-farming operations.

The concern is that this isolation would be compromised by the presence of outside construction workers and continued access to maintenance staff during the operational phase. The concern is not so much that WEF workers would directly engage in stock-theft, but that the layout and intimate workings of study area operations would become known to outsiders.

[11] Impacts associated with construction traffic on local roads is addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

[12] Risks posed by construction workers to local farming operations is addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

At least one farmer indicated that security measures which would be associated with the WEF could potentially benefit the local area (Wallis – pers. comm). Such measures should include security cameras, access booms, and patrols carried on into the operational phase (Kayne Kingwill – pers. comm). EMP measures with regard to trespassing and after-hours people presence should be enforced. Security provision could potentially benefit local contractors, including community-based service providers.
As exposure to roads is a key factor, the developer may consider compensating farmers for de-stocking sensitive camps during the construction phase (Geoff Kingwill – pers. comm).

Increased veld fire risk[13]
The local veld and associated grazing resource largely consists of mixed bossiesveld and grassveld. This allows for year-round utilisation of the grazing resource. The bossiesveld component is crucial to operations during the dry winter season. Bossieveld may take a number of years to recover from veld fires. Fires are currently relatively rare in the study area, and almost exclusively restricted to lighting strikes affecting higher-lying areas (Jason, Judy and Micheal Butterworth, Geoff Kingwill, Reynolds, Wallis – pers. comm).

Nevertheless, farmers are critically dependent on the grazing resource, and any veld fire could have significant negative financial implications for affected farmers. This would include costs associated with buying in fodder and/ or renting grazing elsewhere, or opportunity costs associated with culling herds. Few if any study area farms are currently outfitted with fire-fighting equipment (Reynolds, pers. comm).

Standard EMP measures to prevent and combat veld fires should be implemented. Investment in operational phase fire-fighting equipment could potentially benefit adjacent farmers without such equipment.

Visual and sense of place issues[14]
Visual and sense of place concerns were raised by two adjacent land owners, namely Dr Marais, the owner of Klipplaat, and Mr van Heerden, the owner of Bakensklip. Both owners indicated that prior to the Umsinde project, they were envisaging diversifying their farming operations with eco-tourism for additional financial viability.

The nearest Phase 2 turbines would be located ~2.7 km east of Bakenklip's boundary, and approximately 7 km from the existing (but currently uninhibited) farm house and river valley identified by the owner as a sensitive receptor area. In cumulative terms, Bakensklip would be directly affected by the 132-kV transmission line proposed for Umisnde Phases 1 and 2 (not part of this assessment), and potentially affected by turbines on the approved Ishwati Emoyeni WEF located directly to the west of Bakensklip. The proposed 132 kV transmission line would essentially bisect Bakensklip, affecting the property over a distance of ~8 km.

Klipplaat is located between Umsinde Phase 2 and the approved Ishwati Emoyeni WEF. The closest Phase 2 turbine is proposed <50 m from the boundary. The nearest turbine to the farmstead complex is located ~4.7 km away. The eastern portion of Klipplaat has been earmarked by the owner as most suitable for potentially establishing eco-

[13] Increased risk of veld fires is addressed in the SIA undertaken in December 2015 (Barbour 2015)
[14] Visual and sense of place issues are addressed in the SIA undertaken in December 2015 (Barbour, December 2015)

tourism facilities. Approximately 23 Phase 2 turbines are proposed within 3 km from Klipplaat's eastern boundary. Six turbines would be located within 1 km from the Klipplaat access road off the Swaelkrans road. Klipplaat is not directly affected by the proposed 132 kV Tx line.

Both owners have indicated that, in effect, they would be carrying significant risks in terms of opportunity costs for two large Windlab projects, while not benefiting thereby. Failing some meaningful financial compensation accruing from the Umsinde WEF, both owners strongly object to any turbines which may be visible from Bakensklip, as well as the proposed transmission line, as these would mar the currently undeveloped sense of place, making it less suitable for prospective eco-tourism operations (Marais; van Heerden – pers. comm). Windlab have indicated that both landowners would share in a percentage of revenue from each phase of the Umsinde Emoyeni project regardless whether they have WEF infrastructure on their properties or not. In addition, Mr van Heerden (Bakensklip) would share in the benefits from the neighbouring Ishwati Emoyeni project if it becomes operational.

All other interviewees indicated that the proposed Phase 2 turbine locations would not affect any key vantage points or visually sensitive areas on their properties. Many have noted the long distances to inhabited farmsteads, and the screening provided by the broken nature of the terrain, with nearby hills often intervening or otherwise fragmenting the field of view (Jason, Judy and Micheal Butterworth, Geoff Kingwill, Reynolds, Wallis – pers. comm). The owner of Hartebeesfontein, the only inhabited farmstead within significant proximity (viz. 2 km) of turbines, has indicated that he actually finds the structures pleasing to look at (Hesselink, pers. comm).

The turbines are unlikely to be visible from the R63 and Witteklip road, but would be visible from the Swaelkrans road. As indicated, the Swaelkrans road is currently essentially almost exclusively used by local farmers, and is not currently associated with any bona fide tourism activities or uses.

The nearest significant established eco-tourism related operation is located on Badsfontein to the west of the Phase 1 site. The nearest proposed Phase 2 turbine to the farm house complex on Badsfontein is 15.5 km away. The neatest Phase 2 turbine to Badsfontein's boundary (Farm 26/8) would be located ~5.3 km to the east. Approximately half of Farm 26/8 falls within an 5.3-8 km radius of the nearest turbines. This portion of Badsfontein includes elevated areas used for eco-tourism activities from which Phase 2 turbines may be visible. The access road to Badsfontein (Richmond Road) is located >14 km to the west of the nearest proposed turbine. As the Richmond road would not be impacted by construction traffic, no impacts on the road or dust and noise impacts on Badsfontein farm yard would occur.

COMMENT ON CUMULATIVE IMPACTS

The DEA requires that the potential of cumulative impacts be addressed with specific reference to other existing or proposed Renewable Energy Facilities (REFs) within a 35 km radius from the subject site.

The DEA's Renewable Energy Database (January 2018)[15] indicates that the Umsinde WEF (Phase 1 and 2) site is located within a 35 km radius of at least three other proposed or approved Renewable Energy Facilities. These include the entire site of Windlab's Ishwati Emoyeni WEF, and portions of Mainstream's Victoria West combined Solar and Wind Energy Facility, and the bulk of a site proposed for various phases of Aurora' Betelgeuse Solar Energy Facility. All three REF sites are located to the north-west of the Umsinde WEF site (Figure 7).

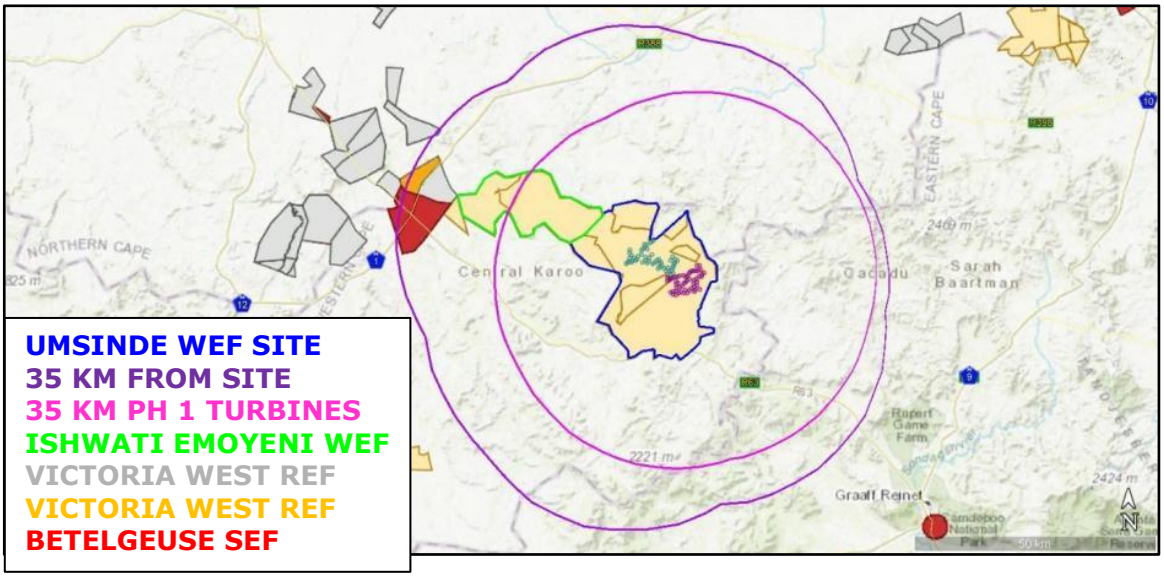

Figure 7: Proposed Umsinde WEF site and Phase 1 turbines (pink dots) in relation to other proposed or approved Renewable Energy Facilities within a 35 km radius

According to the DEA's database, the 140 MW Ishwati Emoyeni WEF and associated transmission line infrastructure has been approved. The database further indicates that Mainstream's Victoria West REF has been approved, as well as three phases (2-4) of Aurora's Betelgeuse SEF. It is unclear whether any of these projects have gained preferred bidder status yet.

While the Mainstream and Aurora REF sites are located at the outer limit of the 35 km radius, the entire Ishwati Emoyeni WEF site is located within 35 km, and the sizeable bulk thereof within 35 km from proposed Phase 1 turbine locations. The nearest Phase 1 (Revised Layout 1) turbine is located ~18 km south-east of the Ishwati Emoyeni WEF site.

The nearest turbines associated with Phase 1 and 2 Revised Layout 1 of the Umsinde WEF are located ~600 m apart. Phase 1 and 2 are therefore likely to be seen as a single, large facility of 110 turbines, with the furthest ones ~32 km apart. As indicated above, the total number of turbine associated with Revised Layout 2 (Phase 1 and 2) is 70.

15 https://dea.maps.arcgis.com/apps/webappviewer/index.html?id=b8452ef22aeb4522953f1fb10e6dc79e.

With the nearest Phase 2 Revised Layout 1 turbine locate ~8.7 km from the Ishwati Emoyeni WEF site, the potential for cumulative impacts does exists. This may be especially applicable to receptors located between the Ishwati Emoyeni WEF site and the Umsinde Phase 2 Revised Layout 1 development area. This would include properties such as Bakensklip, Klipplaat and Badsfontein. Given established and potential eco-tourism-based activities on these properties, they are sensitive to changes in sense of place and visually intrusive infrastructure.

INTERVIEWS

- Butterworth, Mr Jason (22-01-2018). Grootplaas Farm.
- Butterworth, Ms Judy (22-01-2018). Grootplaas Farm.
- Butterworth, Mr Michael (22-01-2018). Grootplaas Farm.
- Hattingh, Ms. Noleen (21-01-2018). Burgershof Guest House, Murraysburg.
- Hesselink, Mr Martin (24-01-2018). Hartebeesfontein Farm, representing Swaelkrans and Kapoksfontein.
- Kingwill, Mr Geoff (22-01-2018). Grand View Farm.
- Kingwill, Mr Kayne (23-01-2018). Middelvlei Farm.
- Marais, Dr A (24-01-2018). Klipplaat Farm.
- Retief, Mr Daniel (22-01-2018). Phillipskraal Farm.
- Reynolds, Mr Percy (22-01-2018). Groot Driefontein Farm.
- Van Heerden, Mr Kobus (23-01-2018). Weltevrede Farm.
- Wallis, Mr Andrew (22-01-2018). Springfontein Farm.

ADDITIONAL I&APS CONTACTED:

- Karoo News Group - no reply to e-mail (18-01-2018) requesting potential meeting to discuss concerns raised during 2016 process; phone number invalid.
- Rubidge, Mr Wayne (Pam Golding Graaff-Reinet) – no reply to e-mail (17-01-2018) or cell phone message (18-01-2018) requesting potential meeting to discuss concerns raised during 2016 process.
- Van der Spuy, Mr. Andre (André van der Spuy Environmental Consultants) – e-mails sent to Mr vd Spuy 18-01-2018 and 25-01-2018; e-mails received from Mr van der Spuy 20-01-2018; 21-01-2018; 22-01-2018.

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- Atchison, (April, 2012). Tourism Impact of Wind Farms: Submitted to Renewables Inquiry Scottish Government. University of Edinburgh
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- Stephen Gibbons (April, 2014): Gone with the wind: Valuing the Visual Impacts of Wind turbines through house prices. London School of Economics and Political Sciences & Spatial Economics Research Centre, SERC Discussion Paper 159;

- Review of the Impact of Wind Farms on Property Values, Urbis Pty Ltd (2016): Commissioned by the Office of Environment and Heritage, NSW, Australia;
- Yasin Sunak and Reinhard Madlener (May 2012): The Impact of Wind Farms on Property Values: A Geographically Weighted Hedonic Pricing. School of Business and Economics / E.ON Energy Research Center, RWTH Aachen University. Model Working Paper No. 3/2012;
- Martin D. Heintzelman and Carrie M. Tuttle (March 3, 2011): Values in the Wind: A Hedonic Analysis of Wind Power Facilities. Economics and Financial Studies School of Business, Clarkson University;
- The potential for local community benefits from wind farms in South Africa, Louise Tait (2012), Master's Thesis, Energy Research Centre University of Cape Town

REVISED LAYOUT 1: PHASE 1 MAPS

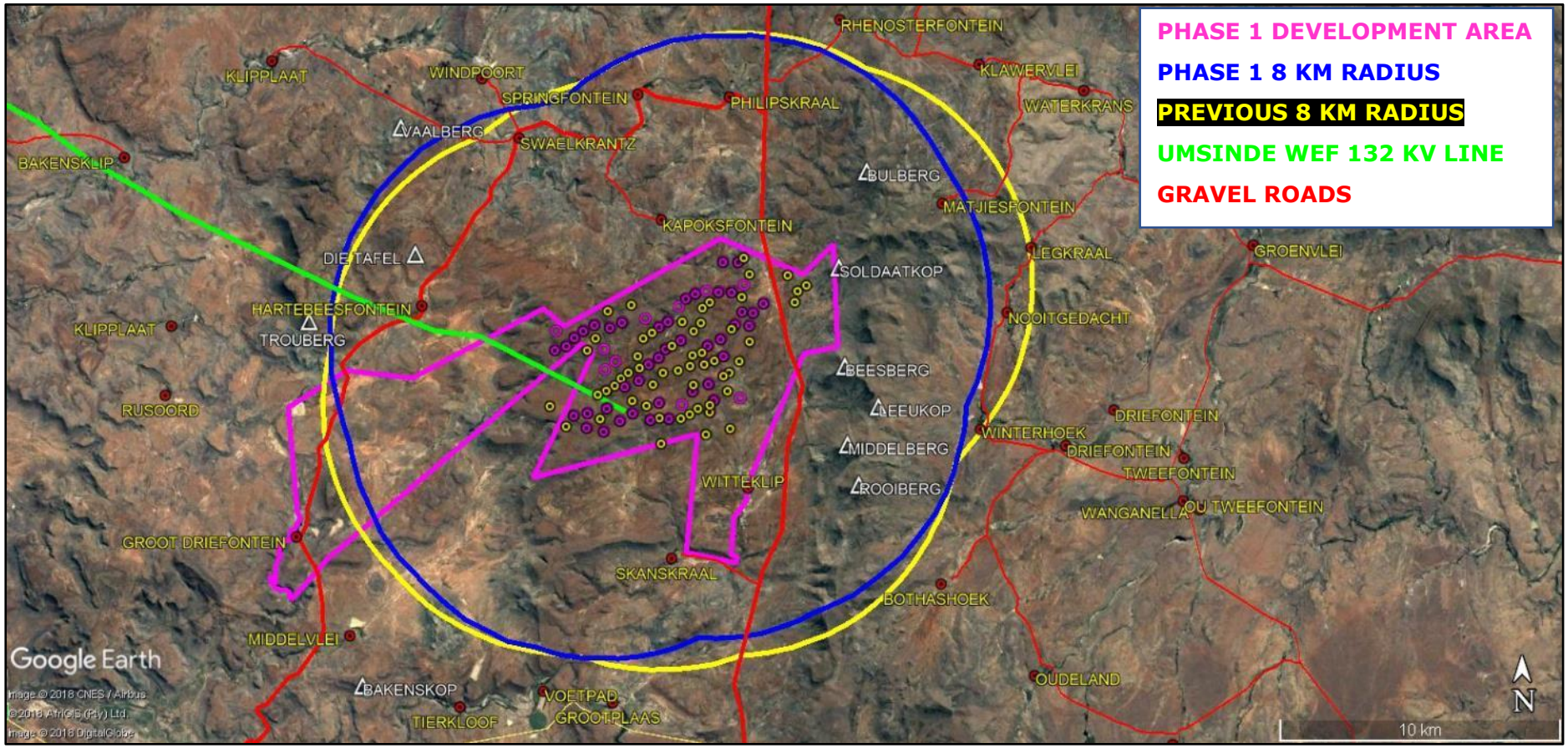

Figure 1: Phase 1 layout change from previous proposal. Open pink circles indicate new turbine locations, pink dots indicate locations which have remained unchanged, and yellow dots indicate locations which have fallen away. 8 km radii from the turbine locations for the previous and current proposals are also indicated[16]

[16] This distance is used by some visual specialists (e.g. SiVest on InnoWind's current applications for the Phezukamoya and San Kraal WEFs near Noupoort) as a rough indication of the distance at which 150 m tall turbine structures typically cease to have significant visual impacts.

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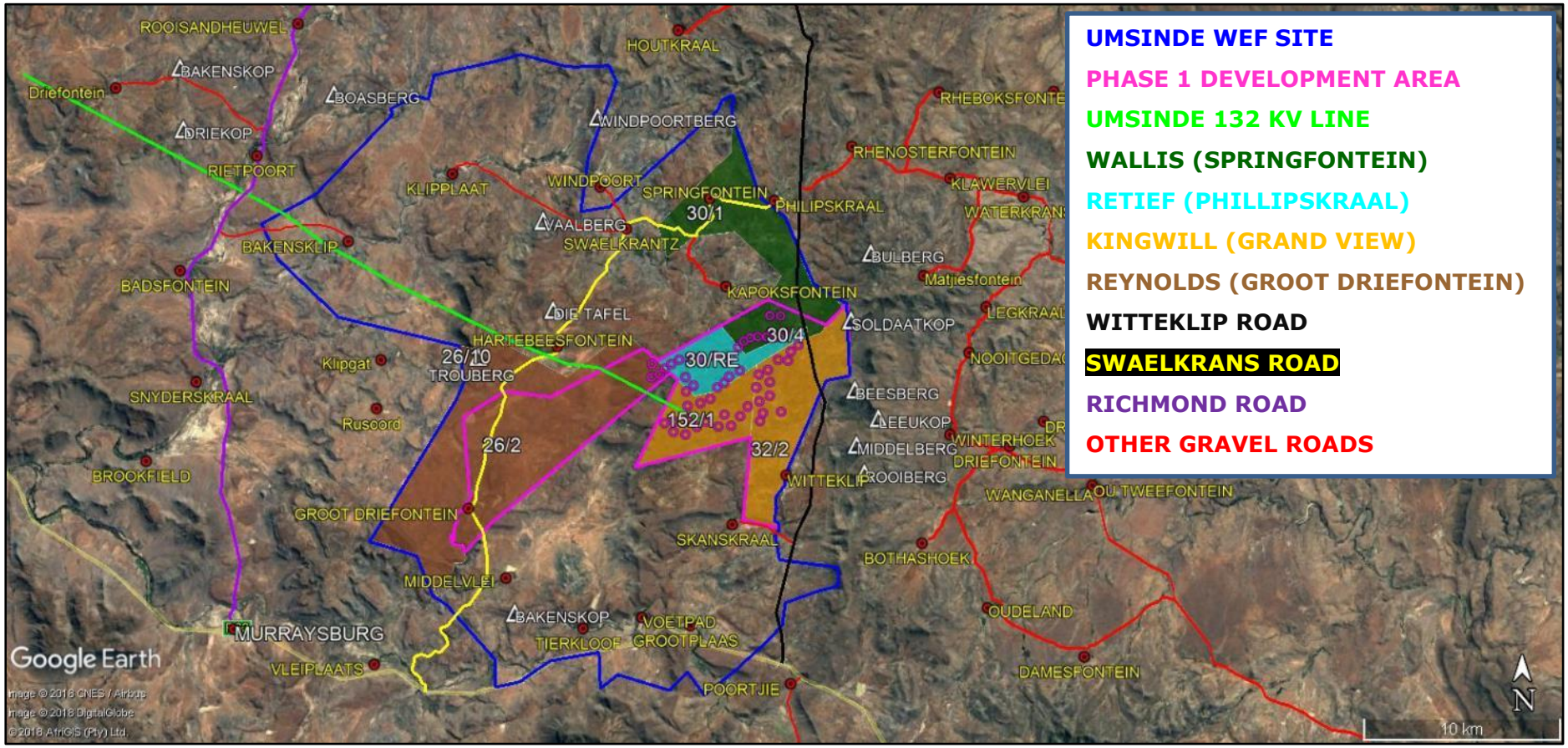

Figure 2: Proposed Umsinde Phase 1 turbine locations (pink circles) in relation to the Umsinde site, Phase 1 development area, directly affected land owners and local roads.

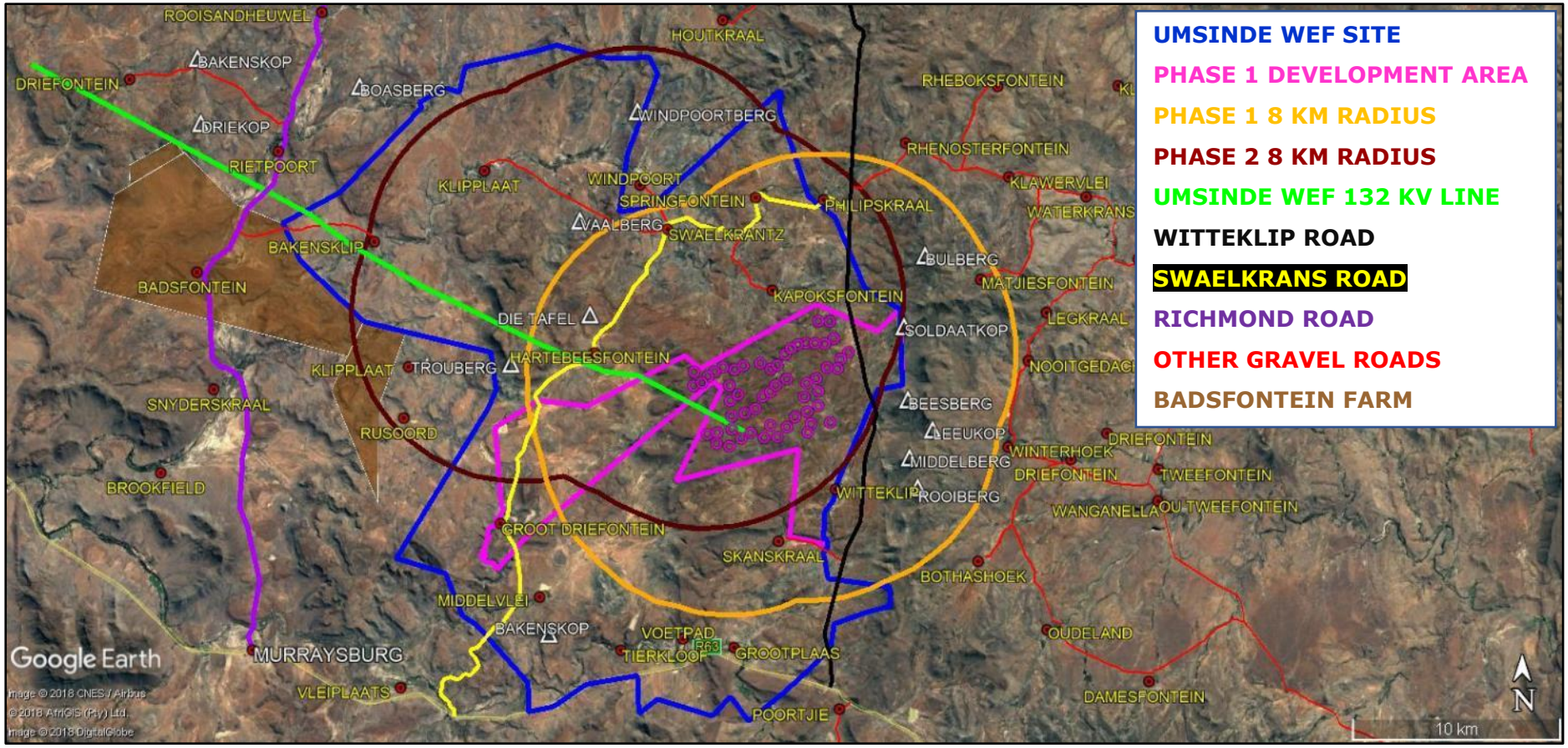

Figure 3: 8 km radius from turbines proposed for Umsinde Phases 1 in relation to local farms and roads. A similar 8 km radius is indicated for Phase 2 in order to illustrate which farms would be affected by both Phases.

REVISED LAYOUT 1: PHASE 2 MAPS

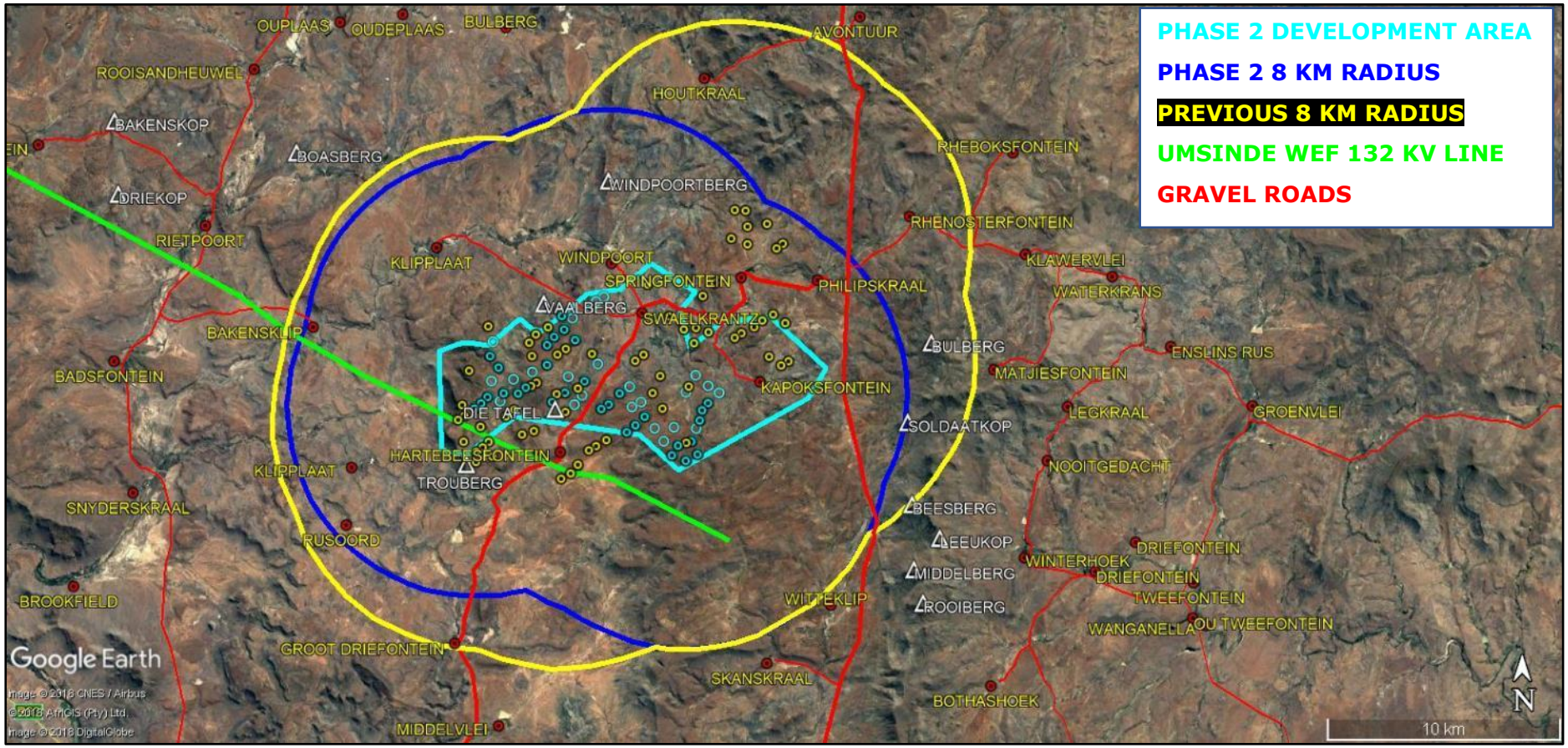

Figure 4: Phase 2 layout change from previous proposal. Open light blue circles indicate new turbine locations, light blue dots indicate locations which have remained unchanged, and yellow dots indicate locations which have fallen away. 8 km radii from the turbine locations for the previous and current proposals are also indicated.

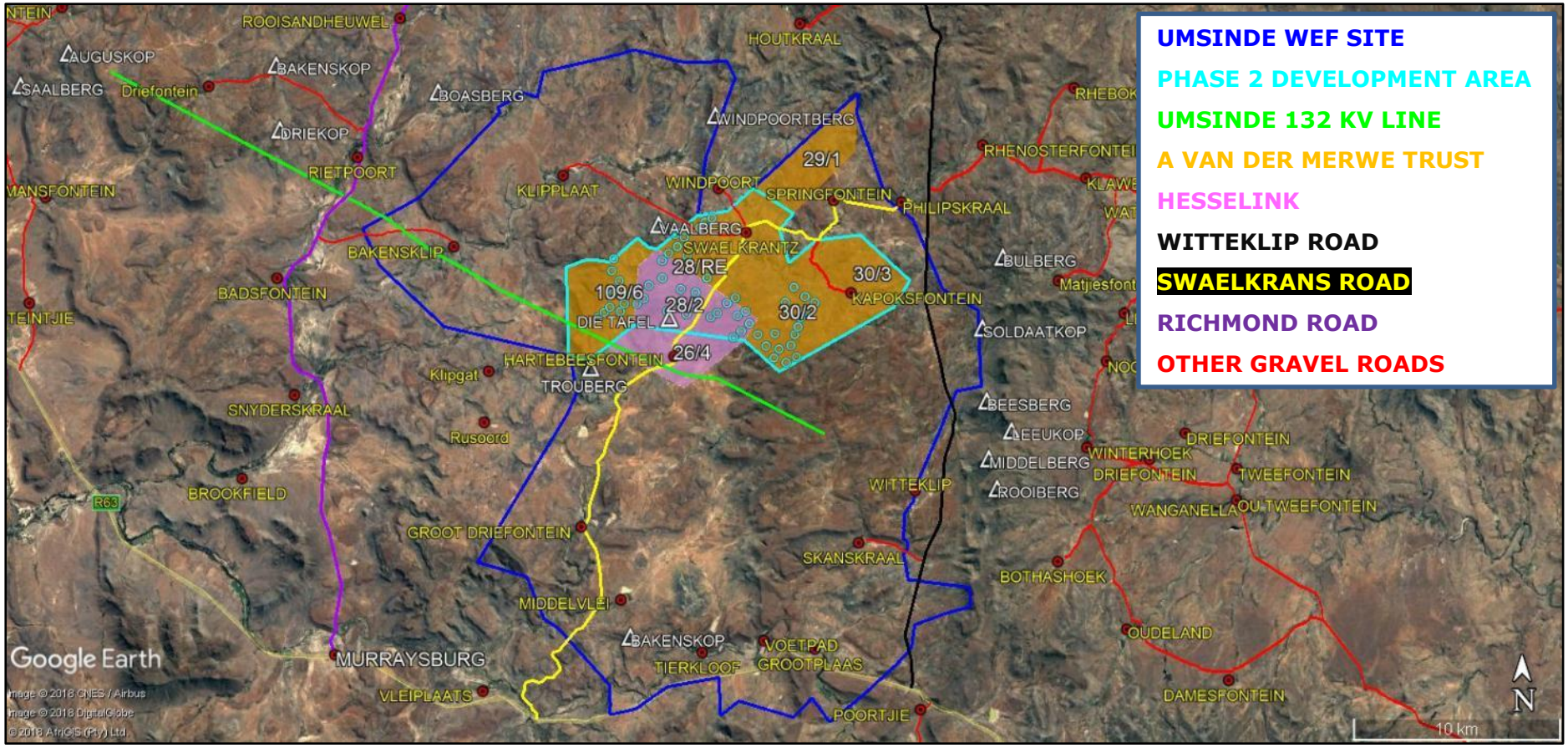

Figure 5: Proposed Umsinde Phase 1 turbine locations (pink circles) in relation to the Umsinde site, Phase 1 development area, directly affected land owners and local roads.

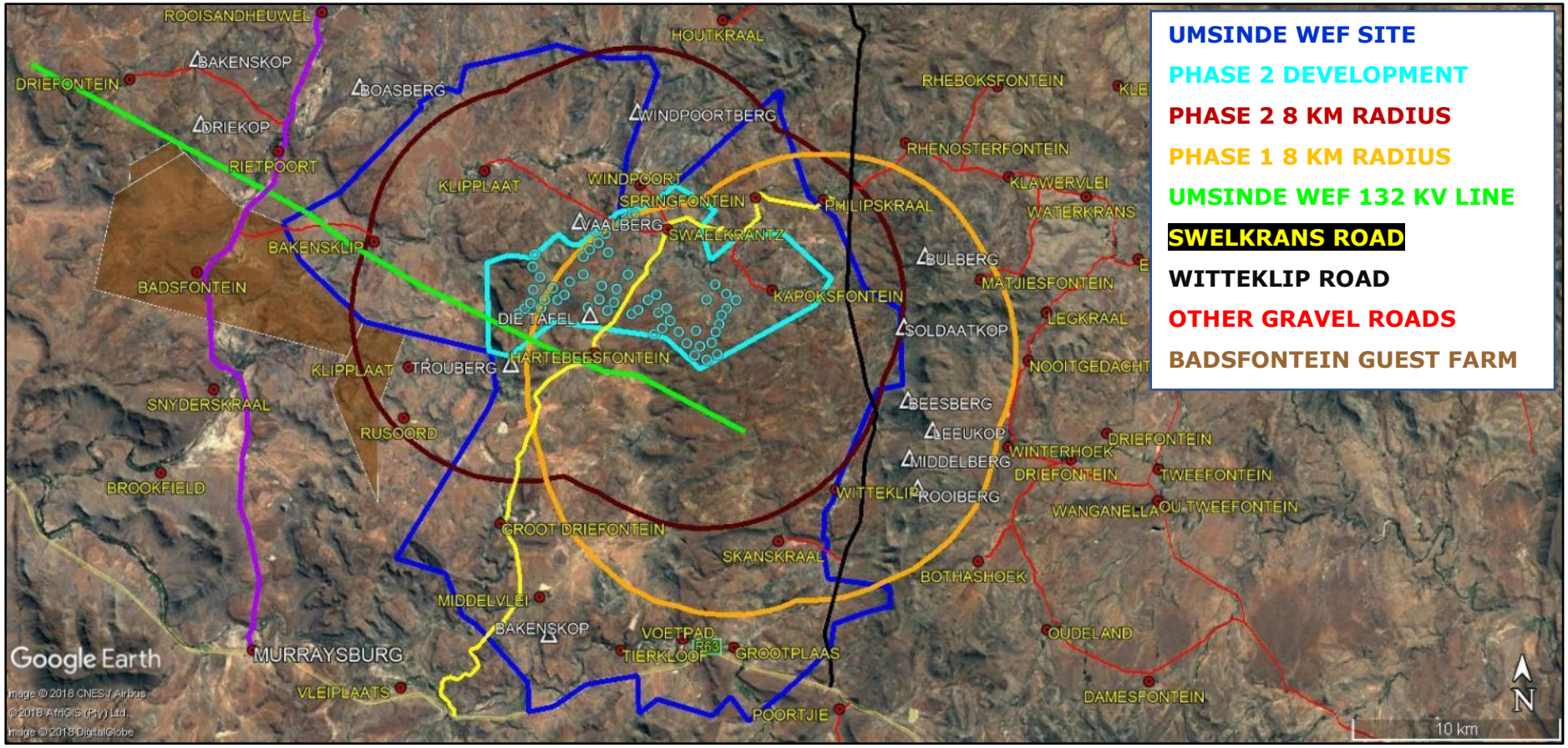

Figure 6: 8 km radius from turbines proposed for Umsinde Phases 2 in relation to local farms and roads. A similar 8 km radius is indicated for Phase 1 in order to illustrate which farms would be affected by both Phases.