TRAFFIC FEASIBILITY STUDY

FOR

PROPOSED DEVELOPMENT

OF THE

MULILO NEWCASTLE WIND POWER

NEWCASTLE

WITHIN

NEWCASTLE LOCAL MUNICIPALITY

SEPTEMBER 2023
(Version 1.2)

PREPARED FOR**:**

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LIST OF ABBREVIATIONS

EIA	Environmental Impact Assessment
MW	Mega Watts
NLM	Newcastle Local Municipality
SANRAL	South African National Roads Agency SOC Limited
TIA	Traffic Impact Assessment
WEF	Wind Energy Facility

1. INTRODUCTION AND BACKGROUND

Emonti Consulting Engineers CC was approached to prepare a Traffic Feasibility Study for the proposed development of the Mulilo Newcastle Wind Power situated within the Newcastle Local Municipality (NLM). It should be noted that this is not a Traffic Impact Assessment (TIA). A TIA is to follow based on the outcome of the overall feasibility of the development and the programming of the development by the Developer.

Following this desktop study, recommendations regarding site access from the public road network, road network improvements, building lines, further traffic related studies, etc., will be made.

The site is located just west of Newcastle, which is situated within the NLM area. A site locality map can be seen in Figure 1.1. The proposed development comprises the implementation of a Wind Energy Facility (WEF).

The Developer plans to develop, construct and operate the WEF located approximately 15km north-west of Newcastle in the KwaZulu-Natal Province.

The Mulilo Newcastle Wind Power will consist of up to 35 turbines. The WEF will be capable of generating a maximum of 200 Mega Watts (MW) of power.

Although the current layout allows a maximum generating output of up to a total of 200 MW for the WEF, the final design may be reduced dependent on the outcome of the specialist studies undertaken during the Environmental Impact Assessment process.

A summary the Mulilo Newcastle Wind Power is included in Appendix C for ease of reference.

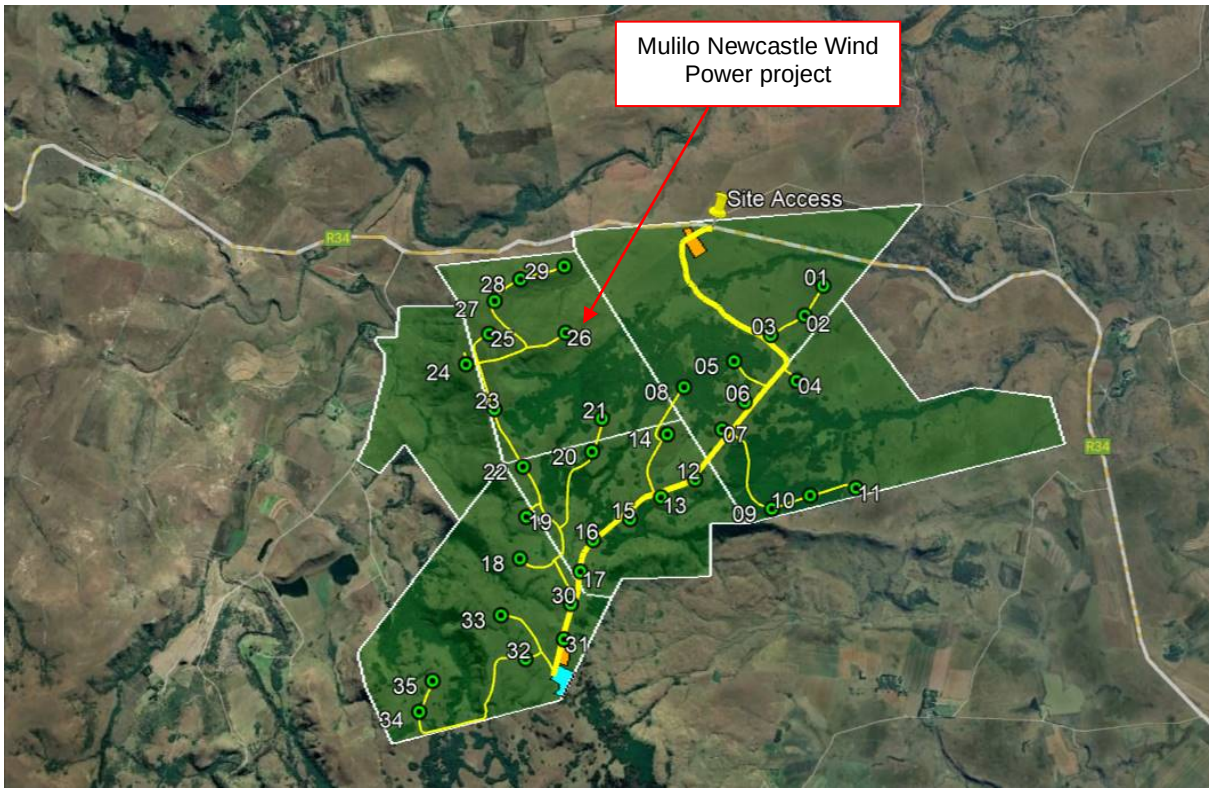


Figure 1.1: Site locality and proposed layout of the wind turbines

2. EXISTING OPERATING CONDITIONS

Capacity

Previous traffic counts that have been made available suggest that sufficient spare capacity exists along the road network to cater for the medium to long term future regarding anticipated traffic growth, including future trips relating to this development. This will however be commented on later in this report and covered in more detail in the TIA, when undertaken.

Cycle and pedestrian facilities

No formalised cycle or facilities are currently available on the surrounding road network. The proposed development is not expected to generate volumes of either cyclists or pedestrians that would warrant the provision of associated facilities.

Public transport facilities

No formalised public transport facilities are currently available on the surrounding road network.

Road condition

The R34 is relatively well maintained and should be capable of accommodating the expected traffic generated by the proposed development, both during the construction and operational stages.

3. TRAFFIC VOLUMES

Current traffic volumes

In order to establish the current traffic conditions relevant traffic count information was used. This traffic count information was obtained from existing traffic count data available. No new traffic counts were undertaken. The volume of traffic on the main road adjacent to the site, i.e., the R34 is relatively low.

From available earlier traffic counts the Average Daily Traffic along the R34 is in the order of 1,500 vehicles per day, of which approximately 200 are heavy vehicles. This suggests that considerable spare capacity exists to accommodate the proposed development.

Generated trips

Based on the size of the development, less than 50 vehicles per hour are expected to be generated, in any given peak period, both for the construction and operational stages. This again implies that spare capacity will exist in the future to accommodate the volume of additional vehicles.

4. INTERNAL CIRCULATION AND PARKING

Parking and loading

The development will not be a major trip generator. As such the demand for parking and loading will be minimal. The period when parking and loading will be at its highest, will be during the construction stage. It should be noted that all the required loading and parking will need to be provided on the site. This will need to be located at the site office and construction compound.

Internal roadways

The internal roadways will be gravel and designed in accordance with the Guidelines for Human Settlement Planning and Design ("The Redbook"), Reference One. Geometric designs of the roads will ensure that the requirements of all types of vehicles expected to visit the site are met, i.e., minimum turning radii, roadway widths, etc. The pavement design will form part of the detailed design stage.

The existing internal roads to be upgraded will be widened to a total width of up to 9m (i.e., 6m for the road surface and 1.5m wide V-drain on both sides of road). In areas where there are no existing roads, new internal roads will be constructed with a final width of up to 9 m to the IPP substation and laydown areas. V-drains will run on both sides of the internal roads.

In certain areas of the site with steep gradients, the internal roads may require cut and fill, which could extend the final width of the road to 12m.

5. ACCESS PROPOSALS

The proposed access to the site is via one new proposed access along the R34. The position of the proposed access is shown in Figure 5.1.

The current speed limit along the R34 is 100km/h. The intersection sight distance appears to be adequate at all the proposed intersections. However, during the entry and exiting of the abnormal

loads special measures will need to be implemented in order to facilitate the turning movements which take longer than normal. These measures will be addressed in the detailed traffic management plan to be undertaken at a later stage.

It should be noted that the proposed access to be used should be that of a general "farm" type access, which will need to be temporarily improved in order to facilitate the expected abnormal loads during the construction stage.

Proposed access along the R34

6. ROAD IMPROVEMENTS

The anticipated impact of the proposed development varies depending on the road segment under review. From the initial review, the following road improvements are most likely to be required to accommodate the development:

i. Localised temporary access widening at the proposed access onto the R34.
ii. Construction of an access road and internal roads to Redbook standards.
iii. The introduction of an access gate to prevent livestock from accessing the R34. The position of the access gate should be located at a minimum distance of 20m from the R34 edge of tar.

7. BUILDING LINES

Generally building lines along roads vary, based on the following:

i. whether they are rural or urban, and
ii. type of development (e.g., residential, commercial, etc.).

In addition to the above, road authorities generally have larger building lines for WEFs. These do change from time to time, but the information currently available indicated the following building lines for wind farms:

i. An absolute minimum offset of tip height plus 10% of the wind turbines may be considered but a desirable offset of tip height plus 50% is favoured to avoid the fall out of parts that might be flung around if a mast falls over. In this regard, the minimum offset of tip height plus 50% of the wind turbines equates to 322.5m.
ii. All other structures shall be erected at least 60m from a national or provincial road reserve fence and 500m from an intersection.

Currently it is proposed that the closest wind turbine be approximately 330m from the nearest provincial road, the R34, which is further than the minimum 322.5m, thus satisfying this minimum requirement.

8. ABNORMAL LOADS TRANSPORTED ON NATIONAL ROADS

As abnormal loads have to be transported by road to the site, a ***permit*** will need to be obtained from the Provincial Department of Transport.

In addition, SANRAL require a ***route clearance report*** to be undertaken. This will be done at a later stage of the planning process. The requirements of the route clearance report are included in Appendix B, which includes the following:
i. Delay to Road Users.
ii. Road Closures.
iii. Road Construction works.
iv. Wide Loads.
v. Monitoring and Records.

It should be noted that SANRAL reserves the right to oppose any issued abnormal load permit in the event of any un-envisioned delay or disruption to public road users on National roads, or in the event that the carrier does not consistently meet the requirements as set out in Appendix B.

9. CONCLUSIONS

Following the desktop investigation, it is concluded that:
i. The current road network is sufficient to cater for this development, subject to certain improvements/amendments being implemented.
ii. Certain localised road improvements may be required in order to facilitate the temporary accesses to the site to accommodate the expected abnormal loads.

It is noted that there is a link between the following four Mulilo Newcastle Wind Power projects:
i. Mulilo Newcastle Wind Power (Pty) Ltd (northern WEF);
ii. Mulilo Newcastle Wind Power 2 (Pty) Ltd (southern WEF);
iii. Mulilo Newcastle Wind Power (Pty) Ltd grid connection; and
iv. Mulilo Newcastle Wind Power 2 (Pty) Ltd grid connection.

The impact of each project has been reviewed independently and included in separate reports. Due to the limited impact of each project on the surrounding road network and the commonality between the various projects, the cumulative impact of the four projects will be able to be accommodated by implementing the recommendations contained herein and within the other reports.

10. RECOMMENDATIONS

Based on the desktop investigation and conclusions it is recommended that:

i. This Traffic Feasibility Study being included as part of the overall Feasibility Report for the development.

ii. The following are the most likely conditions that would be imposed on the development by the relevant road authority/ies. ***(It should however be noted that these improvements may change subject to the findings of the TIA and subsequent consultation with the relevant road authority/ies):***

a. The internal roads will be gravel, the designs of which will be determined at the detailed design stage. The roads will be constructed in a phased manner according to the phasing of the development.

b. Access to the site will be via one proposed new access along the R34.

c. A minimum building line of 322.5m (i.e., tip height of the wind turbine plus 50%).

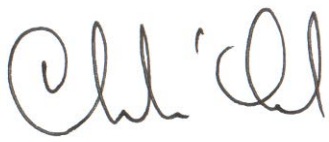
d. All other structures shall be erected at least 60m from the provincial road reserve fence and 500m from an intersection.

e. A traffic management plan being implemented during the construction stage to assist construction vehicles in entering/exiting the site.

f. A detailed Traffic Impact Assessment being undertaken as part of the planning stage of the proposed WEF.

g. A detailed route clearance report will need to be undertaken as part of the planning stage of the proposed WEF.

The combined impact of the four Mulilo Newcastle Wind Power projects will be able to be accommodated by implementing the recommendations contained above and within the other reports.



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11. REFERENCES

Reference 1 Guidelines for Human Settlement Planning and Design ("The Redbook")

APPENDIX A

FIGURES

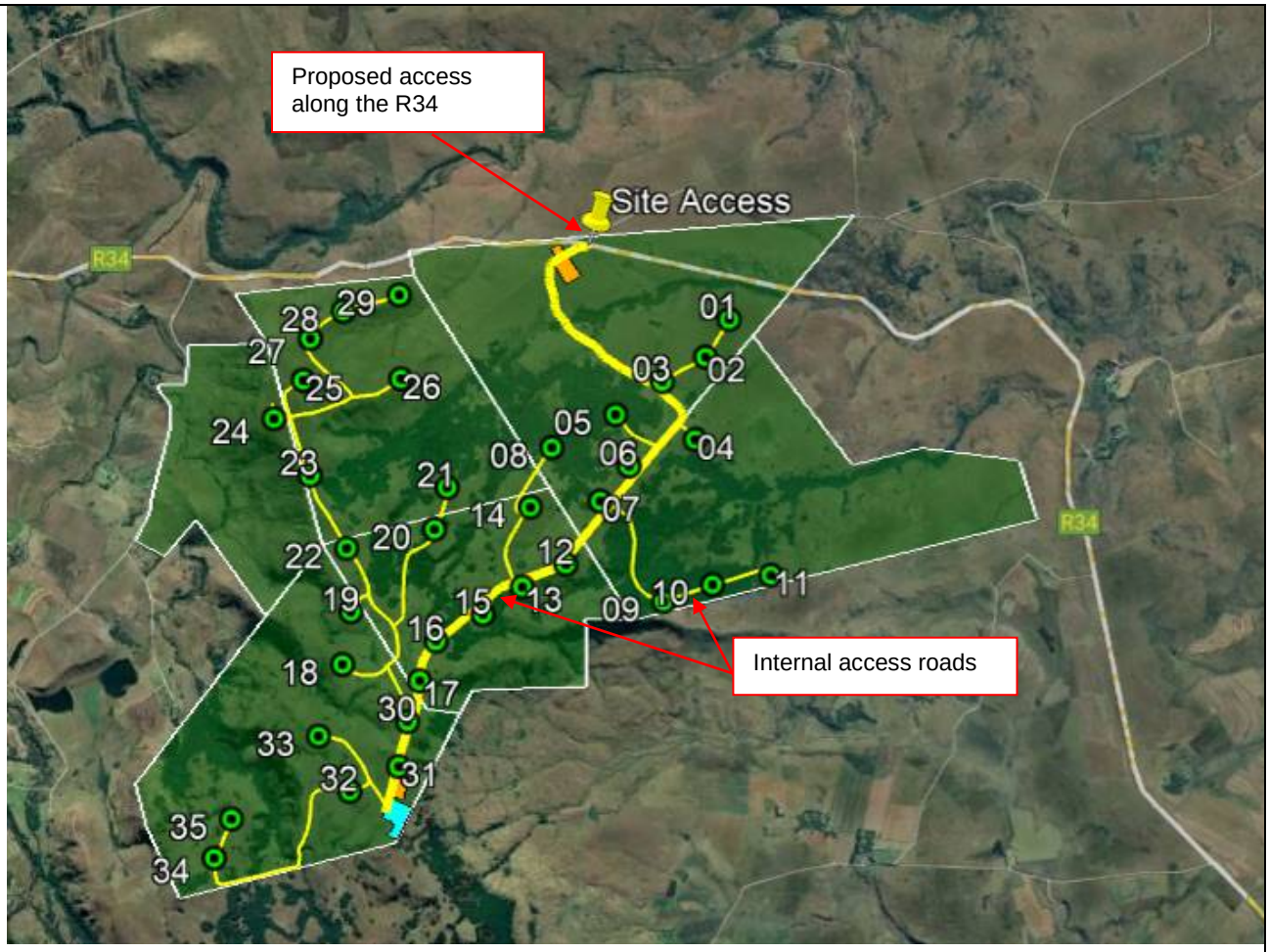

Figure 5.1: Proposed access

APPENDIX B

ABNORMAL LOADS TRANSPORTED ON NATIONAL ROADS

Conditions to carriers of frequent abnormal loads for wind turbines to be included into the route clearance report and abnormal load permits

The statement by the Professional Engineer regarding road safety and traffic engineering aspects shall ensure that the transportation of the intended abnormal loads shall conform to the maximum impacts on road users as detailed below. In order to assist the analysis of traffic impacts, SANRAL traffic monitoring information is available for use.

i. Delay to Road Users:

- Queue lengths: not more than 6 vehicles for longer than 1km should follow behind the abnormal load train without being afforded the opportunity to overtake.
- No single vehicle may follow the abnormal train for more than 5km without being afforded the opportunity to overtake.
- Assessment of the national road constraints and road user trends to be done to plan abnormal passage and to minimise delays to the public road users.
- Utilisation of climbing lanes, rest areas and additional constructed pull-off areas must be actively planned to achieve overtaking of the abnormal train.
- The above requirements must apply in all weather conditions.

ii. Road Closures:

- No longer than 3 hours of accumulated closures per week for all abnormal passage/ all carriers on a road link of 200km shall be permitted. (On mountain pass closures, this closure time could be extended to 6 hours accumulated per week, which closure would be required mainly for the long loads around small radius curves.)
- The carrier must co-ordinate long closures (excess of 1 hour) with other Road Authorities as well as SANRAL construction projects where blasting or other closures could be undertaken. Advance warning of repetitive closures in excess of 15 minutes must be signposted, and signing to be approved by SANRAL. Where abnormal closures and construction closures are located within 50km, they must in all instances be co-ordinated.

iii. Road Construction works:

- The carrier shall liaise continuously at projects of road construction sites to ensure passage of abnormal loads at construction works constraints (which change regularly) and potential damage to temporary bypasses. Should alteration of construction works be required by the carrier, the carrier shall liaise with the Engineer supervising the construction project and be required to pay for any alterations, disruptions or construction delays which may be caused. SANRAL reserves the right to limit passage on construction works to non-abnormal vehicles dimensions and loads, unless suitable arrangements have been made to allow for the passage of abnormal vehicles and loads. Contact details of SANRAL construction projects are available from the relevant SANRAL Regional offices.

iv Wide Loads:

- Unless other acceptable arrangements are provided to SANRAL, abnormally wide loads along two directional roads, where the abnormal width plus 0.4m is in excess of half the surfaced road width, must be done under stop/go conditions, not longer than 5 km in length. Public vehicles in both directions shall be afforded the opportunity to overtake the abnormal load at the stop/go point. For lesser trafficked roads, and with SANRAL approval, the delay

impact criteria (number of vehicles in queue and length of following) may be used instead of the 5km stop/go length criteria.

- Under conditions of reduced visibility, abnormally wide loads in the above stated vehicle width /road width limit should not be transported.

v. Monitoring and Records:

- The carrier shall ensure that all dangerous/illegal overtaking of the abnormal load and train are recorded, and provided to SANRAL on request.
- The carrier shall ensure that all deviations to these requirements are recorded, and provided to SANRAL on request.
- The carrier shall ensure that all newly identified risks are recorded and conveyed to Provincial Roads Authority and to SANRAL, and negative impacts are mitigated.

vi. General:

- The detailed route description for each type of abnormal load, frequency and general travel times must be submitted to SANRAL for assessment. Periods of high or peak traffic flows must be identified and avoided as much as possible.
- The route clearance statement for each type of abnormal load must be included in the report to be submitted to SANRAL for assessment, which must incorporate the above requirements.
- A statement of passage of dimensional and mass abnormal loads over /under structures and bridges must be submitted to SANRAL for consideration, with protective measures where required.
- The modification of National Road infrastructure for the passage of abnormal loads requires separate consents by SANRAL.
- SANRAL approval shall be required in the event of abnormal loads being planned to overnight on a consistent basis, within National Road reserves.
- The carrier must indicate what advertising will be done to warn to road users, nationally, of the impacts of the abnormal load passage, as well as indicating alternate routes. This must be done on a continuous basis as the transport of abnormal loading unfolds.
- Provision for curtailing of transportation of abnormal loads in adverse weather conditions, and measures to be undertaken in the event of incidents such as crashes and breakdowns must be included in the planning.
- SANRAL reserves the right to oppose any issued abnormal load permit in the event of any un-envisioned delay or disruption to public road users on National roads, or in the event that the carrier consistently not meeting the above requirements.

APPENDIX C

DESCRIPTION OF DEVELOPMENT

Mulilo Newcastle Wind Power

The Mulilo Newcastle Wind Power project will consist of up to thirty-five (35) wind turbine generators. The current layout allows for a maximum generating output of up to 200 MW, however the final design will be reduced based on the outcome of the specialist studies undertaken during the EIA process.

Turbine and WEF specifications

Component	Specification
WEF Capacity	Up to 200 MW
Number of Turbines	Up to 35 turbines
Power output per turbine	Unspecified
Hub Height	Up to 140 m
Rotor Diameter	Up to 200 m
Blade length	Up to 100 m
Turbine tip height	Up to 240 m

Facility component descriptions

Facility Component	Description
Crane platform and hardstand area	Crane platform and hardstand laydown for each turbine position.
Turbine Foundations	Reinforced Concrete Foundation. Depth: up to 3.5 m Diameter: up to 30 m per turbine Volume of concrete: up to 800 m^3 per turbine.
IPP Substation	33 kV to 132 kV collector substation to receive, convert and step-up electricity from the WEF to the 132 kV grid suitable supply. The substation's maximum height will be the Lightning Mast up to 25 m high. The facility will house control rooms and grid control yards for both Eskom and the IPP. Additional infrastructure includes parking, up to 2.8 m high fencing, stormwater channels and culverts, ablutions, water storage tanks, septic tanks, and boreholes.
Construction/office yard	This includes bunded fuel areas, oil storage areas, general stores (containers) and skips.
WTG component laydown area	Temporary laydown area.
On-site concrete batching plant	Temporary on-site concrete batching plant.
Primary Site Access Roads	Site access will, where possible, make use of existing farm roads that will be upgraded and maintained for the life of the WEF. The existing roads to be upgraded will be expanded to a width of up to 9 m. New roads will be constructed (in areas where there are no existing roads) with a final width of up to 9 m to the IPP substation and laydown areas.

Facility Component	Description
	V-drains will run on both sides of the road. In certain areas of steep slopes, the constructed road will require cut and fill which will extend the final 12m total width of the road during operations.
Internal roads	Roads connecting the turbine positions will where possible make use of existing farm roads that will be upgraded and maintained for the life of the plant. The existing roads to be upgraded will be expanded to a width of up to 6 m. New roads will be constructed (in areas where there are no existing roads) with a width of up to 6 m and will connect all turbines. V-drains will run on both sides of the road. In certain areas of steep slopes, the constructed road will require cut and fill which will extend the final 9m total width of the road during operations.
33 kV reticulation	A combination of 33 kV overhead lines and 33 kV underground cable (where technically feasible) will be used, aligned along the road network connecting each WTG position to the IPP substation.
Operations and maintenance (O&M) buildings	Includes other infrastructure such as parking, up to 2.8 m high fencing, stormwater channels and culverts, ablutions, water storage tanks, septic tanks and boreholes.
Met masts	Two met masts (Up to 140 m height).

Facility Component Footprints

Facility Component	Construction footprint	Final footprint after rehabilitation
Crane platform and hardstand area	Up to 0.8 ha per turbine which equates to up to 28 ha.	Up to 0.8 ha per turbine which equates to 28 ha.
Turbine foundations	Up to 0.07 ha per turbine which equates to up to 2.5 ha (included in hardstand area).	Up to 0.07 ha per turbine which equates to 2.5 ha (Included in hardstand area).
IPP substation	Up to 1 ha	Up to 1 ha
Construction/office yard	Up to 4 ha	0 ha
WTG component laydown area	Up to 4 ha	0 ha
On-site concrete batching plant	Up to 1 ha	0 ha
Temporary stockpiles	Up to 2 ha	0 ha
Primary site access road and reticulation	Total width of up to 15 m consisting of: • Up to 12 m wide area prepared for road and v-drain • Up to 3 m width for underground 33 kV reticulation. Overhead lines to be used where underground cables are not technically feasible. Total length up to 8.5 km which equates to up to 13 ha.	Total width of up to 12 m consisting of: • Up to 9 m wide road • Up to 1.5 m wide v-drain on either side of road Total length up to 8.5 km, which equates to up to 10.5 ha. 33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 0.25 ha to account for cable markers and/or overhead line foundations and stays along primary site access roads.
Internal roads and reticulation	Total width of up to 12 m consisting of: • Up to 9 m wide area prepared for road and v-drain • Up to 3 m wide area for underground 33 kV reticulation. Overhead lines to be used	Total width of up to 9 m consisting of: • Up to 6 m wide road • Up to 1.5 m wide v-drain on either side of road Total length up to 25 km, which equates to up to

Facility Component	Construction footprint	Final footprint after rehabilitation
	where underground cables are not technically feasible. Total length up to 25 km which equates to up to 30 ha.	22.5 ha. 33 kV underground / overhead line reticulation and stockpile areas to be rehabilitated. Final footprint up to 1 ha to account for cable markers and/or overhead line foundations and stays along internal roads.
Operations and maintenance (O&M) buildings	Up to 0.5 ha	Up to 0.5 ha
Met masts	Up to 0.002 ha per met mast which equates to 0.004 ha.	Up to 0.002 ha per met mast which equates to 0.004 ha.
Total	**Up to approximately 86 ha**	**Up to approximately 65 ha**

Project Properties

Farm No.	Property	Size of property [ha]
1/3350	Portion 1 of the Farm Geelhoutboom No. 3350	647,4976
RE/9447	Remainder Farm Bernard No. 9447	464,8652
RE/9439	Remainder Farm Cliffdale No. 9439	587,2398
RE/16302	Remainder Farm Spitskop No. 16302	280,4491
RE/9448	Remainder Farm Byron No. 9448	392,2519
RE/3350	Remainder Farm Geelhoutboom No. 3350	566,9043