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Transport Impact Statement

De Aar 2 South WEF EA Amendment Application

De Aar, Northern Cape

November 2022

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Report Type	Transport Impact Statement
Title	De Aar 2 South WEF EA Amendment Application
Client	Mulilo Renewable Project Developments (Pty) Ltd
Location	De Aar, Northern Cape
Project Team	Christoff Krogscheepers, Pr. Eng Pieter Arangie Theodore Neels
Project Number	ITS 4502
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This transport impact study was prepared in accordance with the South African Traffic Impact and Site Traffic Assessment Manual (TMH 16, COTO, Aug 2012), by a suitably qualified and registered professional traffic engineer. Details of any of the calculations on which the results in this report are based will be made available on request.

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Abbreviations

AASHTO - American Association of State Highway and Transportation Officials (Standards)

AMG – Access Management Guidelines (Western Cape Government)

CM – Critical Movement

DR – Divisional Road

HCM – Highway Capacity Manual

LOS – Level of Service

MOE – Measures of Efficiency

MR – Provincial Main Road

OP – Minor Road (Ondergeskikte Pad)

RAP&G – Road Access Policy and Guidelines

SATGR – South African Trip Generation Rates

SDP – Site Development Plan

SSD – Shoulder Sight Distance

TIA – Traffic Impact Assessment

UTG – Department of Transport Urban Transport Guideline

1.0 INTRODUCTION

The De Aar 2 South Wind Energy Facility (WEF) was originally approved in 2013 for a total number of 103 turbines, and later reduced to between 25 – 61 in 2016. The initial Environmental Impact Assessment (EIA) was conducted in the year 2012. It is now proposed to reduce the number of turbines to a total of up to 26 turbines. A Transport and Traffic Management Plan (TMP) was recently prepared for the De Aar 2 South WEF during November 2022 (as part of the EMPr update and Layout Plan finalisation process). Please also refer to the November 2022 TMP, as most of the transport impact aspects are also addressed in the TMP. See the document attached in Appendix C.

2.0 LOCALITY

The De Aar 2 South WEF is located approximately 20km east of the town De Aar. The WEF will be constructed on the eastern plateau of De Aar. Refer to **Figure 1** in Appendix A for a Locality Plan.

3.0 PROPOSED DEVELOPMENT

The Applicant proposes the following amendments to the Environmental Authorisation of the De Aar 2 South WEF:

- Proposed extension of the EA validity by 2 years from current expiry date of 01 March 2023, to 01 March 2025.
- Proposed amendments to the project description in the EA:
    - Reducing the number of turbines from the authorised “25 – 61” to “up to 26”.
    - New roads: 6m width (i.e. amend from the authorised “4m wide” roads to 6m wide roads);
    - Upgrading sections of existing roads: 6m width (i.e. amend from estimated “4m width”, to 6m width.
    - Foundations: Change from the authorised “18.4m in diameter that narrows up to 10.6m at the surface (the visible portion) with a depth of 3.5 once completed”, to foundations up to maximum 24m diameter at lowest point and up to 12m diameter at surface.
    - Hardstands: Change from the authorised “A permanent hard standing made of compacted gravel and approximately 50 m x 40 m would be constructed adjacent to each turbine location for the crane", to hardstands with approximate footprint up to 0.47 ha per WTG adjacent to and surrounding each WTG.
    - IPP Substation Control and O&M building: No changes to the development footprint are proposed, however amendment to the co-ordinates of the substation in the EA are proposed.
    - Temporary Laydown Areas: No changes to the development footprint are

proposed, but further detail to be included in the EA (i.e. WTG component laydown, concrete batching plant, office yard).
    - Internal reticulation: Change from the authorised "22 kV" to 33 kV.
    - Removing the specified MW generation capacity per turbine (currently stipulated as "2.3MW – 6.0MW") to facilitate selection of the optimum wind turbine available at design phase.
    - Inclusion of the words "up to" in front of the currently authorised turbine specifications for hub height and rotor diameter to allow for smaller turbines to be installed, if required, due to suppliers.
- Addition of Portion 7 of Farm Vendussie Kuil No. 165 into the EA (given that a section of a proposed road would cross the corner of Portion 7 of Farm No. 165, which is currently not included in the EA).
- Proposed amendment to include an erroneously omitted Listed Activity (Activity 15 of GN R. 545 (Listing Notice 2)) into the EA (i.e. request for correction in terms of NEMA Section 47A(1)(b) and EIA Regulation (27(4)).

The De Aar 2 South WEF will consist of a total of up to 26 turbines with a total generation capacity of up to 140MW. The turbines will be mounted on cylindrical steel or concrete towers with a maximum hub height of up to 120 metres. Each turbine rotor has three blades with a maximum rotor diameter of up to 165 metres.

Components to be imported will be shipped to either Coega, Richards Bay, Cape Town or Saldanha Bay harbours and then transported by road, a distance varying between approximately 535km and 885km respectively. The distance is based on which harbour the components are imported to. Specialised high lifting and heavy load capacity cranes will be utilised to erect the turbines.

The wind farm will be built in one phase, with a total construction period of between 18 to 24 months.

Refer to **Figure 2** in Appendix A for the proposed Final Site Layout Plan.

4.0 Terms of Reference

Provision of a specialist statement for the Application for Amendment of the Environmental Authorisation, including the following, where relevant:

- Describe the status (baseline) of the environment that was assessed during the initial assessment.
- Confirm the current status of the assessed environment.
- A description and assessment of any changes to the environment that has occurred since the initial EA was issued, if any;
- Indicate if the impact rating as provided in the initial assessment remains valid; if the mitigation measures provided in the initial assessment are still applicable; or if there are any new mitigation measures which need to be included into the EA/EMPr, should the request to extend the commencement period, and other proposed amendments, be granted by the Department;
- An indication if there are any new assessments and/or guidelines which are now relevant to the authorised development which were not undertaken as part of the initial assessment, must be taken into consideration and addressed in the specialist statement/ report;
- A description and an assessment of the surrounding environment, in relation to new developments or changes in land use which might impact on the authorised project, the assessment must consider the following:
    - Similar developments within a 30km radius (info obtained from DFFE Screening Tool);
    - Identified cumulative impacts must be clearly defined, and where possible the size of the identified impact must be quantified and indicated, i.e., hectares of cumulatively transformed land.
    - Detailed process flow and proof must be provided, to indicate how the specialist's recommendations, mitigation measures and conclusions from the various similar developments in the area were taken into consideration in the assessment of cumulative impacts and when the conclusion and mitigation measures were drafted for this project.
    - The cumulative impacts significance rating must also inform the need and desirability of the proposed development.
    - A cumulative impact environmental statement on whether the proposed development must proceed.
- The study must conclude the following:

- Has the baseline status of the receiving environment changed significantly since the original EIA in 2012?
- Is the initial impact rating undertaken during the initial assessment still valid? (Confirm whether or not the proposed amendments would result in an increased level or change in the nature of impacts).
- Are the mitigation measures provided in the initial assessment (or subsequent updated assessments) still applicable?
- Are there any new mitigation measures that should be added to the EA/ EMPr if the DFFE decides to approve the amendments?
- Describe any update/new mitigations (or refer to your inputs for the EMPr update report), where relevant.
- Are the proposed amendments, including proposed extension of the validity period, acceptable (relative to your area of expertise)?

5.0 TRAFFIC ANALYSIS SCOPE

This report evaluates the expected traffic impact of the proposed amendments during the construction phase and during the operational phase.

The report is based on existing available information on the road network, road condition information obtained during site visits and an assessment of the expected traffic volumes generated by the construction and operational phases of the proposed De Aar 2 South WEF.

6.0 EXISTING CONDITIONS

The roads included in this study and the existing roadway characteristics are summarised in **Table 1**.

Table 1: Existing Roadway Facilities

Roadway	Type of Road	Posted Speed (km/h)	Road Surface
N10	National Road	120	Paved/Tar
R389	Provincial Road	100	Paved/Tar
Kranskop Road	Provincial Road	Not posted	Gravel

6.1 Existing Cross Sections and Surface Conditions

The N10 is an undivided two-lane road with paved shoulders. The road surface is in a fair condition for the section between Hanover and De Aar. The R389 is an undivided two-lane road with gravel shoulders. The road is in a fair condition, a section of the road has recently been resurfaced. Kranskop Road is an 8m wide gravel road. The road surface is in a fair condition.

The typical cross-section and surface condition of the roads in the site vicinity are shown in **Photos 1** to **4** in Appendix B.

6.2 Existing Traffic Volumes

The existing traffic conditions are based on the traffic volumes extracted from the SANRAL Comprehensive Traffic Observation (CTO) Stations and Provincial count stations in the area. To illustrate the change in traffic volumes since the original assessment the table below shows the year 2012 and the current traffic volumes. Table 2 below shows the annual average daily traffic volumes (AADT), the annual daily truck traffic (ADTT) volumes and the peak hour volumes on the road network in the wind farm site vicinity.

Table 2: Existing Traffic Volumes

Roadway	AADT		ADTT		Peak Hour Volume		% Heavy Vehicles	
	2012	2022	2012	2022	2012	2022	2012	2022
N1	2 344	2 525	938	1 195	255	275	40%	47%
N10	468	650	59	205	58	135	13	30%
R389	48	68	10	17	6	10	20	25%
Kranskop Road	<50	<50	<10	<10	<10	<10	20%	20%

The existing traffic volumes along the surrounding road network are low and the existing traffic volumes will not be any reason for concern in terms of the expected transport impact associated with the proposed development.

7.0 SITE ACCESS

Access to the site will be off the existing Kranskop gravel road. **Photos 5** and **6** in Appendix B show the available shoulder sight distances (SSD) along the R389 from the Kranskop Road intersection. The SSD in both directions is more than 300 metres, which is sufficient.

Private roads and local access roads should be upgraded to at least 6 metres wide, to accommodate the abnormal load vehicles.

8.0 TRANSPORT ROUTE

There are three alternative routes between Coega harbour and the site. Alternative 1 (±477km)

follows the N10 from Coega to Hanover and then to the site. Alternative 2 (±508km) and Alternative 3 (±574km) follow the R334 to Uitenhage, then the R75 via Jansenville to Graaff-Reinett. From Graaf-Reinett Alternative 2 goes via the N9 up to the N10 at Middelburg, then via the N10 to Hanover and then to site. Alternative 3 continues via the R63 from Graaf-Reinett up to the N1 and then via the N1 to Hanover and then to the site.

Alternative 4 (±1 500km) is from the Richards Bay harbour. The route follows the N2 southbound up to Stanger, then follows the R74 in a western direction up to Colenso and then the R103 via Ladysmith to the N2. The route then follows the N2 up to Warden and then via the R103 to Villiers. From Villiers the route follows the R54 to Three Rivers and then via the R57 to Parys. From Parys the route goes via the R59 up to the R64 via Vredefort, Viljoenskroon, Bothaville, Hoopstad and Herttzogville. The route then follows the R64 in a western direction to Kimberley via Boshof and then southbound from Kimberley via the N12 to Britstown. From Britstown the route follows the N10 to Hanover and then to site.

The Cape Town route (Alternative 5 - ±860km) follows the R27 to Melkbosstrand and then via the Melkbosstrand Road to the N1. The route then runs via the N1 to Moorreesburg, then via the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River. It then goes via the N1 to Hanover and then via the R389 to the site. The Saldanha Bay route (Alternative 6 - ±834km) follows the R45 and then takes the R311 to Moorreesburg. From there it takes the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River and then follows the same route as Alterative 4 to the site.

9.0 TRANSPORT IMPACT ASSESSMENT

No specialist traffic impact assessment was undertaken in the EIA process for the project in 2011-2012, however transportation impacts were addressed in the Final EIA Report (April 2012) at the time by the EAP, Aurecon, accordingly. In the Final EIA Report (Aurecon, April 2022), the potential impact of the project on transport was considered to be of medium (-) significance, with or without mitigation and the cumulative potential impact of the project on transport was considered to be of high (-) significance, with or without mitigation measures.

The proposed development with the reduced number of turbines will generate less than 20 truck trips per day with less than a 100 vehicular trip per day during the construction period. There will be a significant increase in traffic volumes during the construction period compared to the existing traffic volumes on the road network, but these volumes are low and well within the function and capacity of the surrounding roads. Even if all planned renewable energy projects in the site vicinity are implemented simultaneously, the impact on the surrounding road network will still be acceptable. The transport impact during the construction period is temporary and in our view the overall transport impact of the proposed development will be low.

The following mitigation measures were recommended in the Final EIA Report (April 2012):

- Ensure that road junctions have good sightlines;
- Implement traffic control measures where necessary;
- Transport components overnight as far as possible; and
- Engage with the roads authorities prior to construction to ensure the necessary road upgrades, permits, traffic escorts etc are scheduled.

The mitigation measures mentioned above are still applicable except the recommendation to transport components overnight as far as possible. Based on the South African Department's Guidelines for Abnormal Load Vehicles (TRH11) abnormal loads are typically not allowed on public roads after sunset and before sunrise. Furthermore, the Transport and Traffic Management Plan included in the updated EMPr replaces all previous mitigation measures and now informs the Transport and Traffic Management aspects of the De Aar 2 South WEF.

The authorised project description for the De Aar 2 South WEF has more than double the number of wind turbines being proposed for in the Amendment Application i.e. the Applicant is proposing a substantial reduction in the number of turbines as part of the EA amendment application, which means that the trip generation for the approved project description will be higher than that of the project description now proposed with up to 26 turbines. The construction period for the approved project description would also have been longer. Please also refer to the De Aar 2 South WEF Transport and Traffic Management Plan for more detail on the expected trip generation estimate for the proposed amended project description.

9.1.1 Construction Phase

Should the proposed amendments be granted, it is expected that the De Aar 2 South WEF will generate approximately 262 vehicular trips per day during the construction phase. The increase in traffic volumes as a result of the De Aar 2 South WEF construction activities will be well within the function and the capacity of the surrounding public road network. Furthermore, the trip generation with the amended layout will be significantly lower than the trip generation associated with the approved project description, which means that the transport impact of the amended project description will be lower than what was previously approved.

9.1.2 Operational Phase

The operational phase of this project is not expected to generate any additional traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site, which was included in the initial approval.

9.1.3 Decommissioning Phase

If the wind farm is not upgraded at the end of the typical lifespan (20 to 25 years from the date of commissioning) the wind farm, including its associated infrastructure (or parts thereof) will be

decommissioned. The decommissioning of the De Aar 2 South WEF is expected to take between 6 to 12 months. The modular components would be removed, recycled and all disturbed areas will have to be appropriately rehabilitated.

The expected transport impact on the road network during the decommissioning phase will be similar or less than the transport impact during the construction phase, and dependent on the level of decommissioning, as it may be that not all turbines are decommissioned. The surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

9.1.4 Cumulative Impacts

To assess the cumulative impact, it will be assumed that all proposed and/or approved renewable energy projects within a 30km radius from the site will be constructed simultaneously (which is, however, extremely unlikely).

There are numerous planned renewable energy projects within a 30km radius from the De Aar 2 South WEF. The construction and decommissioning phases of these projects are the only significant traffic generators. These are short term phases and the impacts on the surrounding road network is temporary. Even if all projects are constructed and decommissioned simultaneously, the road authority will evaluate the applications for the abnormal loads associated with these projects and liaise with the developers to ensure that loads on the public roads are staggered to ensure that the traffic impact is acceptable. Due to the lower number of turbines for the amended layout the trip generation will be lower and the cumulative transport impact will be lower than what was previously reported.

Table 3: Overall Significance (proposed amended project)

DESCRIPTION OF IMPACT	Overall Significance (with and without mitigation)	
	Approved Project Description	Amended Project Description
Increase in traffic volumes on the surrounding road network as a result of construction traffic.	Low	Low
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the construction phase.	Low	Low
Increase in traffic volumes on the surrounding road network during the operational phase.	Low	Low
Gravel loss and possible damage to the road layer works. as a result of additional truck traffic and heavy load truck traffic during the decommissioning phase	Low	Low

10.0 CONCLUSIONS AND RECOMMENDATIONS

This transport impact statement was prepared for the proposed amendments to the EA for the De Aar 2 South WEF to the southeast of De Aar. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed amendments to the EA of the De Aar 2 South WEF on the surrounding transportation system.

This traffic impact analysis resulted in the following conclusions and recommendations.

Existing Traffic Conditions

- The current demand on the existing road network in the site vicinity is low and the road network and intersections operate at acceptable levels of service.
- The existing traffic conditions has not significantly changed since the original assessment in the year 2012.

Construction Phase

- It is expected that the construction phase of the proposed development could generate up to 262 vehicular trips during the average weekday of which approximately 10 percent can be heavy truck traffic.
- Access to the site is proposed via existing accesses off Kranskop Road.

Operational Phase

- The operational phase of this project is not expected to generate significant traffic volumes. The typical day-to-day activities will probably only be service vehicles undertaking general maintenance at the site.

Decommissioning Phase

- If the wind farm is not upgraded at the end of the typical lifespan (20 to 25 years) the site will be decommissioned. The decommissioning of the De Aar 2 South WEF is expected to take between 6 to 12 months. The expected transport impact on the road network during the decommissioning phase will be similar to the transport impact during the construction phase. The surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

Cumulative Impact

- There are numerous planned renewable energy projects within a 30km radius from the De Aar 2 South WEF. Even if all projects are constructed and decommissioned simultaneously, the road authority will evaluate the applications for the abnormal loads associated with these projects and liaise with the developers to ensure that loads on the public roads are staggered to ensure that the traffic impact is acceptable. The cumulative impacts are considered acceptable.

Based on the evaluation as discussed in this report, the existing road network has sufficient spare capacity to accommodate the proposed amendments to the EA of the De Aar 2 South WEF without any road upgrades required to the existing road infrastructure. The proposed amendments to the EA would not result in an increased level or change in the nature of transportation impacts. **It is recommended that the proposed De Aar 2 South WEF Amendment Application be approved from a transport impact perspective**.

REFERENCES

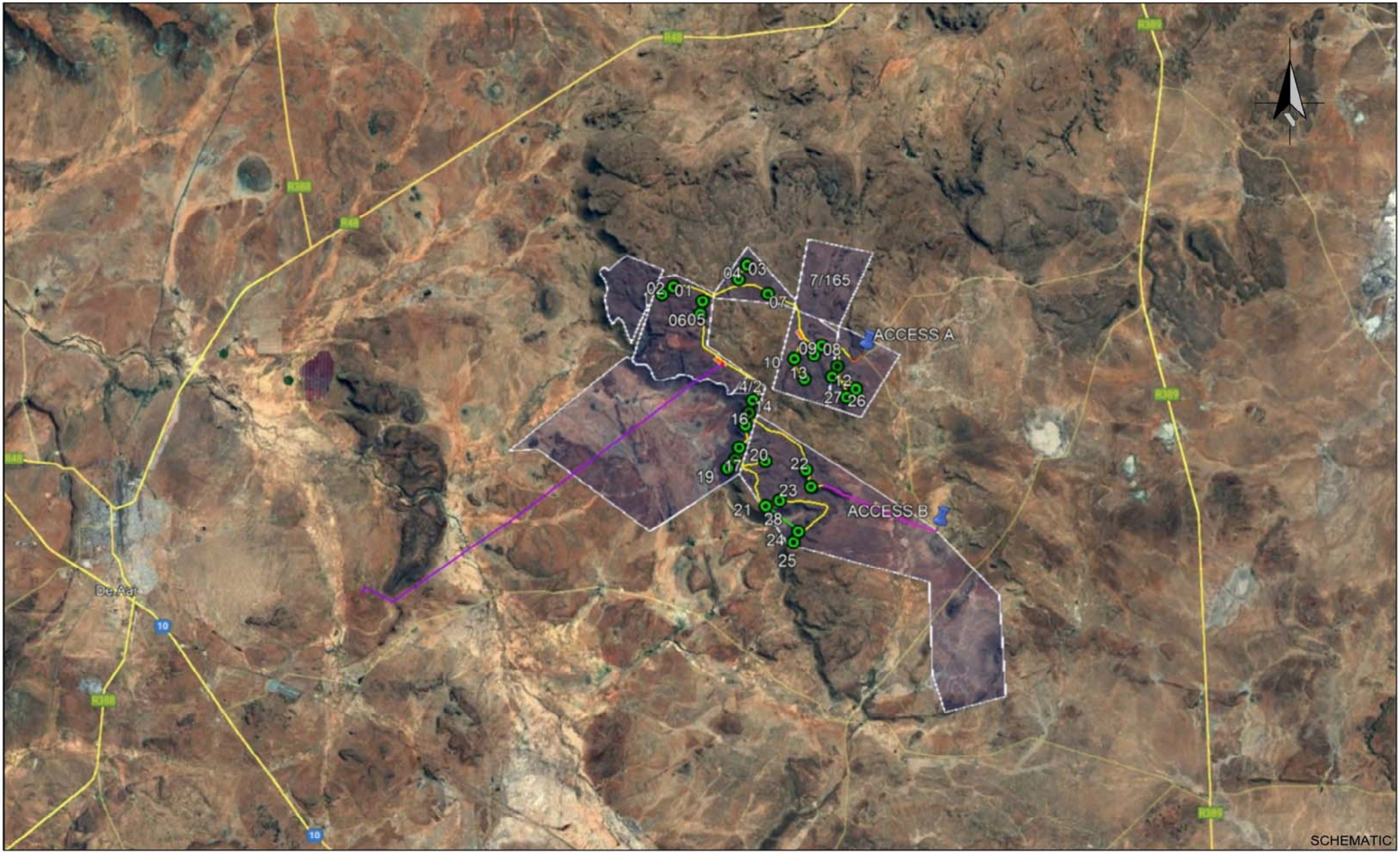
1. Highway Capacity Manual (HCM).
2. Western Cape Government, Access Management Guidelines. 2020
3. Transportation Research Board Highway Capacity Manual, Special Report No. 209. 2000
4. Committee of Transport Officials, South African Trip Data Manual, TMH 17, September 2017
5. Committee of Transport Officials, South African Impact and Site Traffic Assessment Manual, TMH 16 Volume 1, August 2012.

Appendix A

Figures

PROJECT:	FIGURE:	NUMBER:
DE AAR 2 SOUTH WIND ENERGY FACILITY	LOCALITY PLAN	1

G:\4502 TIA De Aar 2 South WEF EMPR\11 Drawings, Figures and GIS\CAD\4502 De Aar WEF_LP_PA_2022-08-05.dwg



PROJECT:	FIGURE:	NUMBER:
DE AAR 2 SOUTH WIND ENERGY FACILITY	SITE LAYOUT PLAN	2

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Appendix B

Photographs

Photo 1: Northbound view along N10 towards the N1 at Hanover

Photo 2: Northbound view along the R389 towards Kranskop Road

Photo 3: Southbound view along the R389

Photo 4: Westbound view Kranskop Road

Photo 5: View to the north along R389 from Kranskop Road

Photo 6 View to the south along R389 from Kranskop Road

Appendix C

De Aar 2 South WEF Transport and Traffic Management Plan

INNOVATIVE
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Transport and Traffic Management Plan

De Aar 2 South Wind Energy Facility

Northern Cape

November 2022

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Report Type	Transport and Traffic Management Plan
Title	De Aar 2 South Wind Energy Facility
Client	Holland & Associates Environmental Consultants
Location	Northern Cape
Project Team	Christoff Krogscheepers, Pr. Eng Pieter Arangie Carla Kleynhans
Project Number	ITS 4502
Date	November 2022
Report Status	Final
File Name:	G:\4502 TIA De Aar 2 South WEF EMPR\12 Report\Issued\4502 De Aar 2 South WEF Transportaion Plan_Final_PA_2022-11-11.docx

This transport and traffic management plan was prepared in accordance with the guidelines and verified by a suitably qualified and registered professional traffic engineer. Details of any of the calculations on which the results in this report are based will be made available on request.

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1.0 INTRODUCTION

Mulilo De Aar 2 South (Pty) Ltd propose to develop a Wind Energy Facility (WEF) on the eastern plateau of De Aar, approximately 20km to the east of De Aar. This Transport and Traffic Management Plan is provided as part of the update of the Environmental Management Programme (EMPr) process for the authorised De Aar 2 South WEF.

2.0 LOCALITY

The De Aar 2 South WEF is located approximately 20km east of the town De Aar. The WEF will be constructed on the eastern plateau of De Aar. Refer to **Figure 1** in Appendix A for a Locality Plan.

3.0 PROPOSED DEVELOPMENT

The De Aar 2 South WEF will consist of a maximum of 26 turbines with a total generation capacity of up to 140MW. The turbines will be mounted on cylindrical steel or concrete towers with a maximum hub height of 120 metres. Each turbine rotor has three blades with a maximum rotor diameter of up to 165 metres.

Components to be imported will be shipped to either Coega, Richards Bay, Cape Town or Saldanha Bay harbours and then transported by road, a distance varying between approximately 535km and 885km respectively. The distance is based on which harbour the components are imported to. Specialised high lifting and heavy load capacity cranes will be utilised to erect the turbines.

The wind farm will be built in one phase, with a total construction period of between 18 to 24 months.

4.0 ASSUMPTIONS AND LIMITATIONS

The following assumptions and limitations apply:

- This Transportation and Traffic Management Plan (TMP) is based on the project information provided by the Client.
- Maximum vertical height clearances along the haulage route must be at least 6.1m to be able to accommodate abnormal loads.
- The imported elements will be transported from either Coega, Richards Bay, Cape Town or Saldanha Bay harbours, with Coega being the most likely..
- Material for the construction will be sourced locally as far as possible.

5.0 SOURCE OF INFORMATION

Information used in this transport study includes:

- Project information provided by the Client
- Google Earth Satellite Imagery
- TRH11, Dimensional and mass limitations and other requirements for abnormal loads, August 2009
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads”, 2000
- National Road Traffic Act, Act 93 of 1996

- Department of Transport (DoT), Geometric Design of Rural Roads, 1988
- Manual for Traffic Impact Studies, Department of Transport, 1995
- South African Road Traffic Signs Manual, 2012
- TRH26 South African Road Classification and Access Management Manual, COTO
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1), COTO, August 2012
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 2), COTO, February 2014

6.0 EXISTING CONDITIONS

The roads included in this study and the existing roadway characteristics are summarised in **Table 1**.

Table 1: Existing Roadway Facilities

Roadway	Type of Road	Posted Speed (km/h)	Road Surface
N10	National Road	120	Paved/Tar
R389	Provincial Road	100	Paved/Tar
Kranskop Road	Provincial Road	Not posted	Gravel

6.1 Existing Cross Sections and Surface Conditions

The N10 is an undivided two-lane road with paved shoulders. The road surface is in a fair condition for the section between Hanover and De Aar. The R389 is an undivided two-lane road with gravel shoulders. The road is in a fair condition, a section of the road has recently been resurfaced. Kranskop Road is an 8m wide gravel road. The road surface is in a fair condition.

The typical cross-section and surface condition of the roads in the site vicinity are shown in **Photos 1** to **4** in Appendix B.

7.0 SITE ACCESS

Access will be off the existing Kranskop gravel road. **Photos 5** and **6** in Appendix B shows the available shoulder sight distances (SSD) along the R389 from the Kranskop Road intersection. The SSD in both directions is more than 300 metres, which is sufficient.

Private roads and local access roads should be upgraded to at least 6 metres wide, to accommodate the abnormal load vehicles.

8.0 TRANSPORT ROUTE

Based on the abnormal load requirements, preliminary routes as outlined in **Figure 3** are proposed for transporting the large equipment from either Coega, Richards Bay, Cape Town or Saldanha Bay harbours to the site. These routes involve avoiding tunnels and mountain passes. Based on the information available Coega is the most likely port of entry. There are three alternative routes between Coega harbour and the site as illustrated in **Figure 3**. Alternative 1 (±477km) follows the N10 from Coega to Hanover and then to the site. Alternative 2 (±508km) and Alternative 3 (±574km) follows the R334 to Uitenhage, then the R75 via Jansenville to Graaff-

Reinett. From Graaf-Reinett Alternative 2 goes via the N9 up to the N10 at Middelburg, then via the N10 to Hanover and then to site. Alternative 3 continues via the R63 from Graaf-Reinett up to the N1 and then via the N1 to Hanover and then to the site.

Alternative 4 (±1 500km) is from the Richards Bay harbour. The route follows the N2 southbound up to Stanger, then follows the R74 in a western direction up to Colenso and then the R103 via Ladysmith to the N2. The route then follows the N2 up to Warden and then via the R103 to Villiers. From Villiers the route follows the R54 to Three Rivers and then via the R57 to Parys. From Parys via the R59 up to the R64 via Vredefort, Viljoenskroon, Bothaville, Hoopstad and Herttzogville. The route then follows the R64 in a western direction to Kimberley via Boshof and then southbound form Kimbrley via the N12 to Britstown. From Britstown the route follows the N10 to Hanover and then to site.

The Cape Town route (Alternative 5 - ±860km) follows the R27 to Melkbosstrand and then the via the Melkbosstrand Road to the N1, then via the N1 to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River, then via the N1 to Hanover and then via the R389 to the site. The Saldanha Bay route (Alternative 6 - ±834km) follows the R45 and then the R311 to Moorreesburg, then the R311 to Riebeeck Kasteel and the R46 via Hermon and Ceres to the N1 at Touws River and then follows the same route as Alterative 4 to the site.

The final route will have to be checked for compliance during the final design stages of the project. All routes have all already been cleared for abnormal loads with the implementation of previous wind farms in the De Aar area. No additional geometric upgrades are required along the route.

Permits will need to be obtained from the relevant road authorities for all abnormal loads and the specific route will be specified based on the characteristics of each load type.

9.0 TRANSPORT MANAGEMMENT PLAN

9.1 Abnormal Loads

9.1.1 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996):

- Length: 22m for an interlink, 18.5m for truck and trailer and 13.5m for a single unit truck
- Width: 2.6m
- Height: 4.3m measured from the ground. Possible height of load – 2.7m.
- Weight: Gross vehicle mass of 56t resulting in a payload of approximately 30t
- Axle unit limitations: 18t for dual and 24t for triple-axle units
- Axle load limitation: 7.7t on front axle and 9t on single or rear axles

Any dimension / mass outside the above will be classified as an Abnormal Load and will require an application to the Department of Transport and Public Works for a permit that will give authorisation for the transportation of the abnormal load. A permit is required for each Province that the haulage route traverses.

9.1.2 Guideline Documentation

The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads”

outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads and the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges, and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power/mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

9.1.3 Permitting – General Rules

The limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing or permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

9.1.4 Load Limitations

The maximum load that a road vehicle or combination of vehicles will be allowed to carry legally under permit on a public road is limited by:

- the capacity of the vehicles as rated by the manufacturer
- the load which may be carried by the tyres
- the structural capacity on bridges and culverts
- the engine power of the prime mover(s)
- the load imposed by the driving axles and
- the load imposed by the steering axles

9.1.5 Dimensional Limitations

A load of abnormal dimensions may cause an obstruction and danger to other traffic. For this reason, all loads must, as far as possible, conform to the legal dimensions. Permits will only be considered for indivisible loads, i.e. loads that cannot, without disproportionate effort, expense or risk of damage, be divided into two or more loads for the purpose of transport on public roads. For each of the characteristics below there is a legally permissible limit and what is allowed under permit

- Width
- Height
- Length
- Front Overhang
- Rear Overhang
- Front Load Projection
- Rear Load Projection
- Wheelbase
- Turning Radius
- Stability of Loaded Vehicles

9.1.6 Delivery of Heavy Equipment

The equipment that needs to be delivered to site are not only large but many of the parts are heavy. A typical tower, with rotor blades and Nacelle are shown in the following photograph.

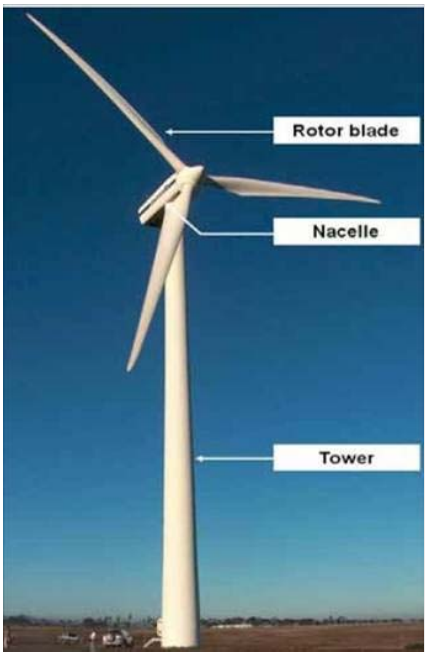


Figure 2: Typical Wind Turbine

The dimensions and weights of the various elements of the wind turbines are summarized in the following two tables. The most extreme dimensions are those of the rotor blades which could vary between 50 and 82.5 metres in length. The heaviest part is the Nacelle which weighs more than 60 tons.

Table 2: Typical Dimensions and Weights of Components

Component		Weight (unit: ton)	Dimensions(unit: m) Length × width × height
Blade*	NR81.5	30.3	80.2 × 4.38 × 3.9
	GW81	24.8	81 × 4.8 ×4.8
Nacelle		74	13.3 × 5.1 × 6.9
Hub		57	5.5 × 5.7× 5.2
Generator / Gearbox		124	7 × 5.5 × 5.5
Tower		Refer to Table 3 for details	

Table 3: Typical Dimensions and Weights of Tower Elements

Tower weight and dimension

Model	120mHH	
Section	Weight (kg)	Dimension (unit:mm) Length ×bottom outer diameter
Top	148040	17890×5160
Middle 4	186730	20000 × 6300
Middle 3	209940	20000 × 7040
Middle 2	228590	20000 × 7720
Middle 1	255100	20000 × 8400
Bottom	280000	20000×9000

Based on the above sizes and weights, the roadways to the site must have the following minimum requirements:

Width: Roads need to be at least 6.0 metres wide to accommodate the turbine components.

Height: Vertical clearances need to be at least 6.0 metres to ensure no hindrances (e.g. overhead lines, telephone lines etc.).

Maximum Weight: The lower tower section and the Nacelle are of the heaviest parts that must be transported. The final weights will have to be determined prior to determining the final loads and as part of the detail investigation.

Outer Curve Radius: The minimum outer and inner radii for the transport trucks depends on the specific trailer used for transport but should be at least between 25,0 metres and 28,0 metres. This will depend on the final lengths of the equipment to be transported and must be evaluated during the detailed evaluation of the sites.

Maximum Slope: The maximum slope of asphalt roads should typically be lower than 10 percent and for gravel roads it should be lower than 7 percent. The type of loads and weights that will need to be transported together with the vehicles that will be used for the transport will determine the maximum gradients of the access roads. It will be necessary to evaluate these gradients during the detail evaluation phase.

Road Surfaces: Abnormal transport vehicles have low ground clearances, and it could be as low as 150 mm. The surfaces of all the tarred national and provincial roads should comply with this requirement. The gravel access roads should also comply with this requirement and will require careful construction control.

Based on the abnormal load requirements the preliminary routes as outlined in **Figure 3** are proposed for transporting the large equipment from the ports of entry to the site.

10.0 TRAFFIC MANAGEMENT PLAN

During the construction phase the increase in truck traffic along the roads in the site vicinity will be significant, compared to the current truck traffic along these roads. However, the expected total traffic volumes along these roads will still be well within the function of the roads and no operational or safety issues are expected. Due to the rural nature of the area around the development site the daily traffic distribution profile along the roads in the site vicinity is random with no specific peak during the day. The construction traffic will have an impact on road users and pedestrians along the surrounding road network, but with effective traffic management the impact can be minimised.

This Traffic Management Plan should be updated prior to the commencement of the construction phase, when more detailed information regarding the delivery of components, traffic data and construction activities are available. The Contractor should designate a person as the custodian of the plan and the custodian will ensure that all personnel and subcontractors are trained to ensure compliance. The requirements of the Traffic Management Plan shall apply to all personnel and subcontractors appointed to provide vehicles and machinery or drivers. The Plan needs to be reviewed after an incident and corrective measures should then be incorporated into the Plan.

The Traffic Management Plan should be updated once construction is completed to include the operational traffic requirements. A copy of the Traffic Management Plan should be kept on site and the Plan must be available to all personnel. The Traffic Management Plan will be reviewed annually or after an incident, when corrective measures will be incorporated into the Plan.

10.1 Trip Generation

10.1.1 Construction Phase

A large amount of traffic will be generated during the construction phase. The following activities will probably occur during the construction phase:

- Construction of the internal access roads,
- Stripping and stockpiling of topsoil,
- Excavation and construction of the foundations for the wind turbines,
- Construction of the operations building,
- Erection/Assembly and disassembly of the cranes
- Assembly of the towers, nacelles and blades,
- Trenching for cabling and
- Reinstatement of the site.

The internal access roads will be constructed mainly of local materials sourced on site, if the material is suitable, otherwise material will be imported from commercial sites. These roads will be retained and used for inspection and maintenance of the wind turbines.

The tower foundations are large reinforced concrete footings. It is assumed that the material removed during excavation will be utilised within the site to create hardstand areas for the cranes

and in reinstating the site after construction. It is assumed that the concrete will be mixed on site and the raw materials will be transported to the site via the existing road network. It is assumed that up to 70 truckloads will be required for each foundation.

Approximately 20 heavy truck loads are required on site to assemble and disassemble the cranes. The components of the wind turbines will be transported to the site from the port of entry and approximately 22 abnormal truck loads are required per wind turbine.

Estimates of the peak hour vehicle trips for new developments are typically based on empirical observations at similar land uses. The estimates summarised in **Table 3** are based on information sourced from other similar projects and it is also based on the assumption that the proposed maximum of 26 wind turbines will be constructed over the 18 to 24-month period.

Table 4: Expected Generated Truck Trips during the Construction Phase

Material	Approximate Number of Trucks loads required
Foundations/Raw materials/containers etc	1 846
Construction Cranes	20
Tower Sections (concrete)	156
Nacelles	26
Blades	78
Switch Cabinets	52
TOTAL	**2178**

Although the construction period can be between 18 to 24 months, for the purposes of this study it is assumed that most the construction work can be completed within a 14-month period to represent a possible worst-case scenario. It is expected that approximately 2 178 trucks loads will be required during the 14-month construction period, working approximately 350 days during the construction period. This means that on average approximately 6 trucks will visit the site per day which equates to approximately 12 truck trips spread over an eight-hour day.

Based on information sourced from other similar projects it is assumed that approximately 350 construction workers could be employed during the peak construction period. It can be expected that the bulk of these workers will commute to/from the construction site via bus or minibus taxi. If 70 percent of the construction staff travels with minibus taxis with an average occupancy of 12 passengers per vehicle it equates to approximately 20 minibuses visiting the site in the morning and afternoon peak hours. If the remaining 30 percent travel with private vehicles, it equates to approximately 262 motor vehicle and truck trips during the average weekday.

10.1.2 Trip Distribution and Assignment

It is expected that all the trips to/from the proposed wind farm will come from De Aar, Philipstown and Hanover. The trucks delivering the wind turbine components will come from direction Hanover via the R389 and most of the trucks delivering raw material for the wind tower foundations and road construction material will come from De Aar area, probably from the De Aar Stone Crushers.

10.1.3 Operational Phase

The number of permanent staff on site for the De Aar 2 South WEF is not expected to be more than 20 people and the day-to-day operation of the proposed WEF will generate relatively low traffic volumes.

10.2 Licensing

All construction vehicles shall have the necessary licences, a valid roadworthy certificate and shall comply with the relevant traffic and transport licencing requirements.

All drivers of vehicles shall have the required licences to operate the vehicle (or machinery) on site or on any public roads. A professional driving permit (PDP) is required if any of the following vehicles are operated:

- Goods vehicles, (more than 3 500 kg).
- Breakdown vehicles.
- Buses (any bus).
- Minibus taxis (more than 3 500 kg), transporting 12 or more people, including the driver.
- Goods vehicle carrying dangerous goods (more than 3 500 kg).
- Road tank vehicles for petroleum-based flammable liquids.
- Motor vehicles transporting 12 or more people, including the driver

10.3 Staff Transport

All staff shall be transported in appropriate vehicles and staff shall not be allowed to be transported on the back of open trucks. Passenger vehicles shall not exceed the carrying capacity of the vehicle.

Collections/Drop-off points for staff shall be located at a safe distance from construction activities. Designated pedestrian pathways shall be demarcated where appropriate. All staff shall receive the appropriate site safety induction training. Staff training shall include appropriate precautionary measures required to be undertaken to facilitate safe and efficient traffic management.

10.4 Road Maintenance

Based on the expected number of construction trips generated by the proposed development the existing road network has sufficient capacity to accommodate the additional trips from an operational perspective. However, many of these trips will be heavy truck traffic and this will result in frequent maintenance required on the surrounding roads, specifically Kranskop Road.

During construction it is expected that road surfaces will require maintenance at regular intervals to prevent damage to the road structure. Once construction is completed the National and Provincial roads should be inspected and repaired where necessary.

10.5 Maintenance of Vehicles and Equipment

All vehicles and equipment shall be regularly maintained, repaired when necessary and inspected on a regular basis to ensure that the vehicles are in good working order. All freight and passenger vehicles shall be monitored to ensure that vehicles are not overloaded.

10.6 Signage

Signage, in accordance with the South African Road Traffic Signs Manual, will be required at appropriate locations along all access roads, the internal roads to the site and public roads used by construction vehicles (in consultation with the relevant traffic authorities) to indicate the following:

- all road and pedestrian hazards
- site access

- site offices
- wayfinding signs on internal roads e.g. parking, toilets, emergency assembly point
- crossing points
- speed limits
- turning traffic, heavy vehicles
- dedicated routes for construction vehicles and staff
- no-go areas
- any traffic control information relevant to the construction activity at the time

It is recommended that flagmen be implement when high volumes of construction traffic are expected to help direct traffic to ensure safe movement of the vehicles and reducing the potential conflicts.

10.7 Speed limits

All drivers operating vehicles shall comply with the posted speed limits (or the maximum allowable speed as per the permit for abnormal load vehicles) on public roads as well as a proposed 30km/h speed limit within the construction site and access roads.

10.8 Stakeholder Engagement

Interested and affected parties should be informed of all transport activities taking place that may affect them or require approval e.g. local community, the local authorities, law enforcement and affected landowners.

Stakeholder engagement should address and provide information to stakeholders regarding general construction activities, construction vehicles routes, projected timelines, procedures for complaints and emergency procedures.

10.9 Abnormal Loads

It is recommended that construction and abnormal load traffic should be limited to outside the typical traffic peaks in build-up areas and through towns. Provincial and Local traffic officials should assist abnormal load vehicles through the towns.

All deliveries with abnormal loads will operate under an approved transportation plan with the necessary traffic routes and traffic accommodation plans in place.

10.10 General Construction Traffic

Most of the equipment and construction material will be delivered to the site with heavy vehicles. The turbine components will be transported by abnormal load vehicles. It is expected that the delivery of the equipment will occur over a 12-month period and the impact of the delivery vehicles on the existing traffic along the road network in the site vicinity will be acceptable.

Mitigation Measures Include:

- The delivery of components and construction materials to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Using a mobile batch plant as well as temporary construction material stockpile yards near the proposed site.
- Transporting site personnel to and from the site by means of busses or minibus taxis. This will reduce the number of trips bound for the site

11.0 CONCLUSIONS AND RECOMMENDATIONS

General

- This Transport and Traffic Management Plan was prepared for the proposed De Aar 2 South Wind Energy Facility to the east of De Aar in the Northern Cape.

Components

- In general, the turbines consist of a tower, a nacelle and rotor blades.
- It is assumed that all components will be imported and shipped to either Coega, Richards Bay, Cape Town or Saldanha Bay harbours.

Transport Route

- Based on the abnormal load requirements, a preliminary route as outlined in Section 8 is proposed for transporting the large equipment from the Coega harbour to the site. These routes have all already been cleared for abnormal loads with the implementation of previous wind farms in the area. No additional geometric upgrades are required along the route.
- Permits will need to be obtained from the relevant road authorities for all abnormal loads and the specific route will be specified based on the characteristics of each load type.

Access

- Access is proposed via the exiting gravel Kranskop Road off the R389.
- Private roads and local access roads on the WEF site should be upgraded to at least 6 metres wide to accommodate the abnormal load vehicles.

Transport Management Plan

- Abnormal permits are required for vehicles exceeding the permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996). The permit will describe load limitations for each load based on the component and the transport route. A permit is required for each Province that the haulage route traverses.
- The Technical Recommendations for Highways (TRH 11): “Draft Guidelines for Granting of Exemption Permits for the Conveyance of Abnormal Loads and for other Events on Public Roads” outlines the rules and conditions that apply to the transport of abnormal loads and vehicles on public roads.

Traffic Management Plan

- This TMP has been prepared to enable the identification and implementation of all legal and best practice requirements in respect of the management of traffic associated with the construction and operation of the facility.

- The Traffic Management Plan has been prepared in respect of the planning phase of the proposed facility. The Traffic Management Plan should be updated prior to the commencement of the construction phase and the operational phase.
- The potential transport impacts imposed by the construction traffic are temporary, short term in nature, and can be mitigated to an acceptable level.
- The operation and maintenance phase include the operation and maintenance of the WEF. The envisaged site traffic would be limited to a few light vehicles, transporting approximately 20 employees per day.
- The maintenance or replacement of wind turbine components would require a crane and abnormal vehicles. Although abnormal load vehicles would be required, the maintenance or replacement of components can be staggered, and the transportation of the components would therefore take place over a short period of time, presumably delivered in one day. Furthermore, traffic disruptions can be minimised by transporting the components during off-peak hours. This phase is therefore expected to generate minimal traffic.

  Mitigation Measures Include:

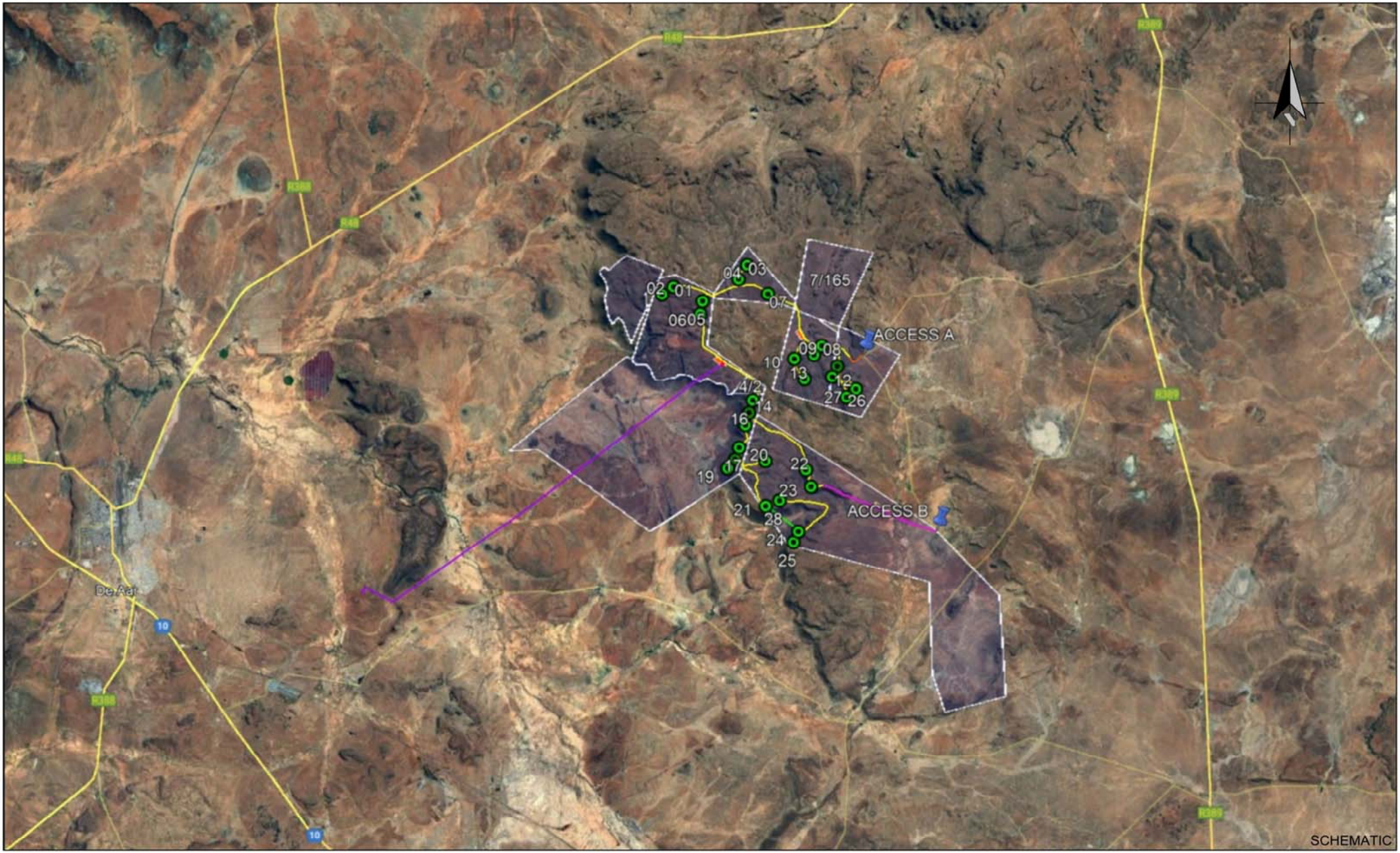
  - The delivery of components and construction materials to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
  - Using a mobile batch plant as well as temporary construction material stockpile yards near the proposed site.
  - Transporting site personnel to and from the site by means of busses or minibus taxis. This will reduce the number of trips bound for the site

Appendix A

Figures

PROJECT:	FIGURE:	NUMBER:
DE AAR 2 SOUTH WIND ENERGY FACILITY	LOCALITY PLAN	1

G:\4502 TIA De Aar 2 South WEF EMPR\11 Drawings, Figures and GIS\CAD\4502 De Aar WEF_LP_PA_2022-08-05.dwg



PROJECT:	FIGURE:	NUMBER:
DE AAR 2 SOUTH WIND ENERGY FACILITY	SITE LAYOUT PLAN	2

G:\4502 TIA De Aar 2 South WEF EMPR\11 Drawings, Figures and GIS\CAD\4502 De Aar WEF_Figures_PA_2022-09-05.dwg

Alternative 4
Alternative 2
Alternative 3
Alternative 1
Alternative 6
Alternative 5
Johannesburg
Eswatini
Lesotho
Bloemfontein
Kimberley
Cape Town
Durban
Richards Bay
Port Shepstone
Margate
Port Edward
East London
Port Alfred
Gqeberha
Coega
Kgalagadi Transfrontier Park
Anysberg Nature Reserve
Tankwa Karoo National Park
Garden Route National Park
Addo Elephant National Park

SCHEMATIC

PROJECT:	FIGURE:	NUMBER:
DE AAR 2 SOUTH WIND ENERGY FACILITY	ABMORNAL LOAD ROUTES - COEGA, RICHARDS BAY, CAPE TOWN AND SALDANHA BAY HARBOURS	3

G:\4502 TIA De Aar 2 South WEF EMPR\11 Drawings, Figures and GIS\CAD\4502 De Aar WEF_AbnormalRoutes_PA_2022-11-10.dwg

Appendix B

Photographs

Photo 1: Northbound view along N10 towards the N1 at Hanover

Photo 2: Northbound view along the R389 towards Kranskop Road

Photo 3: Southbound view along the R389

Photo 4: Westbound view Kranskop Road

Photo 5: View to the north along R389 from Kranskop Road

Photo 6: View to the south along R389 from Kranskop Road