ENERTRAG SOUTH AFRICA

CAMDEN II WIND ENERGY FACILITY, MPUMALANGA

TRANSPORT IMPACT ASSESSMENT

21 JUNE 2022

DRAFT

CAMDEN II WIND ENERGY FACILITY, MPUMALANGA

TRANSPORT IMPACT ASSESSMENT

ENERTRAG SOUTH AFRICA

TYPE OF DOCUMENT (2.0)
DRAFT

PROJECT NO.: 41103247-CAMDEN II TIA
DATE: JUNE 2022

WSP
BUILDING C
KNIGHTSBRIDGE, 33 SLOANE STREET
BRYANSTON, 2191
SOUTH AFRICA

T: +27 21 481 8758
F: +27 11 361 1301
WSP.COM

Our ref.: 41103247-CAMDEN II TIA

21 June 2022

DRAFT

Ashlea Strong
ENERTRAG SOUTH AFRICA
WSP Environment

Dear Madam:

Subject: Camden II WEF: Transport Impact Assessment

Please find attached herewith the revised TIA for your review.

Yours sincerely,

Christo Bredenhann
Associate: Transport Planning

BUILDING C
KNIGHTSBRIDGE, 33 SLOANE STREET
BRYANSTON, 2191
SOUTH AFRICA

T: +27 21 481 8758
F: +27 11 361 1301
wsp.com

QUALITY MANAGEMENT

ISSUE/REVISION	FIRST ISSUE	REVISION 1	REVISION 2	REVISION 3
Remarks	Draft	Rev 1		
Date	17 May 2022	21 June 2022		
Prepared by	Christo Bredenhann Pr Eng	Christo Bredenhann Pr Eng		
Signature				
Checked by	Wayne Petersen Pr Eng	Wayne Petersen Pr Eng		
Signature				
Authorised by	Marshall Muthen Pr Eng	Marshall Muthen Pr Eng		
Signature				
Project number	41103247	41103247		
Report number	1.0	2.0		
File reference	\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41103247 - Enertrag Mpumalanga EIA\43 TIA	\\corp.pbwan.net\za\Central_Data\Projects\41100xxx\41103247 - Enertrag Mpumalanga EIA\43 TIA		

SIGNATURES

PREPARED BY

Christo Bredenhann, Associate

REVIEWED BY

Wayne Petersen, Director

PRODUCTION TEAM

CLIENT

WSP Environment & Energy on behalf of ENERTRAG SOUTH AFRICA	Ashlea Strong

WSP

Project Director	Wayne Petersen *Pr. Eng*
Project Leader/Engineer	Christo Bredenhann *Pr. Eng*

SUBCONSULTANTS

N/a

TABLE OF CONTENTS

1 INTRODUCTION 1

1.1 Background 1

1.1 Scope 1

1.2 Previous submissions 2

1.3 Type and Extent of the development 2

1.1.1 Project Infrastructure 2

1.4 Phasing of the development 4

1.5 Approval of Submissions 4

2 DATA COLLECTION 5

2.1 Site Visits 5

2.2 Road Network & Master Planning 5

2.3 Latent Developments 5

3 SITE LOCATION & SURROUNDING ROAD NETWORK 6

3.1 Site location 6

3.2 Road network description 9

3.3 Site access 10

3.4 Internal site access roads 11

4 PARKING ASSESSMENT 13

5 PUBLIC & NON-MOTORISED TRANSPORT ASSESSMENT 14

6 TRAFFIC FLOWS & TRIP GENERATION 15

6.1 Existing traffic flows 15

6.2 Latent Traffic 15

6.3 Development Trip Generation 15

6.3.1 Construction phase traffic 15

6.3.2 Operational phase traffic 18

6.3.3 Decommisioning phase traffic 18

6.4 Capacity analysis 18

6.5 Intersection safety Assessment 19

7 ENVIRONMENTAL IMPACT ASSESSMENT: TRANSPORT 20

7.1 Impact Assessment Methodology 20

7.1.1 Introduction 20

7.1.2 Assessment of impacts and mitigation 20

7.1.3 Impact mitigation 21

7.2 Assessment Results 22

7.3 Summary 1

8 CUMULATIVE TRANSPORT IMPACT ASSESSMENT 2

8.1 Background 2

8.2 Latent Developments 2

8.3 Cumulative Transport Impacts 3

8.4 Summary 6

9 CONCLUSIONS & RECOMMENDATIONS 7

BIBLIOGRAPHY 9

TABLES

TABLE 1-1: AFFECTED FARM PORTIONS 2
TABLE 1-2: TECHNICAL DETAILS OF THE PROPOSED CAMDEN II WEF & ASSOCIATED INFRASTRUCTURE 2
TABLE 3-1: AFFECTED FARM PORTIONS 6
TABLE 6-1: TOTAL PEAK HOUR TRIP GENERATION – CONSTRUCTION STAFF.....16
TABLE 6-2 ESTIMATED MAXIMUM CONSTRUCTION PHASE TRIP GENERATION.....17
TABLE 6-3: TOTAL MAXIMUM PEAK HOUR TRIP GENERATION.....18
TABLE 7-1: IMPACT ASSESSMENT CRITERIA AND SCORING SYSTEM.....21
TABLE 7-2: IMPACT ASSESSMENT - CONSTRUCTION PHASE.....23
TABLE 8-1: CUMULATIVE IMPACT ASSESSMENT - CONSTRUCTION PHASE: CAMDEN I AMMONIA, SOLAR PV, WEF FACILITIES & CAMDEN II WEF 4
TABLE 8-2: CUMULATIVE IMPACT ASSESSMENT – OPERATION PHASE: CAMDEN I AMMONIA, SOLAR PV, WEF FACILITIES & CAMDEN II WEF 5

FIGURES

FIGURE 3-1 LOCALITY MAP 7
FIGURE 3-2 SITE AERIAL IMAGE AND CADASTRALS OF THE FARM PORTIONS.....8
FIGURE 3-3 TURBINE LOCATIONS 8
FIGURE 3-4 MPUMALANGA PROVINCE ROAD NETWORK.....10
FIGURE 3-5 PROPOSED SITE ACCESS 11
FIGURE 3-6 PROPOSED INTERNAL ACCESS ROADS 12
FIGURE 7-1 MITIGATION SEQUENCE/HIERARCHY.....22
FIGURE 8-1 LOCATION OF CAMDEN I & CAMDEN II RENEWABLE ENERGY COMPLEX 3

APPENDICES

N/A

1 INTRODUCTION

1.1 BACKGROUND

WSP Group Africa (Pty) Ltd (WSP) has been appointed by Enertrag South Africa via Camden II Wind (RF) Pty Ltd to undertake a Transport Impact Assessment (TIA) of the proposed Camden II Wind Energy Facility (WEF), to be located near Camden in Mpumalanga Province.

The Camden II facility, along with the Camden I Wind Energy, Solar PV Energy and Green Hydrogen and Ammonia Facilities, will form part of the Camden Renewable Energy Complex.

This report assesses the expected transport related impacts of the facility during the construction, operation and potential subsequent decommissioning phases. The purpose of this report is to consider the transport impact that the facility will have on the surrounding road network and environment, and to propose mitigating measures to address these impacts, where required.

1.1 SCOPE

The Scope of the TIA is broadly based on the requirements of the South Africa Committee of Transport Officials, South African Traffic Impact and Site Traffic Assessment Manual, TMH16, Vol. 1, Version 1, August 2012. Note that a full TIA including traffic surveys and capacity analysis of affected intersections is excluded.

The scope covers the following:

- Previous traffic related studies, submissions and approvals (if relevant).
- Description of the extent of the development, including location and land-use/s.
- Description of the phased development of the facility (if applicable).
- Record of site visits.
- Description of the local and potentially affected road network, including planning and comment on the road condition, where information is available.
- Assessment of the required site access, parking and internal circulation.
- Assessment of expected trip generation (construction & operational phases).
- Assessment of public transport and non-motorised transport needs
- Recommendations and conclusions with regards to the required traffic and transport related mitigation required.
- Assessment of the transport related environmental impacts and proposed mitigation required.
- Description of latent development in the vicinity of the facility that may also have an impact on the local road network.
- Assessment of the cumulative transportation impact of latent development in the study area.

Note that a Traffic Impact Assessment of the associated electrical grid infrastructure has been excluded from this study, as it does not require assessment. The reason for this is that the expected trip generation to construct this infrastructure will be negligible, and the traffic related impact will therefore be negligible.

1.2 PREVIOUS SUBMISSIONS

No prior TIA's has been undertaken for this WEF.

1.3 TYPE AND EXTENT OF THE DEVELOPMENT

The Camden II WEF will be a maximum 200 MW plant located over the following ten farm portions with a total area of 5000 ha. Refer to Table 1-1.

Table 1-1: Affected farm portions

Parent Farm	Farm No	Portion No	Owner
Adrianople	296	0	Rassie Saaiman
Adrianople	296	1	Lood De Jager Trust
Adrianople	296	2	Smuts Willem Francois
Adrianople	296	3	Van Der Meulen Trust
Buhrmanvallei	297	3	Van Der Meulen Trust
Buhrmanvallei	297	4	Van Der Meulen Trust
De Emigrate	327	3	Buhrman Hendrik Theodor
Buhrmanvallei	297	5	Van Der Meulen Trust
Klipfontein	326	5	Van Der Meulen Trust
De Emigrate	327	6	Van Der Meulen Trust

1.1.1 PROJECT INFRASTRUCTURE

A summary of the details of the facility and associated infrastructure is included in Table 1-2.

Table 1-2: Technical details of the Proposed Camden II WEF & associated Infrastructure

Facility Name	Camden II Wind Energy Facility
Applicant	Camden II Wind Energy Facility (RF) Propriety Limited
Municipalities	Msukaligwa Local Municipality of the Gert Sibande District Municipality
Affected Farms[1]	See Table 1.1
Extent	5000 ha
Buildable area	Approximately 200 ha, subject to finalization based on technical and environmental requirements
Capacity	Up to 200MW
Number of turbines	Up to 50
Turbine hub height:	Up to 200m
Rotor Diameter:	Up to 200m
Foundation	• Concrete foundations of approximately of 25m diameter x 4.5m deep required per turbine.

[1] Based on the current conceptual layout.

	• Dimensions may vary as required by the geotechnical conditions. • +/- 2500m³ concrete. • Concrete foundation will be constructed to support a mounting ring. • Excavation approximately 1000m², in sandy soils due to access requirements and safe slop stability requirements.
O&M building footprint:	Located near the substation. Septic/conservancy tanks (operational phase) with portable toilets for construction phase. Typical areas include: - Operations building – 20m x 10m = 200m² - Workshop – 15m x 10m = 150m² - Stores - 15m x 10m = 150m²
Construction camp laydown	Typical area 100m x 50m = 5000m². Sewage: Portable toilets.
Temporary laydown or staging area:	Typical area 220m x 100m = 22000m². Laydown area could increase to 30000m² for concrete towers, should they be required.
Cement batching plant (temporary):	Gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo.
Internal Roads:	Width of internal road – Between 5m and 6m. Length of internal road – Approximately 60km. Where required for turning circle/bypass areas, access or internal roads may be up to 20m to allow for larger component transport.
Cables:	The medium voltage collector system will comprise of cables up to and include 33kV that run underground, except where a technical assessment suggest that overhead lines are required, in the facility connecting the turbines to the onsite substation.
IPP site substation and battery energy storage system (BESS):	Total footprint will be up to 6.5ha in extent (5ha for the BESS and 1.5ha for the IPP portion of the substation). The substation will consist of a high voltage substation yard to allow for multiple (up to) 132kV feeder bays and transformers, control building, telecommunication infrastructure, access roads, etc. The BESS storage capacity will be up to 200MW/800MWh with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.

1.4 PHASING OF THE DEVELOPMENT

For the purpose of the impact assessment, it was assumed that the facility will be developed in a single phase with an estimated construction period of 2 years.

1.5 APPROVAL OF SUBMISSIONS

This report will be subject to approval from the relevant authorities and will be submitted as part of the Environmental Impact Assessment process.

2 DATA COLLECTION

2.1 SITE VISITS

Site visits were undertaken by WSP staff to assess the local road network and vehicle accesses intersections along the primary road network. No other specific transport related site visits were required.

2.2 ROAD NETWORK & MASTER PLANNING

There are no known local, provincial or national roads planned in the vicinity of the site or the greater study area that will be impacted by the WEF or vice-versa.

2.3 LATENT DEVELOPMENTS

Refer to Section 8: Cumulative Transport Impact Assessment.

3 SITE LOCATION & SURROUNDING ROAD NETWORK

3.1 SITE LOCATION

The WEF will be located on the following 10 land portions, refer to Table 3-1. The farm portions are located in the Msukaligwa Local Municipality of the Gert Sibande District Municipality in Mpumalanga Province. Refer to Figure 3-1 for the locality map, Figure 3-2 for the aerial image of the farm portions and Figure 3-3 for the proposed wind turbine locations.

Note that 45 turbine locations are shown, however this assessment assumes the maximum (conservative) 50 turbines.

Table 3-1: Affected farm portions

Parent Farm	Farm No	Portion No
Adrianople	296	0
Adrianople	296	1
Adrianople	296	2
Adrianople	296	3
Buhrmanvallei	297	3
Buhrmanvallei	297	4
De Emigrate	327	3
Buhrmanvallei	297	5
Klipfontein	326	5
De Emigrate	327	6

Figure 3-1 Locality map

Figure 3-2 Site aerial image and cadastrals of the farm portions

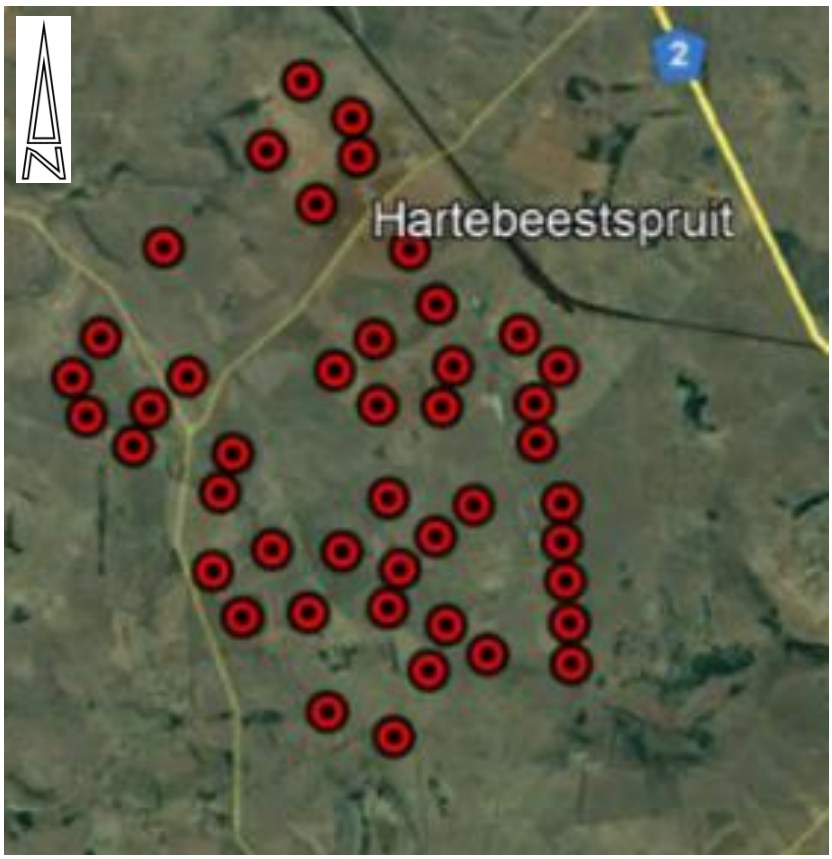

Figure 3-3 Turbine locations

3.2 ROAD NETWORK DESCRIPTION

The site is located east of National Road N2 and to the west of National Road N11.

The N2 is the primary road link between Ermelo and Richards Bay and south to Durban. In the vicinity of the site, the N2 is a single carriageway with 1 lane per direction and gravel shoulders.

The N11 is the primary road link between Ladysmith and Newcastle in Kwa-Zulu-Natal, through Ermelo to Middelburg and beyond. In the vicinity of the site, the N11 is a single carriageway with 1 lane per direction and gravel shoulders.

The site is traversed by two district roads, refer to Figure 3-4 for the alignment of these roads as shown on the Mpumalanga Road network map.

- The D1264 is a district collector between the D260 and the N2. It is a single carriageway 2-way surfaced road (1 lane per direction), with no shoulders. It has a priority Stop controlled T-junction on the N2, and a grade separated crossing (road over rail), over the main railway line between Mpumalanga and Richards Bay.
- The D260 is a district collector from the N11 and follows a roughly southerly alignment beyond its intersection with the D1264. It is a single carriageway 2-way surfaced road (1 lane per direction), with no shoulders. It has a priority Stop controlled T-junction on the N11.

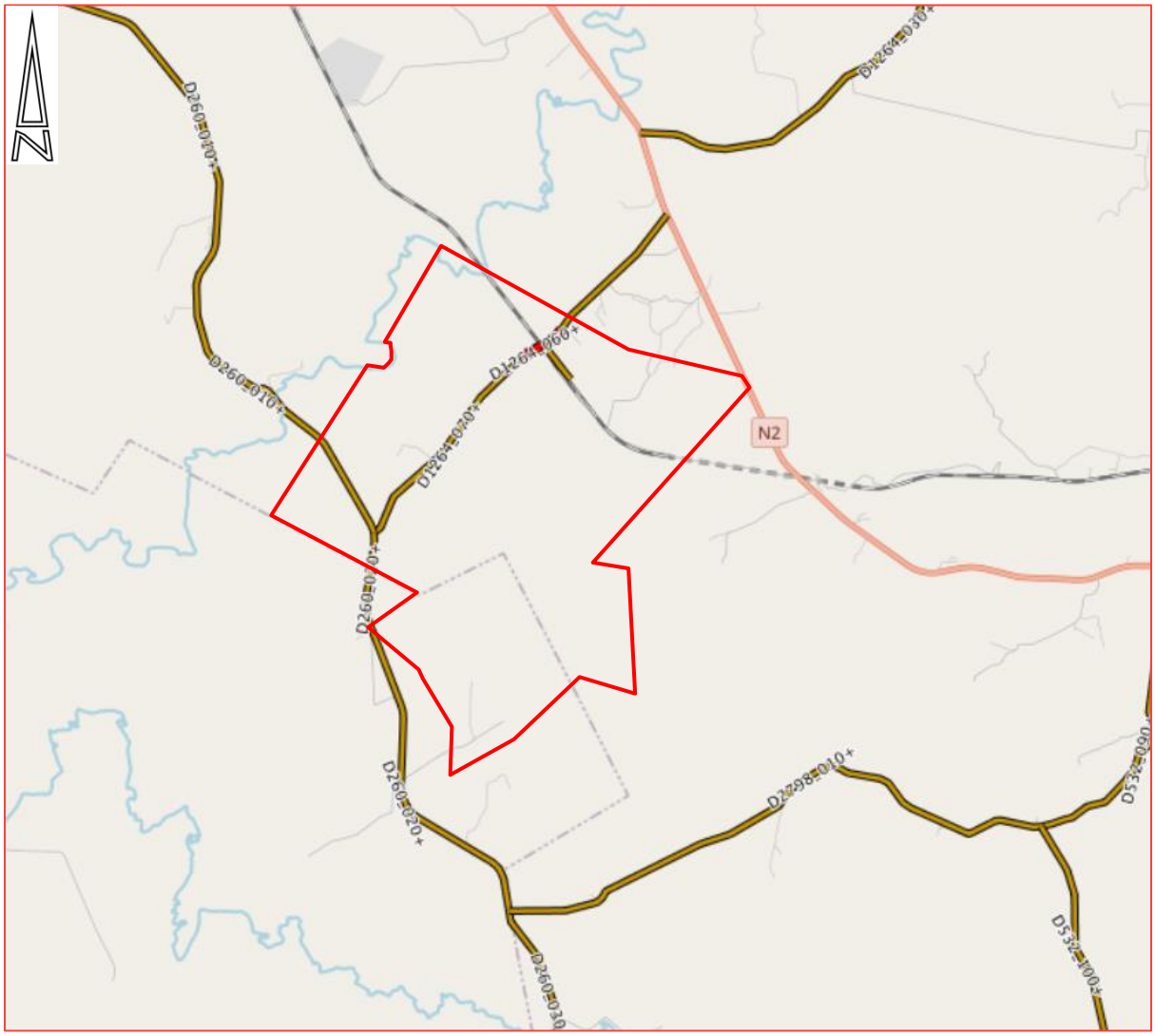

Figure 3-4 Mpumalanga Province road network

Source: Mpumalanga Road Assess Management - http://mp-rams.co.za/rams/rams.html

3.3 SITE ACCESS

It is recommended that access to the Camden II WEF for the construction and operation phase be obtained via either the the D260 off the N11 or the D1264 off the N2. Refer to Figure 3-5. Both these routes access via the Class 1 National road network and both routes traverse the site. The use of these two roads and the existing accesses will also not require application for temporary or permanent access of the National roads.

If an alternate access off the National roads is required for the construction and/or operational phases, the access location/s will require assessment in terms of sight distance, topography, access geometry and overall safety and suitability. This assessment will require a formal access application and approval from SANRAL.

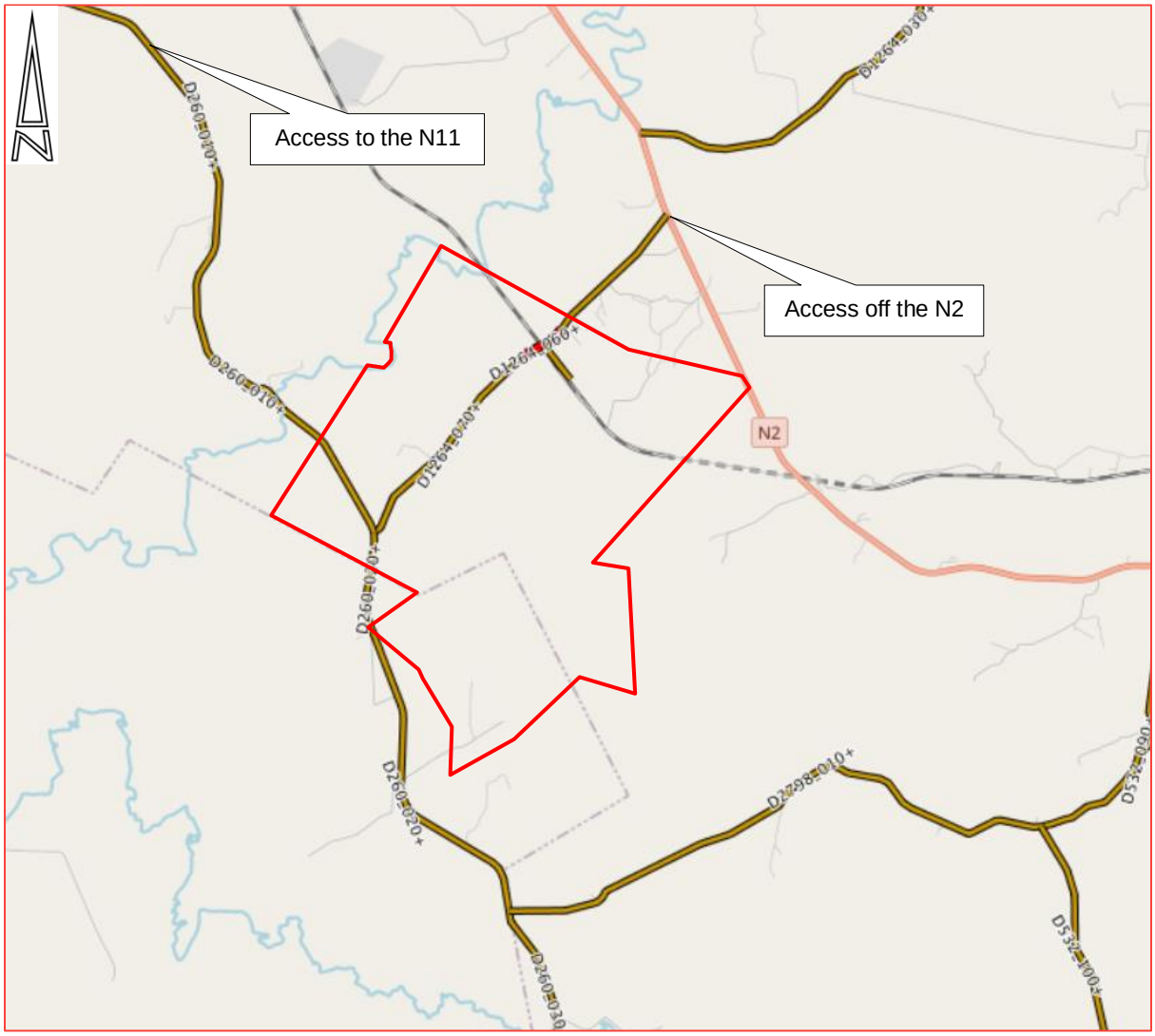

Figure 3-5 Proposed site access

3.4 INTERNAL SITE ACCESS ROADS

The internal access roads are shown in Figure 3-6. These roads will take access off the D1264 and D260 at T-junctions and 4-way crossings. Due to the low construction and operation traffic volumes, these intersections are expected to operate far below capacity. No additional analysis therefore required.

The expected traffic increase on the district roads during the construction phase may result in limited deterioration of the roads, as they are not designed for abnormal loads.

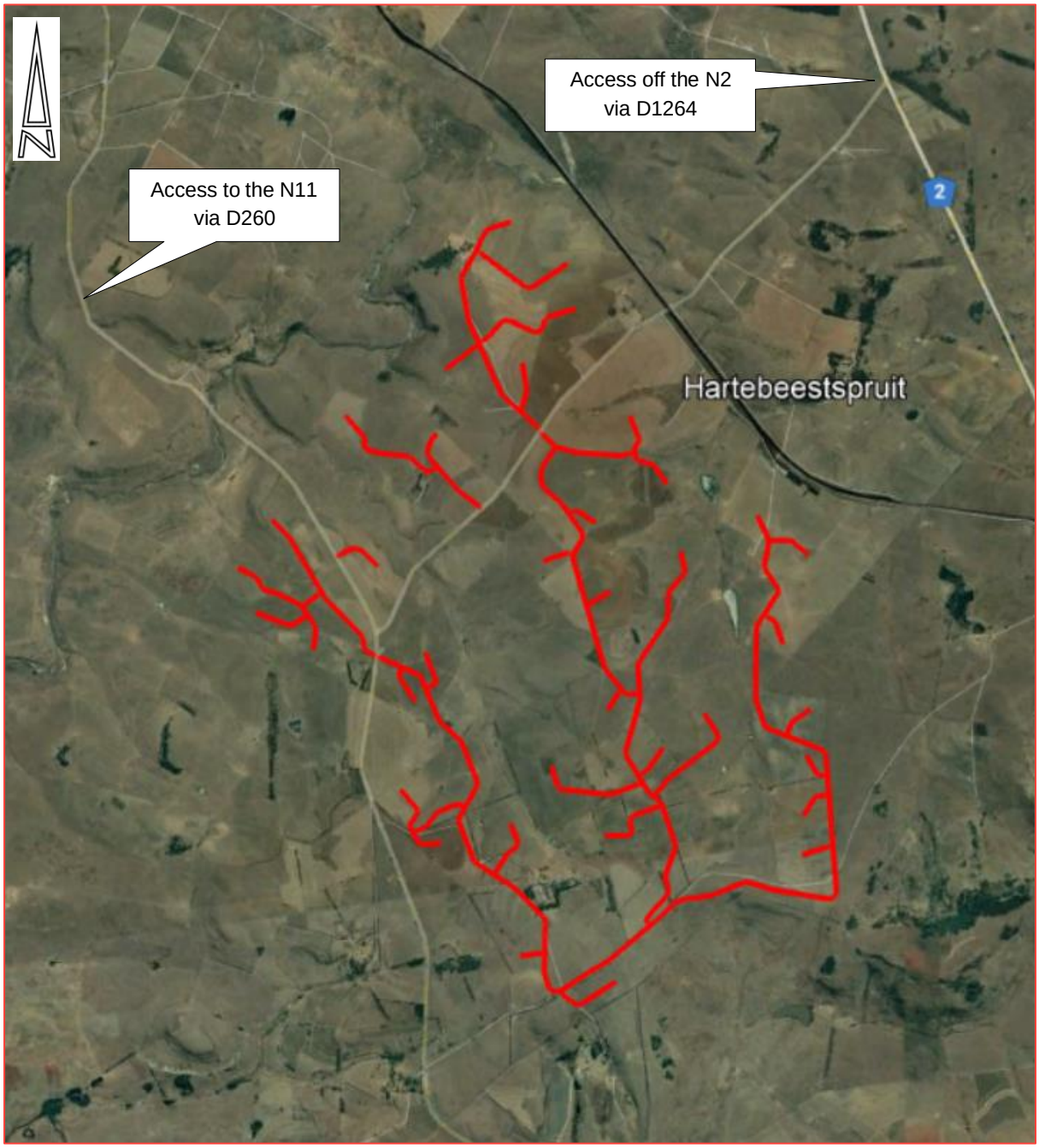

Figure 3-6 Proposed internal access roads

4 PARKING ASSESSMENT

The proposed on-site parking provision will be limited to the following:

- Construction phase – temporary parking for construction staff and construction deliveries.
- Operational phase – parking for operational & maintenance staff vehicles.

All parking will be accommodated on-site.

5 PUBLIC & NON-MOTORISED TRANSPORT ASSESSMENT

In terms of the National Land Transport Transition Act (NLTTA) 22 of 2000, section 29, it is a requirement that an assessment of public and non-motorised transport be included in a transport impact assessment.

Due to the remote location of the site on private farms, public access will not be allowed or required during the construction or operational phases of the project. There is therefore no need for public transport or non-motorised transport infrastructure.

There will be a need for limited public transport services for staff during the construction phase, refer to Section 6. These services can be provided by local operators from Ermelo or other local towns, if required.

6 TRAFFIC FLOWS & TRIP GENERATION

6.1 EXISTING TRAFFIC FLOWS

The existing traffic volumes on the National and District roads were not sourced, as it falls outside the scope of work and is not required.

6.2 LATENT TRAFFIC

Refer to Section 8: Cumulative Transport Impact Assessment.

6.3 DEVELOPMENT TRIP GENERATION

The South African Trip Data Manual (TMH17) does not contain estimates for expected trip generation of a wind power facility of this nature. The following sections estimates the expected trip generation from information provided by the Client.

6.3.1 CONSTRUCTION PHASE TRAFFIC

The construction phase of the facility will generate the only notable traffic that requires assessment. Construction traffic will include vehicles for material and component deliveries, construction staff and all other associated personnel. Trips will include the delivery of over-sized components such as the rotor blades, mast sections and generators. The route/s between the origin of the material and components and the facility may be National, Provincial or Local roads, and each authority will be required to provide the necessary permits for the transportation of any oversized or weight components.

The construction phase traffic was estimated based on the assumptions listed per traffic generator source.

CONSTRUCTION STAFF TRIP GENERATION

- An estimated construction period of 24 months, with a variable number of staff required depending on the construction phase.
- An estimated maximum of 250 workers will be on-site every day during the peak construction period.
- Workers will not be accommodated on-site.
- 90% of the work force (unskilled and semi-skilled workers) is expected to utilise public transport to site from neighbouring towns, most notably Ermelo which is located approximately 30km away.
- It is unlikely that bus transport will be available, therefore all public transport trips will be via minibus taxi, with an average 16 person per vehicle occupancy.
- Staff will not utilise non-motorised transport (NMT), such as cycling or walking to site due to the excessive distances to the closest towns.
- 10% of the work force is expected to travel to site by private car, with an average occupancy of 1.5 persons.

— It is assumed that the public transport vehicles will not remain on-site during the workday, therefore all these vehicles will arrive and again depart during the AM and PM peaks.

Refer to Table 6.1 for the total trip generation for the construction staff per facility.

Table 6-1: Total peak hour trip generation – construction staff

STAFF TYPE	*TOTAL PERSONS PER DAY*		
Unskilled/Semi-skilled staff (Maximum workers per day)	225		
Skilled staff (Maximum workers per day)	25		
Total (Maximum workers per day)	**250**		
TRIP TYPE	**TOTAL (VEH/HR)**	**IN (VEH/HR)**	**OUT (VEH/HR)**
AM Peak hour per mini-bus trips	30	15	15
AM Peak hour private vehicle trips	17	17	
Total AM peak hour trips	**47**	**32**	**15**

CONSTRUCTION MATERIAL TRIP GENERATION

— It is proposed to construct a maximum of 50 wind turbines and support buildings.
— The turbine towers are expected to have a hub height of up to 200m, with a rotor diameter of up to 200m.
— Each 200m diameter turbine rotor will require 3 blades of up to 100m long each (maximum). Rotor blades will be manufactured abroad and imported via the most suitable Port. The dimensions of the blades, their point of origin and the resultant route between the Port and the site will determine the vehicle type and special permits that may be required for the transportation of these blades. The most feasible import point is the Port of Richards Bay, approximately 400km away, with direct access via the N2 Freeway.
— The tower masts may be constructed of tubular steel, concrete, and/or hybrid (steel/concrete) type.
— The trip generation of the steel mast option was assessed, as these will have the highest number of abnormal loads to site, and associated impact on the local road network.
— The tower masts will be constructed of tubular steel, manufactured off-site in sections up to 30m, and are lifted into place on site. Similar to the blades, the type of tower mast components (steel, concrete, hybrid) will determine their origin, port of entry (if imported) and delivery route to the site.
— The route/s between the origin (port of entry) of the oversize/weight components and the site may be National, Provincial or Local roads. The transportation of any oversized or overweight freight along these routes will require authorisation from all the relevant road authorities.
— It is recommended that an abnormal vehicle route management plan be undertaken when the port/s of entry are confirmed. This plan will cover all aspects such as horizontal and vertical vehicle requirements, bridges along the route, speed limits, etc. These plans and the application for the abnormal permits is normally the responsibility of the logistics company that will transport the components to site.

Assumptions were made to estimate the expected trip generation of the construction phase, refer to Table 6.2.

- For trip generation purposes, only the steel mast option was assessed, as these will have the highest number of abnormal loads to site, and highest associated impact on the local road network.
- Each mast will consist of 7 x 29 m steel segments. One segment can be delivered per vehicle trip.
- One rotor blade can be transported on an abnormal size vehicle.
- Concrete foundations of approximately of 25m diameter x 4.5m deep are required, reinforced with 100 tons of steel.
- Approximately +/- 2500m³ concrete per foundation (higher conservative volume used).
- The foundation dimensions may vary as required by the geotechnical conditions.
- Concrete foundation will be constructed to support a mounting ring.
- Excavation of approximately 1000m² per foundation will be required in sandy soils due to access requirements and safe slop stability requirements.
- Concrete will be batched on-site at a temporary plant. Gravel, sand and cement will be transported to site via the local road network, in 45 ton loads per truck, and then stored on site until required.
- Steel is transported in 40 ton loads on standard flatbed vehicles.
- Component and material deliveries will take place over a period of 24 months. It is assumed that deliveries will take place on 80% of all working days for a conservative trip generation estimate.
- A total of 7 558 delivery trips (Total in & out) will be required during the 24 months of construction, which is approximately 20 trips a day (Total in & out).
- The delivery of materials during the AM and PM peak hours will therefore be low, as trucks will arrive and depart throughout the day. If a conservative maximum 10% of the daily trips are generated during the AM and PM peaks, a total of less than 4 trips per peak hour is expected, which is negligible.

Table 6-2 Estimated maximum Construction phase trip generation

	Mast components (no.)	Rotor blades (no.)	Rotor	Nacelle	Generator	Foundation material	
						Concrete (m³)	Steel (tons)
No. of turbines: 1	7 x 29 m length steel sections	3 x 100m length	1	1	1	2 500	100
No. of turbines: 50 (maximum)	350	150	50	50	50	125 000	5 000
No. of vehicle trips (in & out)	**700**	**300**	**100**	**100**	**100**	**6 008**	**250**
Total no. of trips: Construction phase (in & out)	**7558**						
Total no. of trips: per workday (in & out)	**20**						
Total no. of trips: per workday peak hour (in & out)	**2**						

TRIP GENERATION SUMMARY

Refer to Table 6.3 for the expected combined trip generation for the facility during construction.

Table 6-3: Total maximum peak hour trip generation

CAMDEN II	Vehicle Trips per Peak hour								
	Staff			Material deliveries			Total		
	In	Out	Total	In	Out	Total	In	Out	Total
Total	32	15	**47**	1	1	**2**	33	16	**49**

Engineers opinion: The above trip generation calculation represents is fairly conservative (high).

In conclusion, the transport impact of the facility on the local and National major road network is expected to be negligible, also refer to Section 7. A development that develops less than 50 peak hour vehicle trips do not require a traffic impact assessment, as the volume is below the threshold required by the TMH16 manual for Traffic Impact Assessments.

6.3.2 OPERATIONAL PHASE TRAFFIC

The operational phase of the facility will require a negligible number of temporary or permanent staff. The vehicle trips that will be generated by the personnel accessing the site will therefore be negligible, and the associated transport impact on the surrounding road network will be negligible.

6.3.3 DECOMMISIONING PHASE TRAFFIC

Following the initial 20-year operational period of the facility, its continued economic viability will be investigated. If it is still deemed viable its life may be extended; if not, it will be decommissioned. If it is completely decommissioned, all the components will be disassembled, reused and recycled or disposed of.

It is not possible to determine the volume of traffic that will be generated during the decommissioning phase. It is however expected that the volumes will be lower than during the construction phase, and the resultant transportation impact on the local road network will be lower than during the Construction phase.

6.4 CAPACITY ANALYSIS

A capacity analysis of the potential access intersections off the N2 and N11 was not undertaken and is not required for a development with such a low daily and peak hour traffic generation. However, the safety of these intersections may be compromised due to the increase in especially heavy vehicle volumes off the National Roads.

The intersection of the D260 off the N11 has a short right-turn lane off the N11 northbound and a short left-slip off the N11 southbound. No intersection upgrades are required.

The estimated low construction and operation phase traffic that may use the D1264 does not justify the construction of additional turning lanes at its intersection with the N2.

6.5 INTERSECTION SAFETY ASSESSMENT

The following recommendations are made to improve the safety of the access intersections off the N11 and N2 during the construction phase. Note these upgrades should be the responsibility of the Provincial Road Authority and SANRAL, as these are general safety improvements. The developer has however stated that they will undertake these upgrades, if permitted to do so by the relevant authorities.

N11 / D260

Should approval be granted by the relevant authority, provide additional warning signs as follows:

- Install a Stop Signs (R1.1) on the D260 at the intersection with the N11
- Install a side road junction warning signs (W108) on the southern approach of the N11, located approximately 100m from the intersection.
- Install truck crossing warning sign (W345) with the W108 sign.
- Install truck crossing warning sign (W345) with the staggered junction warning sign located on the northern approach of the N11.

N2 / D1264

Should approval be granted by the relevant authority, provide additional warning signs as follows:

- Install a Stop Signs (R1.1) on the D1264 at the intersection with the N2
- Install a truck crossing warning sign (W345) with the W108 sign located on the northern approach of the N2.
- Install a truck crossing warning sign (W345) with the W107 junction warning sign located on the southern approach of the N2.

7 ENVIRONMENTAL IMPACT ASSESSMENT: TRANSPORT

7.1 IMPACT ASSESSMENT METHODOLOGY

7.1.1 INTRODUCTION

The EIA for the proposed facility, of which this TIA is an informant, uses a methodological framework developed by WSP to meet the combined requirements of international best practice and NEMA, Environmental Impact Assessment Regulations, 2014 (GN No. 982) (the "EIA Regulations").

7.1.2 ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[2], indirect[3], secondary[4] as well as cumulative[5] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[6] presented in Table 7-1.

[2] Impacts that arise directly from activities that form an integral part of the Project.
[3] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[4] Secondary or induced impacts caused by a change in the Project environment.
[5] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[6] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

Table 7-1: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

7.1.3 IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the

footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in Figure 7-1.

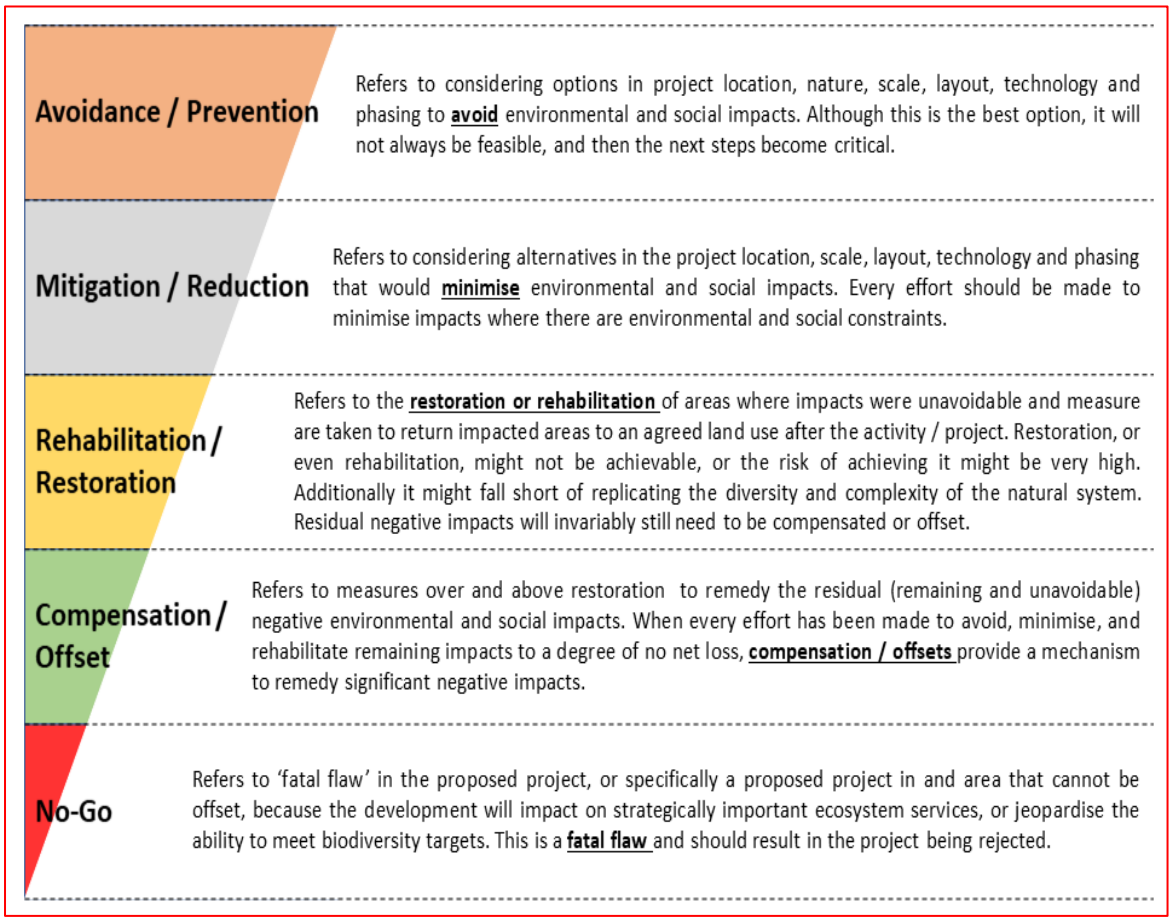

Figure 7-1 Mitigation Sequence/Hierarchy

7.2 ASSESSMENT RESULTS

- Refer to Table 7-2 for the Construction Phase traffic related environmental impact assessment of the proposed facility.
- The Operational phase traffic impact was not assessed, as the trip generation during this phase will be negligible, with a negligible impact.
- The Decommissioning phase traffic impact will be similar to the Construction Phase traffic and was not assessed separately.

Table 7-2: Impact assessment - Construction phase

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation							Mitigation Measures
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating	
1:	Noise, dust & exhaust pollution due to vehicle trips on-site	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Construction	Negative	Easy	2	1	1	1	5	**25**	**N2**	1	1	1	1	2	**8**	**N1**	• All unsurfaced roads must be regularly sprayed with water to prevent dust generation • All vehicles that travel on-site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel on-site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N2 - Low**							**N1 - Very Low**							
2:	Noise, dust & exhaust pollution due to additional trips on the national and district roads	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Construction	Negative	Easy	2	2	1	1	5	**30**	**N2**	1	2	1	1	2	**10**	**N1**	• All unsurfaced roads must be regularly sprayed with water to prevent dust generation • All vehicles that travel to site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel to site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N2 - Low**							**N1 - Very Low**							

7.3 SUMMARY

The overall significance of each impact during the Construction Phase of the Camden II WEF detailed in Table 7-2 is Low without mitigation, and Very Low with mitigation. The impacts are limited to the peak construction period only, site only/local or regional, and fully reversible.

The proposed mitigating measures are easy to implement and will assist to either prevent or reduce the impacts of increased vehicle engine and tyre noise, exhaust fumes and generation of dust on unsurfaced roads and unnecessary road damage.

8 CUMULATIVE TRANSPORT IMPACT ASSESSMENT

8.1 BACKGROUND

The DFFE requested that a cumulative transport impact assessment be undertaken of the latent power facilities in the vicinity of the Camden II WEF.

8.2 LATENT DEVELOPMENTS

The only known latent development in the vicinity of the Camden II WEF is the proposed Camden I WEF, solar PV and BESS. This facility will also take access off the N11 and potentially the N2 during its construction and operational phases.

Refer to the WSP report: Camden I Transportation Impact Assessment, dated June 2022. The location of the Camden I and Camden II facilities are shown in

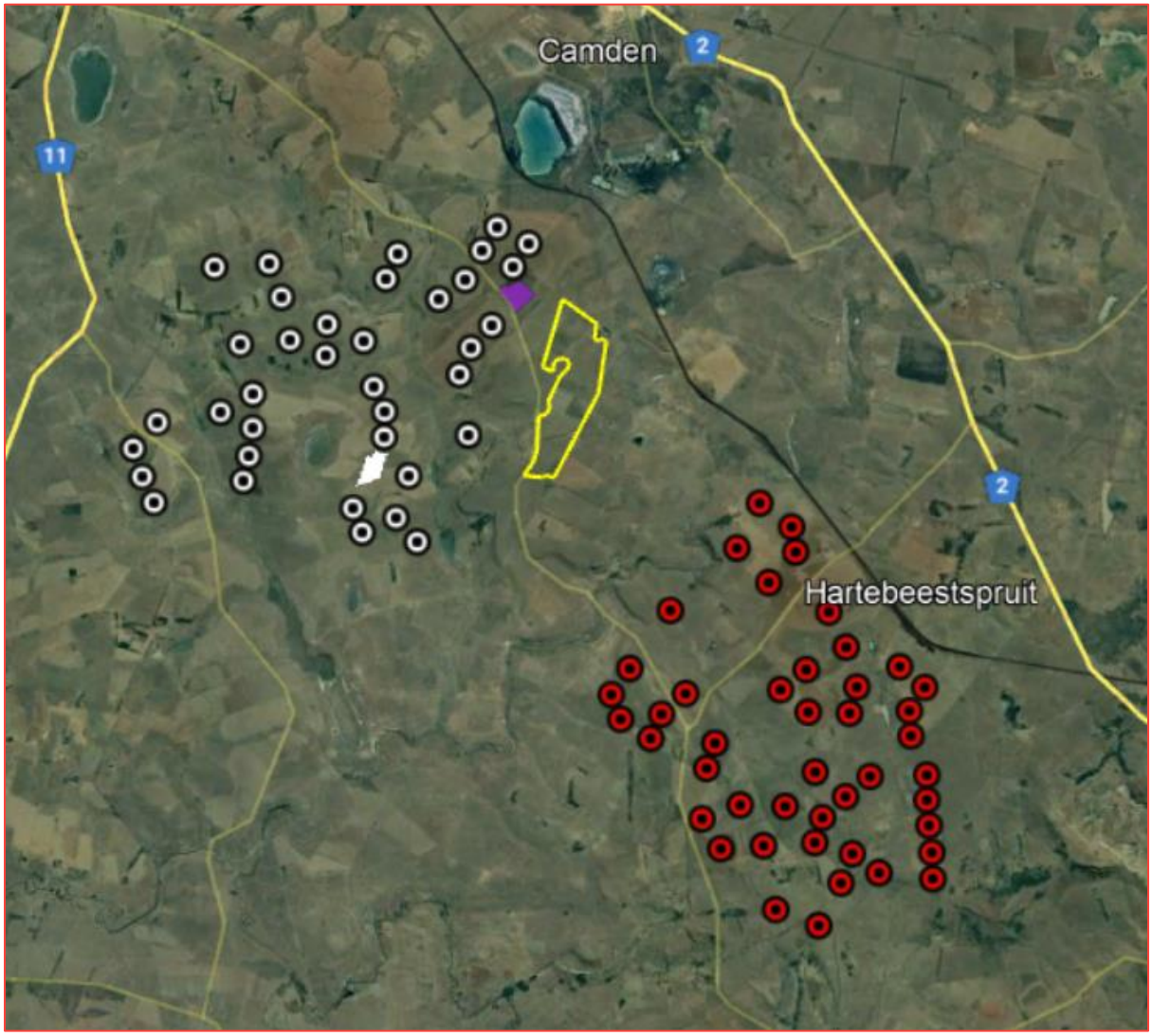

Figure 8-1

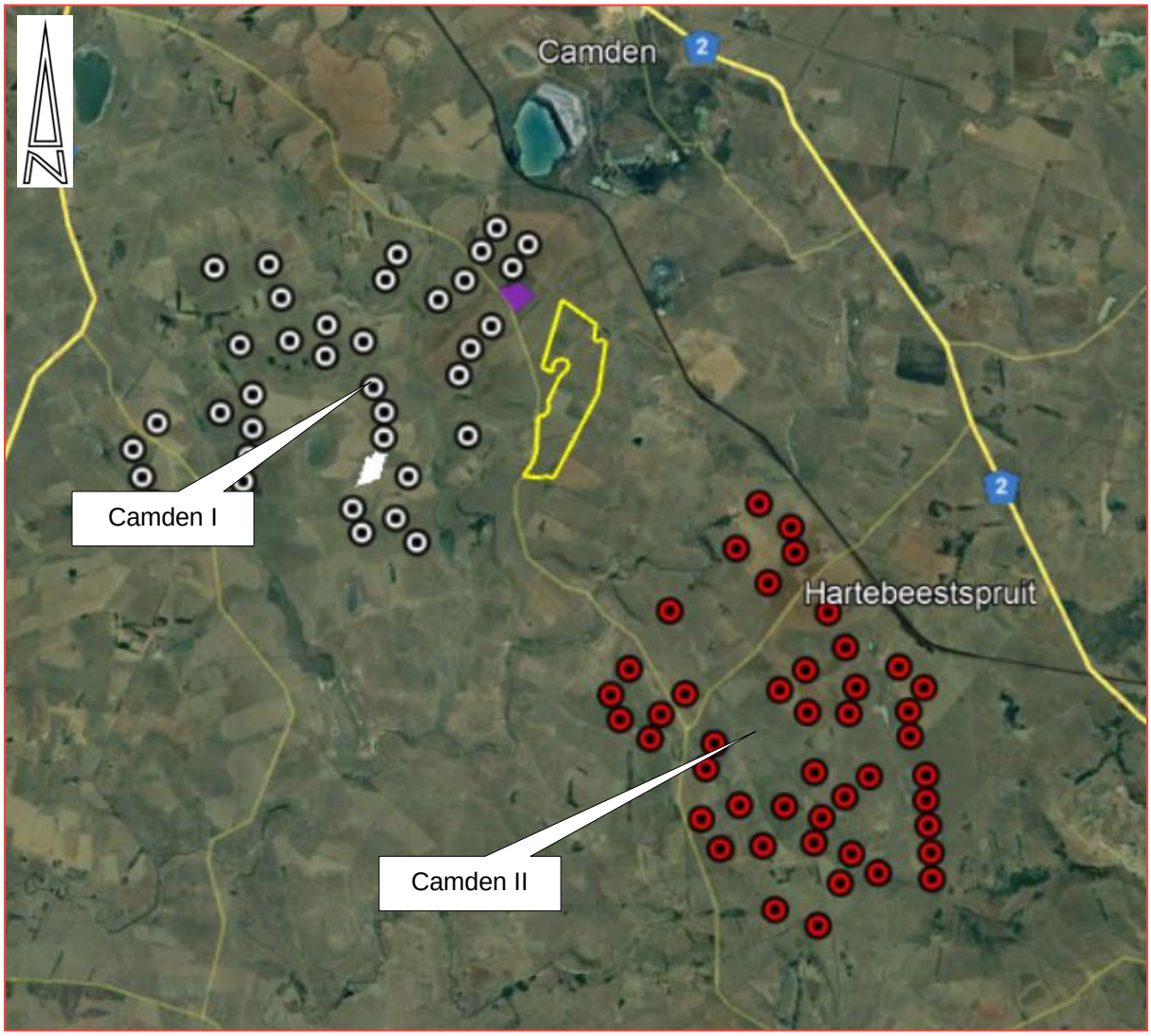

Figure 8-1 Location of Camden I & Camden II Renewable Energy Complex

8.3 CUMULATIVE TRANSPORT IMPACTS

Refer to Table 8-1 and Table 8-2 for the expected cumulative transport impacts on the local road network due to the latent Camden II facility.

Table 8-1: Cumulative impact assessment - Construction phase: Camden I Ammonia, Solar PV, WEF facilities & Camden II WEF

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation							Mitigation Measures
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating	
1:	Noise, dust & exhaust pollution due to vehicle trips on both the Camden I & II sites	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Construction	Negative	Easy	2	1	1	1	5	**25**	**N2**	1	1	1	1	2	**8**	**N1**	• All unsurfaced roads must be regularly sprayed with water to prevent dust generation • All vehicles that travel on-site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel on-site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N2 - Low**							**N1 - Very Low**							
2:	Noise, dust & exhaust pollution due to additional trips on the national and district roads	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Construction	Negative	Easy	2	2	1	1	5	**30**	**N2**	1	2	1	1	2	**10**	**N1**	• All unsurfaced roads must be regularly sprayed with water to prevent dust generation • All vehicles that travel to site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel to site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N2 - Low**							**N1 - Very Low**							

Table 8-2: Cumulative impact assessment – Operation phase: Camden I Ammonia, Solar PV, WEF facilities & Camden II WEF

Impact number	Aspect	Description	Stage	Character	Ease of Mitigation	Pre-Mitigation							Post-Mitigation							Mitigation Measures
						(M+	E+	R+	D)x	P=	S	Rating	(M+	E+	R+	D)x	P=	S	Rating	
1:	Noise, dust & exhaust pollution due to vehicle trips on both the Camden I & II sites	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Operation	Negative	Easy	3	2	3	4	4	**48**	**N3**	2	2	1	4	3	**27**	**N2**	• All unsurfaced roads must be regularly sprayed with water to prevent dust generation • All vehicles that travel on-site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel on-site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N3-Moderate**							**N2 - Low**							
2:	Noise, dust & exhaust pollution due to additional trips on the national and district roads	• Vehicle engine noise • Vehicle tyre noise • Dust generation on unsurfaced roads • Vehicle exhaust fumes	Operation	Negative	Moderate	3	3	3	4	4	**52**	**N3**	2	3	1	4	3	**30**	**N2**	• Unsurfaced district roads will require more regular maintenance • All vehicles that travel to site must be roadworthy to ensure noise and emissions levels comply to national vehicle standards, thereby minimising noise/exhaust pollution • All vehicles that travel to site must not be overloaded, and abnormal vehicles must comply to relevant legislation for overweight loads, to ensure lowest possible road surface damage.
Significance						**N3-Moderate**							**N2 - Low**							

8.4 SUMMARY

- The maximum traffic generation of the Camden I and Camden II facilities are expected to occur at the same time for the construction phase, as the facilities will be developed concurrently. The cumulative impact will be very low on the site and local road network during construction, with the implementation of the recommended mitigations.
- The maximum traffic generation of the Camden I and Camden II facilities are expected to occur at the same time for the operation phase, as the facilities will be operated concurrently. The cumulative impact will be low on the site and local road network during the operation phase, with the implementation of the recommended mitigations.
- It should be noted that the Significance of the transport impact of the Camden II facility is far lower than the expected significance of the Camden I facilities for the construction and operation phases.
- The cumulative impact of the decommissioning phases of the Camden I and Camden II facilities were not assessed, as it cannot be determined if these phases will occur concurrently, if ever.

9 CONCLUSIONS & RECOMMENDATIONS

Based on this study, the following key conclusions and recommendations are relevant:

- The proposed Camden II Wind Energy Facility will be located approximately 12km south of Camden in the Msukaligwa Local Municipality of the Gert Sibande District Municipality in Mpumalanga Province.
- The Camden II WEF will be located over the following ten farm portions, with a total area of 5000 ha:
  - Portion 0, Farm 296, Adrianople
  - Portion 1, Farm 296, Adrianople
  - Portion 2, Farm 296, Adrianople
  - Portion 3, Farm 296, Adrianople
  - Portion 3, Farm 297, Buhrmanvallei
  - Portion 4, Farm 297, Buhrmanvallei
  - Portion 5, Farm 297, Buhrmanvallei
  - Portion 3, Farm 327, De Emigrate
  - Portion 6, Farm 327, De Emigrate
  - Portion 5, Farm 326, Klipfontein
- The facility will be a 200 MW Wind Energy Facility of maximum 50 turbines, each with a 200m diameter rotor, 3 x 100m long blades and a 200m hub height.
- The Scope of the TIA was informed by the Committee of Transport Officials' South African Traffic Impact and Site Traffic Assessment Manual, TMH16, Vol. 1, Version 1, August 2012.
- A single short term (2 year) implementation was assumed for analysis purposes.
- There are no known planned road upgrades in the study area.
- There are no known large scale latent developments in the vicinity of the site that may have an impact on the local road network, except for the latent energy developments that were assessed as part of the Cumulative Impact Assessment, the Camden I facility.
- Access to the site will be via the existing access of the D260 to the N11 and the D1264 off the N2.
- Construction and operational phase parking will be accommodated on-site.
- There is no need for public transport services or non-motorised transport infrastructure to serve the site for the construction and operational phase, except for the transport of staff.
- The estimated peak trip generation of the facility will be 48 veh/hr in the weekday AM and PM peaks during the Construction phase.
- The expected traffic increase on the district roads during the construction phase could result in damage to the unsurfaced roads, as they are not designed for abnormal vehicles. The repairs, if required, should be the responsibility of the Contractor and the Provincial road authority.
- The trip generation during the Operational phase will be negligible.
- It is not possible to determine the volume of traffic that will be generated during the decommissioning phase. It can however be expected that the volumes will be lower than during the construction phase, and the resultant transport impact on the local access roads will be lower than during the Construction phase.
- The transport route/s between the origin of the turbine components and the facility may be National, Provincial or Local roads; and each authority will be required to provide the necessary permits for the transportation of any oversized or abnormally heavy components.

- It is recommended that an abnormal vehicle route management plan be undertaken when the port/s of entry of the tower components (masts, blades, rotor nacelles, generators, etc.) are known. These plans should include all aspects such as horizontal and vertical requirements along the routes, bridges along the route, speed limits, etc. These plans and the application for the abnormal permits is normally the responsibility of the logistics company that will transport the components to site.
- A capacity analysis of the access intersections off the N2 and N11 was not undertaken and is not deemed necessary for a development with such low daily and peak hour traffic generation.
- The safety of the intersections off the National roads may be compromised due to the increase in especially heavy vehicle volumes. It is recommended that additional temporary and permanent road signage is installed at the intersections of the D260/N11 and the D1264/N2 to improve the safety of the intersections. The developer has undertaken to implement the required signage to the relevant Provincial and SANRAL standards, if allowed to do so.
- The overall significance of each impact during the Construction Phase of the facility detailed in Table 7-2 is Low without mitigation, and Very Low with mitigation. The impacts are limited to the peak construction period only, site only/local or regional, and fully reversible.
- The proposed mitigating measures are easy to implement and will assist to either prevent or reduce the impacts of increased vehicle engine and tyre noise, exhaust fumes and generation of dust on unsurfaced roads and unnecessary road damage.
- The maximum traffic generation of the Camden I and Camden II facilities are expected to occur at the same time for the construction phase, as the facilities will be developed concurrently. The cumulative impact will be very low on the site and local road network during construction, with the implementation of the recommended mitigations.
- The maximum traffic generation of the Camden I and Camden II facilities are expected to occur at the same time for the operation phase, as the facilities will be operated concurrently. The cumulative impact will be low on the site and local road network during the operation phase, with the implementation of the recommended mitigations.
- It should be noted that the Significance of the transport impact of the Camden II facility is far lower than the expected significance of the Camden I facilities for the construction and operation phases.
- The cumulative impact of the decommissioning phases of the Camden I and Camden II facilities were not assessed, as it cannot be determined if these phases will occur concurrently, if ever.

It is concluded that the proposed Camden II Wind Energy Facility will have a negligible transport impact on the adjacent road network, and it is recommended that the TIA should be accepted as part of the EIA application.

BIBLIOGRAPHY

- South Africa Committee of Transport Officials TMH 17 South African Trip Data Manual, Version 1.01, September 2013.
- South Africa Committee of Transport Officials, South African Traffic Impact and Site Traffic Assessment Manual, TMH16, Vol. 1, Version 1, August 2012.
- Journal of the South African Institution of Civil Engineering, Vol.57, December 2015, Technical Paper. A study on the design and material costs of tall wind turbine towers in South Africa, AC Way, GPAG van Zijl.

APPENDIX