INNOVATIVE
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Transport Impact Assessment

Haga Haga WEF Part 2 EA Amendment

East London, Eastern Cape

September 2020

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Report Type	Transport Impact Assessment
Title	Haga Haga WEF Part 2 EA Amendment
Client	Coastal and Environmental Services (Pty) Ltd
Location	East London, Eastern Cape
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Project Number	ITS 3800.1
Date	September 2020
Report Status	Final
File Name:	G:\3800.1 TIA Haga Haga Wind Farm Revised Layout\12 Reports\Issued\3800 TIA Haga Haga WEF Part2 EA Amendment_FinalReport_PA_2020-09-14.docx

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)

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

It is proposed to develop a site on various land parcels in the area to the north of Haga Haga for a wind energy facility (wind farm) for the generation and transmission of electricity from wind generators with associated infrastructure. Innovative Transport Solutions previously conducted a transport impact assessment (TIA) for the Haga Haga WEF with the latest report dated July 2018. The turbine layout has now been amended and this report summarises an investigation of the transport impact related to the construction phase and operational phase of the amended wind farm layout and provides mitigation measures where necessary.

2.0 LOCALITY

The Wind Energy Facility is located to the north of the Haga Haga area in the Eastern Cape. The site is approximately 10 kilometres to the west of Kei Mouth and 5 kilometres to the north of Haga Haga. Refer to **Figure 1** in Appendix A for a Locality Plan.

3.0 PROPOSED DEVELOPMENT

The WEF will now consist of a maximum of 36 turbines. The turbines will be mounted on cylindrical steel or concrete towers with a maximum hub height of 180 metres. Each turbine rotor has three blades with a maximum rotor diameter of 200 metres. The proposed site layout is illustrated in **Figure 2**.

Components to be imported will be shipped to Coega harbour and then transported by road over a distance of approximately 320 km to the site depending on the load restrictions. Specialized high lifting and heavy load capacity cranes will be utilized to erect the turbines. The wind farm will be built in one phase, with a total construction period of between 18 to 30 months.

Refer to **Figure 2** in Appendix A for a Site Layout Plan.

4.0 TRAFFIC ANALYSIS SCOPE

This report evaluates the expected traffic impact of the proposed development during the construction phase and during the operational phase. The report will identify the possible access routes to the site, comment on the condition of the existing roads in the site vicinity, identify possible access points to the site and recommend road improvements to the surrounding road network.

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 Haga Haga Wind Farm.

5.0 EXISTING CONDITIONS

Roads included in this study are the National Road (N2), the R349 and several other Provincial roads in the site vicinity. The existing roadway characteristics are summarised in **Table 1**. During the construction phase of the Haga Haga Wind Farm an increase in normal and heavy vehicle traffic is expected along the roads in the site vicinity. The higher traffic volumes will result in an increased impact due to gravel loss and dust pollution during the construction phase.

Table 1: Existing Roadway Facilities

Roadway	Type of Road	Posted Speed (km/h)	Road Surface
N2	National Road	120	Paved/Tar
R349 (MR695)	Provincial Main Road	100	Paved/Tar
MR697	Provincial Main Road	100	Paved/Tar
MR694	Provincial Main Road	Not posted Assumed 60	Gravel
MR696	Provincial Main Road	60	Paved/Tar
DR2766	Provincial Divisional Road	Not posted Assumed 60	Gravel
MN10124	Provincial Minor Road	N/A	Gravel
MN10132	Provincial Minor Road	N/A	Gravel
MN10135	Provincial Minor Road	N/A	Gravel

5.1 Existing Cross Sections and Surface Conditions

In the vicinity of the proposed development, the N2 has a typical rural formation of a National Road, paved with one lane per direction of travel with paved shoulders along both sides of the road. The lanes are 3.7m wide with 2m wide shoulders. The typical cross section for the R349 and MR697 is 3.7m wide lanes with 2m wide shoulders. The N2, the R349 and MR697 have good surface conditions in the site vicinity. MR697 is a narrow tarred road less than 6 metres wide. The road surface is in poor condition. MR694 is a 8 metre wide gravel road and the gravel surface is in fair condition with some poor sections. DR2766 is a 6 metre wide gravel road and the gravel surface is in fair condition with some poor sections due to storm water damage. The Provincial Minor Roads are farm roads and the road surfaces are in poor condition. The typical cross-section of the roads in the site vicinity are shown in **Photos 1** to **8** in Appendix B.

5.2 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. The table below illustrates the current annual average daily traffic volumes (AADT), the annual daily truck traffic 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
N2	7 400	950	680	13%
R349 (MR695)	1 280	173	135	14%
R349 (MR697)	580	50	48	9%
MR694	140	12	15	9%
MR696	340	30	30	9%

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.

6.0 SITE ACCESS

Construction access to the different wind turbine locations will be via existing farm access roads off the Provincial roads in the site vicinity as illustrated on the proposed Site Layout Plan **Figure 2** in Appendix A. The access layouts and configurations will be confirmed during the design stage of the project.

The Provincial Minor Roads will need to be widened to at least 8 metres to accommodate the abnormal load vehicles. Private roads and local access roads should also be at least 8 metres wide. The public road network in the site vicinity should be maintained during the construction period and once the construction phase is completed any damage to the surrounding Provincial Road Network should be repaired to an acceptable standard.

7.0 TRANSPORT ROUTE

Based on the abnormal load requirements, a preliminary route as outlined in **Figure 3** is proposed for transporting the large equipment from the Coega harbour to the site. The route goes via National Road N2 passing the Colchester, then continue along the National Road N2 eastbound bound through Grahamstown, King William's Town and East London and then northbound along the N2 up to the Provincial Main Road R349 and then via the R349 eastbound to the site.

The final route will have to be checked for compliance during the final design stages of the project. 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.

The N2 route between Coega and East London has not yet been identified as one of the cleared routes for abnormal loads. However, based on the preliminary route evaluation the route is acceptable from a transport impact perspective. The specific routes through towns need to be confirmed with the permit application. Possible constraints at intersections, interchanges and overpasses will also be confirmed during the permit application process based on the characteristics of each load. Based on the information currently available no issues are expected along the route and the turbine components can be imported via the Coega harbour.

Some components can also be manufactured locally in Cape Town and can be transported to site via the N1 up to Beaufort West, then via the R61 to Aberdeen, the N9 to Graaf-Reinett, the R63 to King William's Town and then via the N2 through East London up to the R349 and the site.

8.0 TRAFFIC IMPACT ANALYSIS

The expected effects of traffic that would be generated by the proposed development during peak hours were analysed as follows:

- The **background traffic** volumes were determined for the study network in the vicinity of the site. These are the traffic volumes that would be on the road network in the absence of the proposed development (No go Alternative);

- A growth factor was applied to account for regional growth
- Construction Phase Traffic
- **Site-generated trips** were estimated for the proposed development;
- The construction phase traffic and the assigned site-generated traffic from the proposed development were added to the **background traffic** volumes to determine the **total traffic** conditions during the construction phase and with the development completed.

8.1 Year 2025 Background Traffic Conditions (No go alternative)

For the purposes of this study, year 2025 background traffic volumes were developed by applying a 3.0 *percent annual traffic growth rate* to the existing traffic volumes on the major links. This estimated growth rate was assumed to allow for the additional traffic volumes that will be generated by other in-process and future developments in the vicinity of the proposed development.

Due to the low traffic volumes along the surrounding road network it is expected that the road network will continue to operate at acceptable levels-of-service during the background conditions. The roads in the site vicinity are in a fair condition and no major maintenance will be required in the near future.

8.2 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 75 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 Coega harbour and approximately 12 abnormal truck loads are required per wind turbine.

8.2.1 Trip Generation

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 36 wind turbines will be constructed over the 18-month period. These assumptions are considered a possible worst case scenario.

Table 3: Expected Generated Truck Trips during the Construction Phase

Material	Approximate Number of Trucks loads required
Foundations	2 700
Construction Cranes	100
Tower Sections	180
Nacelles	36
Blades	108
Switch Cabinets	72
TOTAL	**3 196**

Although the construction period can be between 18 to 30 months, for the purposes of this study it is assumed that most the construction work can be completed within an 18-month period to represent a possible worst-case scenario. It is expected that approximately 3 200 trucks loads will be required during the 18-month construction period, working approximately 450 days during the construction period. This means that on average approximately 7 trucks will visit the site per day which equates to approximately 14 truck trips spread over an eight-hour day.

Based on information sourced from other similar projects it is assumed that approximately 200 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 taxis. If 70 percent of the construction staff travels with minibus taxis with an average occupancy of 12 passengers per vehicle it equates to approximately 12 mini buses visiting the site in the morning and afternoon peak hours. If the remaining 30 percent travel with private vehicles, it equates to approximately 200 motor vehicle and truck trips during the average week day with approximately 85 trips during the a.m. and p.m. peak hours when workers are dropped off or picked up.

8.2.2 Trip Distribution and Assignment

It is expected that many of the trips to/from the proposed Wind Farm will travel via the N2 from direction East London. The trucks delivering the components and equipment will come from the East London area via the N2. Most of the trucks delivering raw material for foundations and road construction material will probably come from commercial sources in the larger East London area.

8.2.3 Proposed Road Network Upgrades

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. During construction it is expected that road surfaces of the gravel roads will require maintenance at regular intervals to prevent damage to the road structure.

Once construction is completed the Provincial roads should be inspected and repaired where necessary. The day to day operation of the proposed Wind Farm will generate relatively low traffic volumes, which can easily be accommodated by the surrounding road network.

8.3 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. The number of permanent staff on site is not expected to be more than 40 people and therefore no additional upgrades are required to accommodate the operational site traffic.

8.4 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 site will be decommissioned. The decommissioning is expected to take between 6 to 12 months. The modular components would be removed and 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 the surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

8.5 Alternative Development Proposals

No other feasible site alternatives have been proposed for the establishment of the proposed wind energy facility. Therefore no site alternatives are evaluated in this report.

8.6 Traffic Management and Transportation 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.

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. No significant road safety issues are expected in terms of possible vehicle and pedestrian conflicts. 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.

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

9.0 CONCLUSIONS AND RECOMMENDATIONS

This transport impact assessment was prepared for the proposed Haga Haga Wind Energy Facility to the north east of East London. This report summarises the existing transportation conditions within the site vicinity and provides an assessment of the transportation impacts of the proposed development 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.

2025 Background Traffic Conditions

- A growth rate of 3 percent per annum was applied to the existing traffic volumes to determine the 2025 background traffic conditions.
- All the intersections and roadways will continue to operate at acceptable levels-of-service in the future during the worst peak hours of the year without the proposed development.

Construction Phase

- It is expected that the construction phase of the proposed development could generate up to 200 vehicular trips during the average weekday of which approximately 12 percent will be heavy truck traffic.
- Access to the site is proposed via existing farm accesses off the Provincial road network in the site vicinity. The access layouts and configuration will be confirmed during the design stage of the project.

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. The number of permanent staff on site is not expected to be more than 40 people and therefore no additional upgrades are required to accommodate the operational site traffic.

Development Alternatives

- No Feasible site alternatives have been identified for the establishment of the proposed wind energy facility. Therefore no site alternatives are evaluated in this report.

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 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 and the surrounding road network has sufficient capacity to accommodate the expected traffic volumes associated with the decommissioning of the wind farm.

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

Based on the evaluation as discussed in this report the existing road network has sufficient spare capacity to accommodate the proposed Haga Haga Wind Energy Facility without any major road upgrades required to the existing road infrastructure. It is recommended that the proposed development be approved from a transport impact perspective.

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Appendix A

Figures

Appendix B

Photographs

Photo 1: Northbound view along the N2 towards the R349 intersection

Photo 2: Westbound view along the R349 towards the Site

Photo 3: North westbound view along MR697 towards MR696

Photo 4: Northbound view along MR696 towards the R349

Photo 5: Eastbound view along MR694 from the R349

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Photo 6: Northbound view along MN10124 from the R349

Photo 7: Southbound view along MN10132 from the R349

Photo 8: Westbound view along MN10255 from MR696