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EIA REPORT:
PROPOSED UMMBILA ELECTRICAL GRID INFRASTRUCTURE MPUMALANGA

TRANSPORT STUDY

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First Issue

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SYNOPSIS

Preparation of a Transport Study for the EIA stage for the electrical grid infrastructure of the proposed Ummbila Emoyeni Solar Energy Facility near Bethal in the Mpumalanga Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

Wind Energy Facility, Electrical Grid Infrastructure, Wind Farm, Transport Study

QUALITY VERIFICATION

This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.

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PROPOSED UMMBILA ELECTRICAL GRID INFRASTRUCTURE TRANSPORT STUDY

TABLE OF CONTENTS

FIGURES

TABLES

ANNEXURES

PROPOSED UMMBILA ELECTRICAL GRID INFRASTRUCTURE TRANSPORT STUDY

1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

Emoyeni Renewable Energy Farm (Pty) Ltd is proposing the development of Electrical Grid Infrastructure (EGI) to support the Ummbila Emoyeni Renewable Energy Farm, shown in Error! R eference source not found.**,** (which will comprise a 666MW Wind Energy Facility and a 150MW Solar Energy Facility) which aims to export energy to the national electricity grid.

The Ummbila Emoyeni Renewable Energy Farm is proposed in response to the identified objectives of national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the renewable energy facilities under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme or a similar programme, with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with the Ummbila Emoyeni Renewable Energy Farm set to inject up to 816MW of electricity into the national grid (wind and solar generation). Similarly, the location of the new generation in the Mpumalanga Province is important in the context of the Just Energy Transition (JET). The Ummbila Emoyeni Projects will provide valuable jobs and socio-economic benefits that are required in an area where coal fired generation will be phased out over the next 10 years. This will be vitally important if the JET is to be successfully implemented and is a transition for everyone.

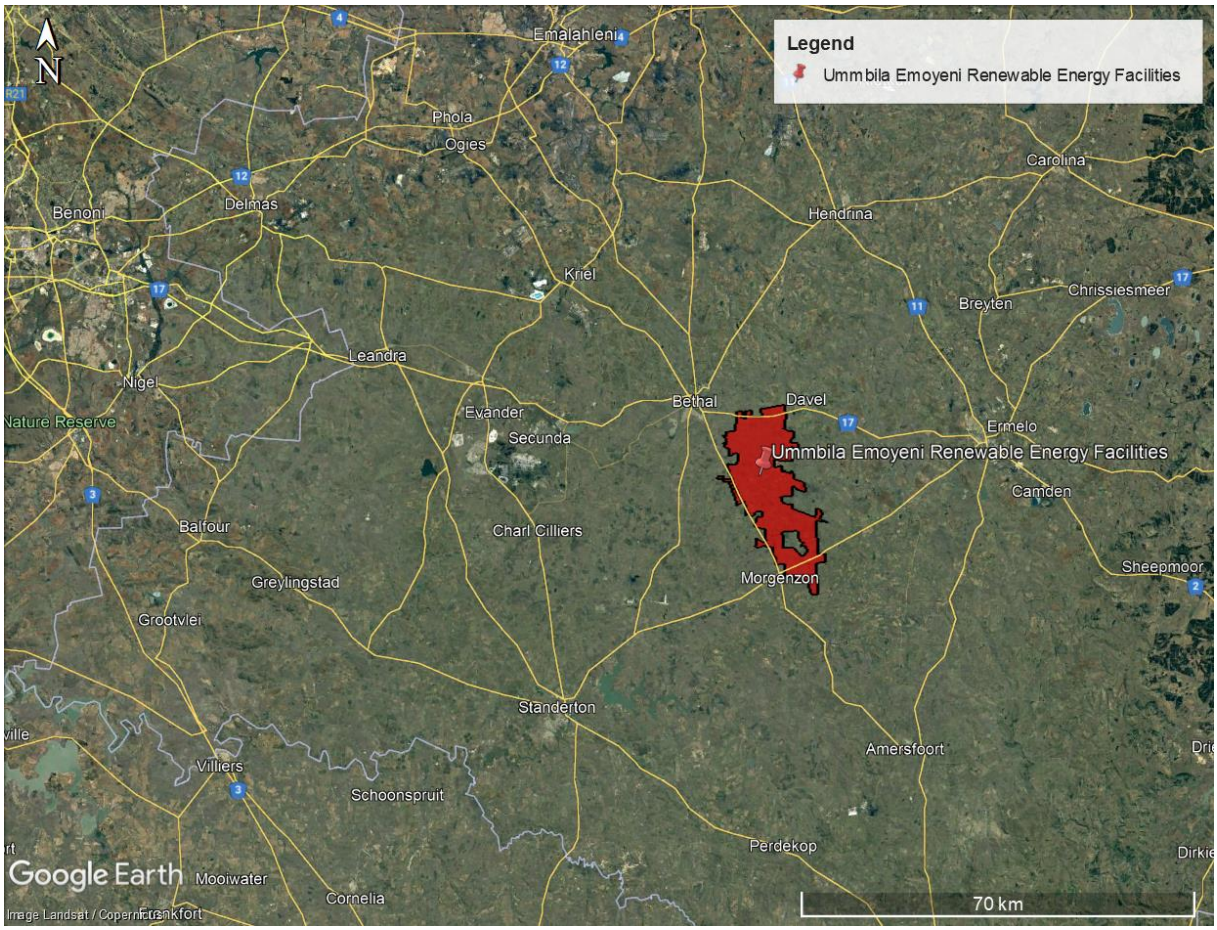

Figure 1-1: Proposed Ummbila Emoyeni Renewable Energy Facilities

As part of the environmental impact process, the services of a Transportation Specialist are required to conduct the Transport Study for the EGI.

The main transportation activity to be investigated will be the transportation of construction materials, equipment and people to and from the site/facility.

1.2 Scope of Work

The TIA will assess the transport impact of the powerline on the existing transport network during the construction, operation and maintenance, as well as the decommissioning phases.

The transport study will aim to provide the following objectives:

- Recommend a preliminary route for the transportation of the components to the proposed site.
- Recommend a preliminary transportation route for the transportation of materials, equipment
  and people to site.
- Recommend alternative or secondary routes where possible.

1.3 Approach and Methodology

The report deals with the traffic impact on the surrounding road network in the vicinity of the site:

- During the construction phase;

- Operation and maintenance during the operational phase; and
- The decommissioning phase.

This transport study was informed by the following:

Project Assessment
- An initial meeting with the client to gain sound understanding of the project;
- Overview of project background information including location maps, component specifications and any resulting abnormal loads (if any) to be transported; and
- Research of all available documentation and information relevant to the proposed facility.

The transport study considered and assessed the following:

Traffic and Haul Route Assessment
- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes between port of entry / manufacturing location; and
- Construction, operational (maintenance) and decommissioning vehicle trips.

Site layout, Access Points and Internal Roads Assessment per Site
- Description of the surrounding road network;
- Description of site layout; and
- Assessment of the possible access points onto the site.

1.4 Assumptions and Limitations

The following assumptions and limitations apply:
- This study is based on the project information provided by the Developer.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route is 5.2m for abnormal loads.
- All haulage trips on the external road network will occur on either surfaced national and provincial roads or existing gravel roads.
- Material for the construction of internal access roads will be sourced locally as far as possible.
- The decommissioning phase will have a similar transport impact as the construction phase.

1.5 Source of Information

Information and software used in the transport study includes:
- Project Information provided by the Developer;
- Google Earth.kmz provided by the Developer;
- Google Earth Satellite Imagery;
- Road Traffic Act, 1996 (Act No. 93 of 1996);
- National Road Traffic Regulations, 2000;

- Transnet Port Information – https://www.transnetportterminals.net;
- Mpumalanga Road Asset Management System (RAMS);
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa;
- 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; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE STUDY

Powerlines are a system of overhead transmission lines and underground cables. Their main function is to transfer power from an electrical generation source to a substation from which distribution to the consumer will occur.

The materials/components required for powerlines include:

- Towers/poles to support the electrical cables,
- Wire conductors typically made of aluminium,
- Foundations for towers/poles,
- Dampers,
- Ground wires,
- Insulators, and
- Transformer.

Components are expected to be locally sourced and transported to site using appropriate National and Provincial routes. It is expected that the components will generally be transported to site with normal heavy load vehicles.

2.1 Transportation requirements

It is anticipated that the following vehicles will access the site during construction:

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar PV modules, frames and the inverter, which are within freight limitations;
- Flatbed trucks transporting the cable coils and frames, which are within the freight limitations;
- Light Differential Vehicle (LDV) type vehicles transporting workers from surrounding areas to site; and
- Drilling and piling machines and other required construction machinery being transported by conventional trucks or via self-drive to site.

2.2 Abnormal Load Considerations

Expected abnormal vehicles will comprise of lifting equipment required to off-load and assemble the components. Mobile cranes are considered for the purposes of this report and are classified as non-load carrying vehicles. Mobile cranes usually exceed mass and legal dimension limits and must therefore be operated under permit. 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) and the National Road Traffic Regulations, 2000:

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

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

2.3 Further 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.

2.4 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.

2.5 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 damaging effect on pavements;
- the structural capacity on bridges and culverts;
- the power of the prime mover(s);
- the load imposed by the driving axles; and
- the load imposed by the steering axles.

2.6 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; and
- Stability of Loaded Vehicles.

2.7 Transporting Other Plant, Material and Equipment

In addition to transporting the specialised equipment, the normal Civil Engineering construction materials, plant and equipment will need to be transported to the site (e.g. sand, stone, cement, gravel, water, compaction equipment, concrete mixers, etc.). Other materials/components required for the construction of the overhead lines and substations can include electrical cables, ground wires, insulators, dampers, wire conductors, towers/poles as support structures for electrical cables and associated tower/pole foundations, pylons and substation transformers. These will also be transported to site during construction and will generally be conducted with normal heavy loads vehicles.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of the site

The project (hereafter also referred to as 'Ummbila Emoyeni EGI') is located ~6km south-east of Bethal and 1km east of Morgenzon, within the Mpumalanga Province, as shown in Error! R eference source not found.. The proposed site for the Ummbila Emoyeni Renewable Energy Farm is bounded by the N17 to the north, the R39 to the east and south and the R35 to the west.

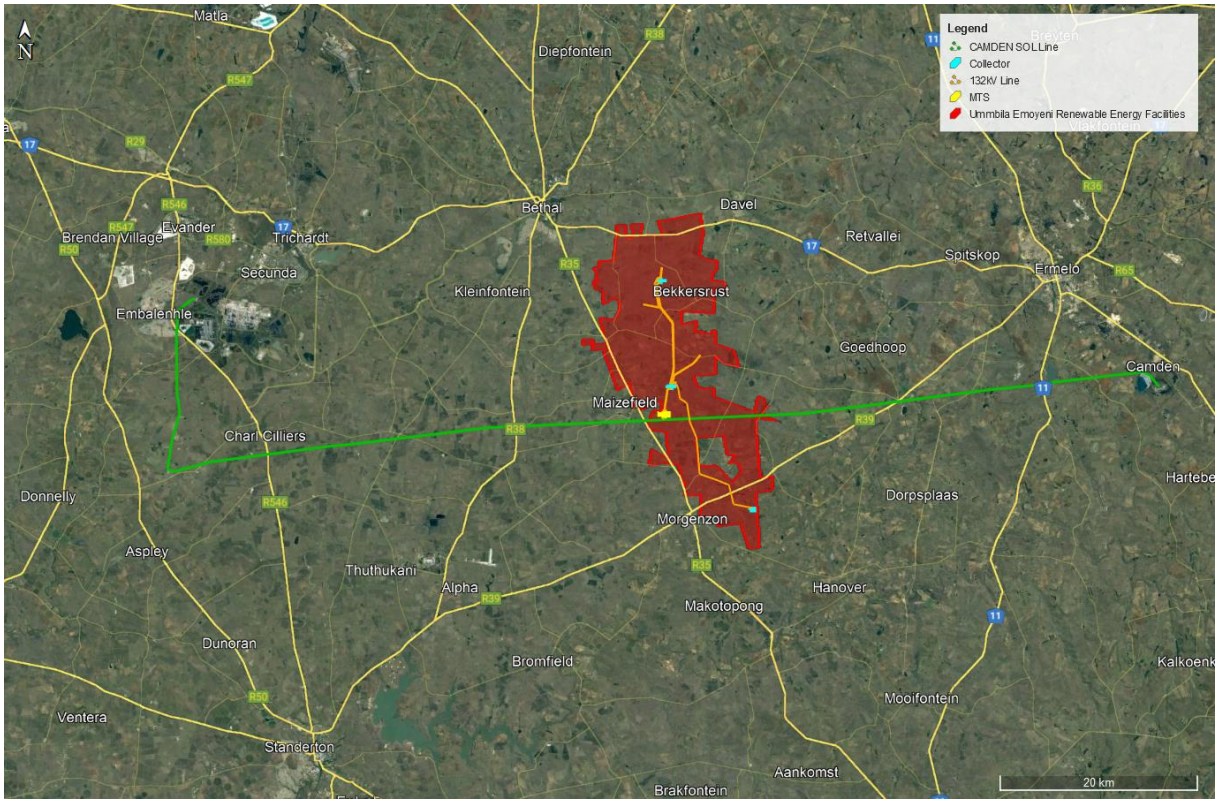

Figure 3-1: Aerial View of the Ummbila Emoyeni EGI and the Ummbila Emoyeni Renewable Energy Farm

The Ummbila Emoyeni EGI is proposed on the farm portions shown in **Table 3-1.**

Table 3-1: Affected Farm Portions

Parent Farm Number	Farm Portions
Farm 261 – Naudesfontein	15 R/E, 21
Farm 264 – Geluksplaats	0, 1, 3, 4, 5, 6 R/E, 8 R/E, 9R/E, 10, 11, 12
Farm 268 – Brak Fontein Settlement	6,7,10,11,12
Farm 420 – Rietfontein	8,9,10,11,12,15 R/E,16,18,19,22,32
Farm 421 - Sukkelaar	2, 2, 7, 9, 9 10, 10 11, 11 12, 12, 22 ,25 R/E, 34, 35, 36, 37, 37, 38, 39, 40, 42, 42
Farm 422 – Klipfontein	0, 2 R/E, 3 R/E, 4, 5, 6, 7, 8 R/E, 9, 10, 12, 13 R/E, 14 R/E, 16, 17, 18, 19, 20, 21, 22, 23
Farm 423 – Bekkerust	0 R/E, 1, 2 R/E, 4, 5 R/E, 6, 10, 11, 12, 13 14, 15, 17, 19 R/E, 20, 22, 23, 24,25
Farm 454 – Oshoek	4 R/E, 13, 18
Farm 455 – Ebenhaezer	0, 1, 2, 3

Farm 456 – Vaalbank	1, 2, 3, 4, 7, 8, 13, 15, 16, 17, 18, 19
Farm 457 – Roodekrans	0, 1, 4, 7, 22, 23, 23
Farm 458 – Goedgedacht	0, 2, 3, 4, 4, 5, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 21, 22, 23, 25, 26 R/E, 27, 28, 29, 31, 32, 33, 34, 35, 36, 37, 39, 41, 42, 43
Farm 467 – Twee Fontein	0 R/E, 1 R/E, 4 R/E, 5, 6, 7 R/E, 8, 10
Farm 469 – Klipkraal	5 R/E, 6, 7, 8
Farm 548 – Durabel	0

The grid connection solution entails establishing a 400/132 kV MTS, between Camden and SOL Substations, which will be looped in and out of the existing Camden-Sol 400 kV transmission line, on-site switching stations (132kV in capacity) at each renewable energy facility (Eskom Portion) and 132kV power lines from the switching stations at each renewable energy facility to the new 400/132Kv MTS. The location of the MTS will be refined through an ongoing process of communication with Eskom Planning but will be within close proximity to the 400kV line in order to cut into this line.

The grid connection infrastructure will include:

- A new 400/132kV Main Transmission Substation (MTS), to be located on the Camden SOL Lines.
- Two 400kV loop-in loop-out power lines to the existing Camden-Sol 400kV transmission line.
- On-site switching stations (Eskom Portion) (132kV in capacity) at each renewable energy facility.
- Collector substation with 2 x 132kV bus bars and 4 x 132kV IPP feeder bays to onsite IPP S/Ss.
- 132kV power lines from the switching stations to the new MTS.
- Access roads up to 8m wide.

Temporary infrastructure, including laydown areas and a concrete batching plant, will be required during the construction phase. All temporary infrastructure will be rehabilitated following the completion of the construction phase, where it is not required for the operation phase.

3.2 Proposed Main Access Routes to the Proposed Site

The site and route investigation showed that it will be possible to transport components by road to the proposed site. The site can be accessed via the R38, R35 , N17 and R39 (see **Figure 3-2**).

Access will likely be via the R35 between Bethal and Morgenzon. The R35 is a surfaced provincial road. Existing roads on the affected properties will be used where feasible and practical to provide direct access to the EGI. Where necessary, new access roads (up to 12 wide) will be established to provide access to the Main Transmission Substation (MTS).

During construction, a permanent access road along the length of the power line corridor (300m wide) between 4 -6m wide will be established to allow for large crane movement. This track will then be utilised for maintenance during operation.

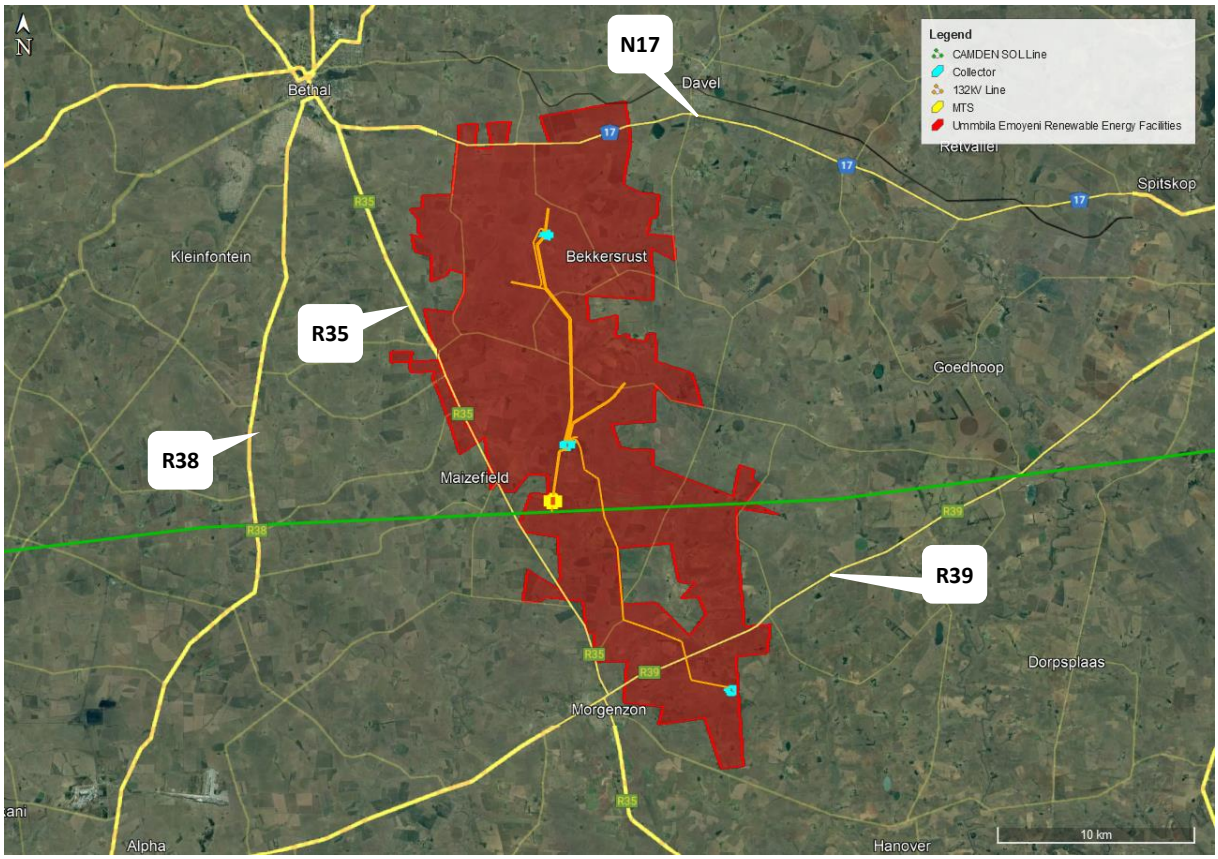

Figure 3-2: Main access routes to the Proposed Site

It needs to be ensured that all the gravel road sections remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

It should be noted that any low hanging overhead lines (lower than 5.1m), e.g., Eskom and Telkom lines, along the proposed route would have to be moved or raised to accommodate the abnormal load vehicles.

3.3 Main Route for the Transportation of Materials, Plant and People to the proposed facility

The nearest towns in relation to the proposed development site are Standerton, Secunda, Bethal and Ermelo. It is envisaged that most materials, water, plant, services and people can be procured within an 60km radius of the proposed facility. However, this would be informed by the REIPPPP requirements. The nearest city, Johannesburg, is located approximately 180km from the proposed development site.

Quarries in the vicinity could be contracted to supply materials during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the stockpile yard could be staggered to minimise traffic disruptions.

4 IDENTIFICATION OF KEY ISSUES

4.1 Identification of Potential Impacts

The potential transport related impacts are described below.

4.1.1 Construction Phase

Potential impact

- Construction related traffic
- The construction traffic would also lead to noise and dust pollution.
- This phase also includes deliveries, excavations and trenching that will temporarily generate the most traffic.

4.1.2 Operational Phase

Traffic during the operational phase will consist of maintenance staff maintaining the proposed infrastructure. The trips generated during this phase are deemed low. as the operational trips will only be for occasional maintenance requirements.

4.1.3 Decommissioning Phase

This phase will result in the same impact as the construction phase as similar trips are expected.

5 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

5.1 Potential Impact (Construction Phase)

Nature of the impact

- Potential traffic congestion and delays on the surrounding road network and associated noise and dust pollution.

Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and will depend on the staff requirements and where material and equipment are sourced from.

The possible construction trips are discussed below.

1. **Material and component delivery:** Vehicle trips from material and component delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Not enough detail about the powerline is known at this stage to provide an estimated trip generation volume for material and component traffic.

   The materials and components expected for the powerline construction can generally be transported by normal heavy load vehicles. Project planning can be used to reduce delivery trips during peak hours. In addition to this, using a mobile batch plant as well as temporary construction material stockpile yards near the proposed site can also reduce peak hour trips.

2. **Construction machinery:** Cranes for pylon/tower assembly, heavy vehicles required for earthworks etc. These vehicles are expected to have negligible traffic impact as they will arrive on site in preparation for construction. Once on site, these vehicles will produce internal site traffic with minimal effect on the external road network.

3. **Site personnel and workers:** Based on information obtained from similar projects the following trip generation assumptions are made for construction personnel:

Table 5-1:Estimation of Site Staff

Activity	Approx. team size	Approx. duration at a point (i.e., tower location)
Centre line pegging and identification of new gates	3	1 day
Access Negotiations	1	1 day
Tower Pegging	5	1 days
New gate installation	5	1 days
Foundation nominations (for main structure and anchors)	5	2 days
Excavation of foundation	10	2 days
Foundation steelwork (reinforcing)	10	2 days
Foundation (concrete) pouring	20	2 days
Delivery of tower steelwork	5	1 day
Assembly team / Punching and painting	10	3 days
Erection	20	2 days
Stringing	50	7 days
Sag and tension	10	3 days
Rehabilitation	5 to 15	2 – 10 days

It is assumed that the same team will move together from one construction location to the next. Based on this assumption a maximum of 50 to 70 workers can be expected on site per workday.

Busses have a capacity 60 passenger capacity while minibus taxis have an average passenger capacity of 15. Assuming approximately 15 highly skilled personnel will travel by car, at a rate of 1.5 passengers per car, the following trips are assumed based on a worst-case scenario of 70 workers:

- for the skilled personnel a maximum of 15 trips are expected.
- The remaining 55 workers can travel by bus (i.e., 1 bus trip) or 4 (four) minibus taxi trips.

Depending on the construction schedule and the type of vehicle used to transport staff, a maximum of 19 peak hour site personnel trips is assumed for the purposes of this assessment. This volume is deemed to generate an insignificant traffic impact.

The potential transport impacts imposed by the construction traffic short term in nature and can be mitigated to an acceptable level.

- *Proposed mitigation measures*

- The delivery of components to the site must be staggered and trips must be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads during the construction and decommissioning phases, as required.
- Regular maintenance of gravel roads by the Contractor during the construction and decommissioning phases.
- The use of onsite concrete batching plants and quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.

- *Significance of impact with mitigation measures*
  The proposed mitigation measures for the construction traffic will result in a minor reduction of the impact on the surrounding road network, but the impact on the local traffic will remain low as the existing traffic volumes are deemed to be low. The dust suppression, however, significantly reduces the impact.

5.2 Potential Impact (Operational Phase)

The operational phase will not generate any significant traffic volumes. During operation, it is expected that maintenance and security staff will periodically visit the facility. The traffic generated during this phase will be minimal and intermittent and will not have an impact on the surrounding road network.

5.3 Potential Impact (Decommissioning Phase)

The decommissioning phase will result in the same impact as the construction phase as similar trips are expected.

6 IMPACT ASSESSMENT SUMMARY

The assessment of impacts and recommendation of mitigation measures as discussed above are collated in the table below. The assessment methodology is attached as **Annexure B**.

Table 6-1: Impact Rating - Construction Phase

Nature: **Traffic congestion and associated noise and dust pollution during the construction phase**			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	**Motivation**	**Significance**
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	**Medium Negative (40)**
Extent	Local (2)	Pressure will be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation: • Stagger component delivery to site • Reduce the construction period • Source quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods as much as possible • Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	**Low Negative (18)**
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts: The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks: Traffic will return to normal levels after construction is completed.			

Table 6-2: Impact Rating – Operational Phase

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will have not have any impact on the surrounding road network.

Table 6-3: Impact Rating- Decommissioning Phase

IMPACT TABLE – DECOMMISSIONING PHASE
This phase will have a similar impact as the Construction Phase i.e., traffic congestion, air pollution and noise pollution, as similar trips/movements are expected.

7 CUMULATIVE IMPACTS

To assess the cumulative impact, it was assumed that all renewable energy projects within 50km currently proposed and authorized, would be constructed at the same time. This is the precautionary approach as in reality; these projects would be subject to a highly competitive bidding process. Only a handful of projects would be selected to enter into a power purchase agreement with Eskom, and construction is likely to be staggered depending on project-specific issues.

The construction and decommissioning phases are the only significant traffic generators for renewable energy projects. The duration of these phases is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.

Table 7-1: Cumulative Impact rating

Nature: Traffic congestion and associated noise and dust pollution possible along the N17, R35, R39 and the existing gravel road network, depending on the main access route selected, will be the main impact.		
	Overall impact of the proposed project considered in isolation (post mitigation)	**Cumulative impact of the project and other projects in the area**
Extent	medium (2)	High (5)
Duration	Short term (2)	medium term (3)
Magnitude	minor (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	**Low (18)**	**Medium (32)**
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: ▪ *Stagger component delivery to site* ▪ *Dust suppression* ▪ *Reduce the construction period* ▪ *The use of quarries in close proximity to the site* ▪ *Staff and general trips should occur outside of peak traffic periods* ▪ *Should routes approaching the proposed site from the south be considered, further investigations would be required to ascertain if the bridges/watercourse crossings on the gravel roads could accommodate heavy and abnormal load vehicle., the bridges will need to be investigated for load bearing and width.*		

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed Ummbila Emoyeni EGI does not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network. However, this would also mean that there would be no socio-economic benefits to the surrounding communities, and it will not assist government in meeting the targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

9 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

OBJECTIVE: It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction phase where an increase in vehicle trips can be expected. No traffic related mitigation measures are envisaged during the operational phase due to the low traffic volume generated during this phase.

Project component/s	Construction Phase traffic
Potential Impact	Dust and noise pollution due to increase in traffic volume
Activity/risk source	Transportation of material, components, equipment and staff to site
Mitigation: Target/Objective	Minimize impacts on road network and surrounding communities

Mitigation: Action/control	Responsibility	Timeframe
• Stagger component delivery to site • The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network • Dust suppression • Reduce the construction period as far as possible • Maintenance of gravel roads • Apply for abnormal load permits prior to commencement of delivery via abnormal loads • Assess the preferred route and undertake a 'dry run' to test • Staff and general trips should occur outside of peak traffic periods as far as possible. • Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required	• Holder of the EA	• Before construction commences and regularly during construction phase

Performance Indicator	Staggering or reducing the construction trips will reduce the impact of dust and noise pollution.
Monitoring	• Regular monitoring of road surface quality. • Monitoring congestion levels (increase in vehicle trips) • Apply for required permits prior to commencement of construction

10 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed EGI to the proposed Ummbila Emoyeni Solar Energy Facility were identified and assessed.

- During operation, it is expected that maintenance and security staff will periodically visit the facility The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The traffic generated during the construction phase can be mitigated to acceptable levels.
- The traffic generated during the decommissioning phase will be similar to the construction phase traffic.

The potential mitigation measures mentioned in the construction and decommissioning phases are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of quarries near the site would decrease the impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods.
- Maintenance of internal roads.
- Any low hanging overhead lines (lower than 5.1m) e.g. Eskom and Telkom lines, along the proposed routes will have to be moved or raised to accommodate the abnormal load vehicles.

The site can be accessed via the R38, R35 , N17 and R39; however, access will likely be via the R35 between Bethal and Morgenzon. Existing roads on the affected properties will be used where feasible and practical to provide direct access to the EGI. Where necessary, new access roads (up to 12 wide) will be established to provide access to the Main Transmission Substation (MTS)

The construction, operation and maintenance, as well as the decommissioning phase of the EGI is not envisaged to generate a significant traffic impact on the surrounding road network.

The development of the EGI is supported from a traffic engineering point of view, provided that the recommendations in this report are adhered to.

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11 REFERENCES

- Google Earth Pro
- Road Traffic Act, 1996 (Act No. 93 of 1996)
- National Road Traffic Regulations, 2000
- SANS 10280/NRS 041-1:2008 - Overhead Power Lines for Conditions Prevailing in South Africa
- 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

Annexure A – Specialist Expertise

ADRIAN JOHNSON

Profession	*Civil Engineering Technologist*
Position in Firm	*Manager: Traffic and Transportation*
Area of Specialisation	*Traffic & Transportation Engineering*
Qualifications	*PrTechEng, Master of Transport Studies, BSc (Hons) (Applied Science: Transport Planning), BTech Civil Engineering*
Years of Experience	*16 Years*
Years with Firm	*5 Years*

SUMMARY OF EXPERIENCE

Adrian Johnson is a Professional Technologist registered with ECSA (201570274). He joined JG Afrika (Pty)Ltd. in January 2017. Adrian holds a BSc (Hons) (Applied Sciences: Transportation Planning) degree from the University of Pretoria, a BTech degree in Civil Engineering from the Cape Peninsula University of Technology and completed a Masters' degree in Transport Studies at the University of Cape Town in 2020. He has more than 16 years of experience in a wide range of engineering projects.

He has technical and professional skills in traffic impact studies, transport impact assessments, public transport planning, non-motorised transport planning & design, data analysis of public transport systems, access management plans, quality control, project planning and implementation, geometric design, site supervision, transport assessments for renewable energy projects, speed limit reviews and road safety audits.

13 PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrTechEng - Engineering Council of South Africa, Registration No 201570274
SAICE - South African Institute of Civil Engineering. No 201700129
SARF WR - South African Road Federation Western Region Administrator and Committee Member

14 EDUCATION

2004 - National Diploma (Civil) – Peninsula Technikon
2006 - BTech (Civil) – Cape Peninsula University of Technology
2011 - BSc (Hon) (Applied Sciences: Transportation Planning) – University of Pretoria
2020 – Master of Transport Studies – University of Cape Town

15 SPECIFIC EXPERIENCE

15.1 JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
September 2022 – Date
Position – Manager: Traffic and Transportation

15.2 JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
2017 – June 2022
Position – Senior Technologist (Traffic and Transportation Engineering)

Various Transport Impact Statements (TIA) and Traffic Impact Statements (TIS) for private clients including:

- Weltevreden Clinic TIS for Edifice Consulting Engineers
- Oakhurst Primary TIS for BVZ Plan
- Sinai Academy TIS for Bettesworth Scott Planners
- Rustlamere TIA for Bettesworth Scott Planners
- Joostenbergvlakte Farms 732 and 728 TIA for Asla
- Garden Emporium TIA for Rory Cameron Smith Architects
- Strandfontein Sandmine TIS for Chand Environmental Consultants
- Proposed development of Erf 538 Grassy Park TIA for First Plan
- Riebeek West: Proposed Function/Wedding Venue TIS for Elco Property Developers

Limpopo Road Asset Management System Undertake network level road safety assessments and analysis of accident statistics of the Limpopo road network (5 000km). – Client: Roads Agency Limpopo SOC Ltd

Kampies Housing Development Proposed upgrade of the informal settlement on Cape Farm 616 Philipi and Erf 63 Spring Field, providing 275 units. Client: Ian Rout & Associates

Highlands Housing Project Traffic calming plans for three proposed sites in Mitchells Plain, Cape Town – Client: City of Cape Town

Richards Bay Gas to Power Facility Transport study for the proposed renewable energy facility in Richards Bay, KwaZulu Natal – Client: Private Client

Solid Waste Management Sector Plan – Collections Work Brief Information Analyst assisting with the assessments and detailed analysis of the collections and drop-off facilities operating model of the City of Cape Town – Client: City of Cape Town

Nooiensfontein Housing Project Transport Study for the Nooiensfontein Housing Development in Bluedowns (2500 units) – Client: Ian Rout & Associates

Bardale Housing Development Transport Impact Assessment and Signal timing plan, Western Cape – Client: Integrated Housing Development

Enkanini Housing Transport Impact Assessment for the development of the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality

Sutherland and Rietrug Access Road Transport study for the upgrading and widening of the access road to the proposed Sutherland Windfarm, Northern Cape Client: Nala Environmental Consulting

Pienaarspoort Windfarm Transport study for the proposed Pienaarspoort Windfarm, Western Cape Client: Savannah Environmental (Pty) Ltd

Speed Limit Review Main Road 546, Main Road 552 and Divisional Road 2220, Lutzville, Western Cape – Client: Western Cape Government

Gromis and Komis Wind Energy Facility Transport study for the proposed Windfarm, Northern Cape. Client: CSIR

Geelkop Solar Facility Transport study for the proposed Geelkop Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Khunab Solar Facility Transport study for the proposed Khunab Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

Bloemsmond Solar Facility Transport study for the proposed Bloemsmond Solar PV Facility near Upington, Northern Cape – Client: AEP (Pty) Ltd

NMT Study for the Upgrading of DR1285, Elgin – Client: Western Cape Government

Traffic Study for the Kudusberg and Rondekop Wind Energy Facilities, Northern Cape. Client: G7

Speed Limit Review Main Road 540, Elandsbay, Western Cape – Client: Western Cape Government

Road Safety Audit for N1 Section 16 Winburg to Ventersburg – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the for the N4 at Bapong, Client: Bakwena

Road Safety Audit for N2 Wild Coast Toll Road Projects, Eastern Cape & Natal, Client: Aurecon/Knight Piesold on behalf of SANRAL

Kuruman Wind Energy Facility Transport study for the proposed Kuruman Windfarm, Northern Cape. Client: CSIR

Coega West Windfarm Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega

Parking Audit of the Groenvallei area in Bellville – Client: City of Cape Town

Road Safety Appraisals for the Mpumalanga Province – Client: Mpumalanga Provincial Government

Transportation and Traffic Management Plan for the proposed Coega West Wind Energy Facility in Port Elizabeth – Client: Electrawinds Coega (Pty) Ltd

Road Safety Appraisals for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Speed Limit Reviews for North Region of Cape Town – Client: Aurecon on behalf of City of Cape Town

Road Safety Audit for the Upgrade of N1 Section 4 Monument River – Client: Aurecon on behalf of SANRAL

Road Safety Audit for the Upgrade of N2 Section 8 Knysna to Wittedrift – Client: SMEC on behalf of SANRAL

Road Safety Audit for the Upgrade of N1 Section 16 Zandkraal to Winburg South – Client: SMEC on behalf of SANRAL

Traffic and Road Safety Studies for the Improvement of N7 Section 2 and Section 3 (Rooidraai and Piekenierskloofpass) – Client: SANRAL

Traffic Engineer for the Upgrade of a 150km Section of the National Route N2 from Kangela to Pongola in KwaZulu-Natal, Client: SANRAL

15.3 GIBB (Pty) Ltd

2014 – 2016
Position – Technologist / Project Leader (Traffic and Transportation Engineering)
Operational Support to the MyCiTi Integrated Rapid Transit System - Tasks included analysis of AFC data, generating monthly operations reports, analysis of passenger surveys, journey time runs, travel time surveys, compilation of a MyCiTi Festive Season Report and compilation of reports for the Century City and V&A Waterfront stakeholders. Client: Transport for Cape Town.

Technical Support to the MyCiTi Business Planning Department - A detailed route-by-route analysis, during peak and off-peak conditions to generate daily demand profiles, with a focus on identifying inefficiencies.
Additional tasks included:

- An assessment of profitability of routes based on patronage, revenue and operating costs;
- Analysis of AFC data;
- Comparison between the manual survey results and the Transportation Reporting System (TRS) data;
- Analysis of the Free Token Card Promotion;
- Route and bus optimisation;
- Station and feeder stop utilization and
- Assessment of Parking Tariffs for Managed Parking Bays within the City of Cape Town.

Client: Transport for Cape Town.

AFC Data Analysis - Data Analysis of AFC Data of the City of Tshwane's A Re Yeng Bus Service.
Client: Development Bank of Southern Africa.

Ghana Transport Statues Quo Study - Transport Status Quo Study for the Greater Accra Regional Spatial Development Framework. Client: Government of Ghana: Ministry of Lands & Natural Resources.

Botswana TIA – Transport Impact Assessment for the Mogoditshane- Kanye Road project in Botswana. Client: Republic of Botswana's Ministry of Transport and Communications: Roads Department.

Botswana Access Management Plan Transport Impact Assessment for the Mogoditshane- Kanye Road project in Botswana. Client: Republic of Botswana's Ministry of Transport and Communications: Roads Department.

MyCiTi System Planning - Rationalisation of the GABS bus routes within the City of Cape Town. Client: Transport for Cape Town.

Road Safety Master Plan - Compilation of a Road Safety Master Plan for Stellenbosch Municipality. Client: Stellenbosch Municipality.

Constantia TIS - Transport Impact Statement and Parking Motivation for the proposed redevelopment of Erf 2134, Constantia. Client: High Constantia Properties.

Top Yard TIA - Transport Impact Assessment for the Government Garage Precinct Plan (Top Yard). Client: PricewaterhouseCoopers (PWC).

Boschendal TIA - Transport Impact Assessment for the development of Boschendal Village. Client: Boschendal (Pty)Ltd.

Vergenoegd TIA - Transport Impact Assessment for the development of Portion 19 of Farm 653, Vergenoegd. Client: Headland Planners.

Tygerberg Hospital Traffic Status Quo Study - Traffic Status Quo Study for the Development Framework for the Tygerberg Hospital Site in Bellville. Client: City Think Space.

Eerste River TIA - Transport Impact Assessment for Erf 5541, Eerste River. Client: Headland Planners

15.4 BVi Consulting Engineers

2013– 2014
Position – Technologist (Transportation Engineering)

Waaihoek Wind Energy Facility TIA - Transport Impact Assessment for the proposed construction of a
Wind Energy Facility on Waaihoek Farm near Utrecht Town in Kwazulu-Natal. Client: Mainstream Renewable Power.

Sere Wind Farm - Supervision of bellmouth widening and other modifications along routes between the Saldanha Port and the Sere Wind Farm near Koekenaap. Client: Siemens.

Slip lane Design for Windhoek Service Station - Geometric design of a slip lane to the existing Windhoek Fuel Centre, Windhoek, Namibia. Client: Multi Consult.

15.5 Lafarge Industries

2011– 2013
Position – Quality Controller

Responsible for the quality control at four ReadyMix concrete plants and the Tygerberg Quarry.

- Design of new concrete mixes and optimisation of existing mix designs.
- Assist client with technical matters and problem solving.
- Compile technical reports.
- Motivate, train and develop staff to ensure growth and succession.
- Arrange and monitor staff schedules.
- Conduct Quality training for field technicians, reps and batchers.
- Statistical analysis of concrete results and monitoring product performance.

15.6 Aurecon Mozambique

2010– 2011
Position – Roadworks Engineer (Site Supervision)

Mozambique site supervision - Roadworks Engineer responsible for inspection of works and monitoring workmanship for the Construction of a 135km road from Montepuez to Ruaca in Northern Mozambique. Client: Administracao Nacional De Estradas (Mozambican Roads Authority)

15.7 Aurecon South Africa

2004– 2010
Position – Technician/Technologist (Traffic and Transportation Engineering)

Kewtown site supervision - Resident Engineer for the Community Residential Units Programme Pilot Project in Kewtown. Client: City of Cape Town.

N2 road design - Vertical and horizontal alignment of the N2 from Coega to Colchester. Client: SANRAL.

Western Cape Provincial Weighbridges - Resident Engineer on various projects involving the upgrading and expansion of the 9 Provincial Weighbridges in the Western Cape. Client: Provincial Administration: Western Cape.

Traffic and Transport tasks - Various traffic counts, traffic data analysis and transport impact statements. Client: Various.

Annexure B – Impact Assessment Methodology

IMPACT ASSESSMENT METHODOLOGY

Direct, indirect and cumulative impacts of the issues identified through the scoping study, as well as all other issues identified in the EIA phase must be assessed in terms of the following criteria:

1. The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.

2. The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high).

3. The **duration**, wherein it will be indicated whether:
   - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
   - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
   - medium-term(5–15 years) – assigned a score of 3;
   - long term(> 15 years) - assigned a score of 4; or
   - permanent - assigned a score of 5;

4. The **magnitude**, quantified on a scale from0-10, where a score is assigned:
   - 0 is small and will have no effect on the environment
   - 2 is minor and will not result in an impact on processes
   - 4 is low and will cause a slight impact on processes
   - 6 is moderate and will result in processes continuing but in a modified way
   - 8 is high (processes are altered to the extent that they temporarily cease)
   - 10 is very high and results in complete destruction of patterns and permanent cessation of processes

5. The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).

6. the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and

7. the **status**, which will be described as either positive, negative or neutral.

8. the degree to which the impact can be reversed.

9. the degree to which the impact may cause irreplaceable loss of resources.

10. the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:
S=(E+D+M)P

S = Significance weighting
E = Extent
D = Duration
M=Magnitude
P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e. where the impact must have an influence on the decision process to develop in the area).

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included. Complete a table and associated ratings for **each** impact identified during the assessment.

Example of Scoping evaluation table summarising the impacts identified

Impact [description of the impact]			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Potential loss of faunal species	Direct impacts: » Loss of habitat will potentially lead to a loss faunal species Indirect impacts: » Minimal edge effects leading to loss of habitat outside development site, thus, loss of faunal species	Regional	None identified at this stage
Potential loss of Species of Special Concern	Direct impacts: » None Indirect impacts: » Loss of protected species in terrestrial habitat	National	None identified at this stage
Description of expected significance of impact The proposed development site has a long history of transformation and therefore the impacts on the terrestrial environment are likely to be limited as the species typically resident in and around urban and industrial areas are commonly generalists with a wide range of habitat types. Protected species such as *Crinum stuhlmannii* and *Zoothera guttata* have potential to occur on the proposed development site. However, no protected species were observed within the development areas during the previously conducted site visits. Impacts can be minimised through the implementation of appropriate mitigation measures.			
Gaps in knowledge & recommendations for further study » Mapping of all protected species and species of special concern within the development footprint. » Mapping of known and potential habitats used in breeding, foraging, roosting, aestivation and hibernation. » Describing the condition of all habitats and clearly indicating these on an Ecological sensitivity map. » Indication of the potential of protected species to occur on the proposed development site. **Recommendations with regards to general field surveys** » Field surveys must include the proposed development site and adjacent surrounding areas with indigenous			

vegetation and habitats within a 500 m radius of the project footprint.
» In season (November to April) follow-up terrestrial site visits to determine the diversity of resident fauna species
» In season follow-up terrestrial site visits to determine the diversity of vegetation species.
» A follow up site visit is to be undertaken for small mammal trapping.
» Active search will be required for the protected species and species of concern that have a high probability of occurrence which will be impacted by the proposed facility.

EIA Report Requirements

Assessment of impacts must be summarised in the following table format. The rating values as per the above criteria must also be included. Complete a table and associated ratings for each impact identified during the assessment.

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**			
Impact description: The impact will occur due to added pressure on the availability of housing located in the local community. This may contribute to increased levels of competition in the temporary housing market.			
	Rating	**Motivation**	Significance
Prior to Mitigation			
Duration	Short-term (1)	The construction period will last for less than one year	**Low Negative (18)**
Extent	Local (1)	Pressure will only be added on the local municipality to provide housing for outsourced construction workers	
Magnitude	Low (4)	The increase in demand for affordable accommodation should not be extensive as workers will primarily be sourced from the local communities.	
Probability	Probable (3)	The possibility of the impact on the provision of affordable accommodation is very low	
Mitigation/Enhancement Measures			
Mitigation: "Mitigation ", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. ▪ Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.			
Post Mitigation/Enhancement Measures			
Duration	Short-term (1)	Pressure will only be added on the local municipality to provide housing for outsourced construction workers.	**Low Positive (8)**
Extent	Local (1)	The increase in demand for affordable accommodation should be mitigated if external construction crews are provided with onsite accommodation.	
Magnitude	Minor (2)	The possibility of the impact on the provision of affordable accommodation is very low.	
Probability	Improbable (2)	A reduced amount of pressure will be added on the local municipality to provide housing for outsourced construction workers.	

Cumulative impacts: "Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Residual Risks: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).

Assessment of Cumulative Impacts

As per requirements of the EIA Regulations, specialists are required to assess the cumulative impacts. In this regard, please refer to the methodology below that will need to be used for the assessment of Cumulative Impacts.

"Cumulative Impact", in relation to an activity, means the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to existing and reasonably foreseeable impacts eventuating from similar or diverse activities.

The role of the cumulative assessment is to test if such impacts are relevant to the proposed project in the proposed location (i.e., whether the addition of the proposed project in the area will increase the impact). This section should address whether the construction of the proposed development will result in:

- Unacceptable risk
- Unacceptable loss
- Complete or whole-scale changes to the environment or sense of place
- Unacceptable increase in impact

The specialist is required to conclude if the proposed development will result in any unacceptable loss or impact considering all the projects proposed in the area.

Example of a cumulative impact table:

Nature: Complete or whole-scale changes to the environment or sense of place (example)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (1)	Low (1)
Duration	Medium-term (3)	Long-term (4)
Magnitude	Minor (2)	Low (4)
Probability	Improbable (2)	Probable (3)
Significance	**Low (12)**	**Low (27)**
Status (positive or negative)	Negative	Negative
Reversibility	High	Low
Irreplaceable loss of resources?	Yes	Yes
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		

"Mitigation ", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind.