MARIKANA
30MW Solar PV
TIA
May 2022
REVISION 0

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SYNOPSIS

Preparation of a Traffic Impact Assessment (TIA) for the proposed development of the Marikana 30MW Solar PV facility. The site is to be located in North West province

KEY WORDS:

Traffic Impact Assessment, Solar Photovoltaic (PV) Facility

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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Verification	Capacity	Name	Signature	Date
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MARIKANA
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TIA

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1 INTRODUCTION

1.1 Scope, Purpose and Objectives of this Specialist Report

The TIA is aimed at determining the traffic impact of the proposed land development and whether such development can be accommodated by the transportation system.

The report deals with the items listed below and focuses on the surrounding road network in the vicinity of the site:

- Extent of the traffic study area,
- The proposed development,
- The existing road network and future road planning proposals,
- Trip generation for the proposed development during the construction, operation, and decommissioning phases of the facility,
- Traffic impact of the proposed development,
- Access requirements,
- potential routes for the transportation of components to the proposed site,
- preliminary transportation route for the transportation of materials, equipment and people to site,
- Recommend alternative or secondary routes where possible.
- Public Transport access,
- Non-motorised Transport facilities, and
- Recommended public transport and NMT upgrades, if necessary.

1.2 Details of Specialist

Iris Sigrid Wink of JG Afrika Pty (Ltd) is the Traffic & Transportation Engineering specialist appointed to provide a Traffic Impact Assessment for the Sibanye Stillwater SA PMG Solar PV project. Iris Wink is registered with the Engineering Council of South Africa (ECSA)), with Registration Number 20110156. A curriculum vitae is included in Appendix A of this specialist assessment.

In addition, a signed specialist statement of independence is included in Appendix B of this specialist assessment.

1.3 Background

The development of renewable energy facilities is proposed by various Special Purpose Vehicles (SPVs). The project entails the development of three (3) separate solar Photovoltaic (PV) facilities with a combined contracted capacity of up to 205MW and will be known as SRPM Solar PV, Karee Solar PV, and Marikana Solar PV respectively, each including a grid connection and other associated infrastructure.

The Solar PV facilities are based near current Sibanye Stillwater mining operations ~6km east of the town of Rustenburg, 3km east of the town of Photshaneng and 8km east from the town of Marikana within the Rustenburg and Madibeng Local Municipalities respectively, and within the greater Bonjanala Platinum District Municipality, North West Province (NWP).

The projects will all tie-in to the electricity grid behind the Eskom meter at the respective Sibanye customer substations.

As of 2019, the Industrial Sector was the leading electricity consumer in South Africa, with up to 56 percent of the total consumption (Ratshomo 2019). Mining and quarrying accounted for 10% of the industrial consumption while non-ferrous metals and non-metallic both accounted for 8% and 5%, respectively (Chamber of Mines of South Africa, 2017,). The NWP is rated as the fourth largest electricity consuming province in South Africa and consumes approximately 12% of the available electricity (Department of Economic Development, Environment, Conservation and Tourism (DEDECT) 2012). This is mainly due to the high demand of the electrical energy-intensive mining and related industrial sector. Approximately 63% of the electricity supplied to the NWP is consumed in its mining sector (DEDECT 2012)

The North West DEDECT's Renewable Energy Strategy aims to improve the North West Province's environment, reduce the NWP's contribution to climate change, and alleviate energy poverty, whilst promoting economic development and job creation in the province whilst developing its green economy. Sibanye Stillwater aims to comply with the Mining industry's Mission to decarbonise.

The successful development of the renewable energy projects will enable Sibanye Stillwater to make a valuable and meaningful contribution towards growing the green economy within their Province and South Africa. This will assist the NWP in creating green jobs and reducing Green House gas emissions, whilst reducing the energy demand on the National Grid.

The details on the PV Facilities are listed below:

Table 1-1: PV facilities summary

Applicant	Project Name	Generating capacity	Farm Name and No.	Portion No.
SRPM Solar (Pty) Ltd	SRPM Solar PV	80MW	Farm Waterval No. 303	5, 6, 8, 16, and 48
K4 Solar (Pty) Ltd	Karee Solar PV	95MW	Farm Brakspruit No. 299	23
Marikana Solar (Pty) Ltd	Marikana Solar PV	30MW	Farm Middelkraal No. 466	9

1.4 Terms of Reference

JG Afrika (Pty) Ltd was appointed by Savannah Environmental (Pty) Ltd on behalf of their client Sibanye Stillwater SA PMG, to provide a Traffic Impact Assessment, as part of the scoping phase of the Environmental Impact Assessment (EIA), for the proposed Sibanye Still Water solar PV project.

This TIA report refers to the proposed Marikana 30MW solar Pv facility and assesses the traffic impact the proposed facility would impose on the surrounding road network.

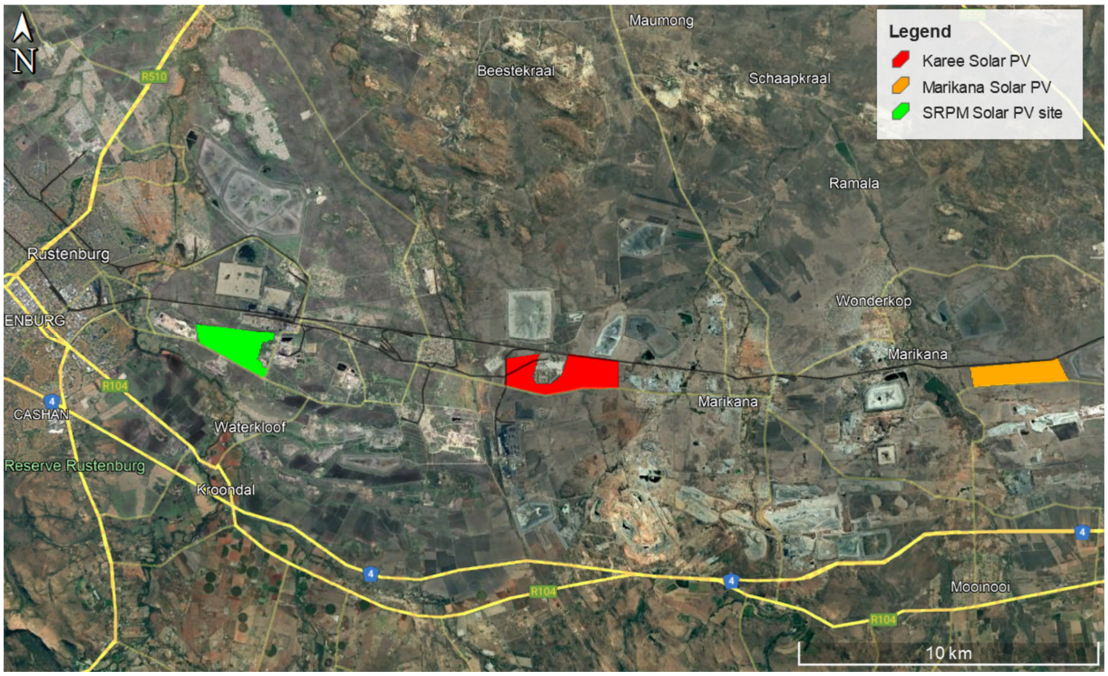

Figure 1-1: Sibanye Still Water Solar PV Project Localities

2 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,
- operational phase, and
- decommissioning phase.

This transport study includes the following tasks:

Project Assessment

- Communication with the project team to gain sound understanding of the project.
- Overview of available project background information including but not limited to location maps, site development plans, anticipated vehicles to the site (vehicle type and volume), components to be transported and any resulting abnormal loads.
- Research of all available documentation and information relevant to the proposed facility.

Access and Internal Roads Assessment

- Assessment of the proposed access points including:
  - Feasible location of access points
  - Motorised and non-motorised access requirements
  - Queuing analysis and stacking requirements, if required
  - Access geometry
  - Sight distances and required access spacing
  - Comments on internal circulation requirements and observations

Haulage Route Assessment

- Determination of possible haulage routes to site regarding:
  - National routes
  - Local routes
  - Site access points
  - Road limitations due to abnormal loads

Traffic Estimation and Impact

- Construction, operational, and decommissioning phase vehicle trips
  - Generated vehicles trips
  - Abnormal load trips
- Investigation of the impact of the development traffic generated during construction, operation and decommissioning.

Report (Documentation)

- Reporting on all findings and preparation of the report.

2.1 Information Sources

The following documents have been used to undertake the traffic study:

- TRH26 South African Road Classification and Access Management Manual, COTO

- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1), COTO, August 2012
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 2), COTO, February 2014
- Madibeng Local Municipality 2020/21 Draft IDP
- Sibanye Stillwater Scope of Work for the Environmental Impact Assessment (EIA)
- Google Earth Pro
- Transnet port terminals website
- Fire Safety By-law 2016- Birgrivier Municipality

2.2 Assumptions, Knowledge Gaps and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by the client.
- 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.

  It is envisaged that for this project, the inverter, transformer and switchgear will be transported to site in containers on a low bed truck and trailer.
- A mobile crane and the transformer transport are the only abnormal load envisaged for the site. The crane will be utilised for offloading equipment, such as the transformers.
- Maximum vertical height clearances along the haulage route is 5.2m for abnormal loads.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Cape Town area, Johannesburg, or possibly Pinetown/Durban.
- All haulage trips 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.
- Based on an assumed 550W capacity per panel, the maximum number of solar panels to be used at the site is estimated to be 54 546 solar panels.
- The final access points are to be determined during the detailed design stage. Only recommended access points are known at this stage.
- projects in the vicinity of the site to be considered as part of the EIA cumulative impacts are as follows:

  i. SRPM Solar PV (80MW)
  ii. Karee Solar PV (95 MW)

2.3 Consultation Processes Undertaken

The TIA is based on available project information and consultation with the Environmental Practitioner assigned to the project.

3 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed development are:

- Abnormal load permits, (Section 81 of the National Road Traffic Act 93 of 1996 and National Road Traffic Regulations, 2000),
- Port permit (Guidelines for Agreements, Licenses and Permits in terms of the National Ports Act No. 12 of 2005), and
- Authorisation from Road Authorities to modify the road reserve to accommodate turning movements of abnormal loads at intersections.

4 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TIA

4.1 Port of Entry

It is envisaged that the components will be imported to South Africa via the Port of Durban or the Port of Richards Bay as the closest ports to the site.

4.1.1 The Port of Durban

The Durban container terminal is the busiest container terminal in Africa. the Durban Container Terminal operates as two terminals Pier 1 and Pier 2, handling 65% of South Africa's (SA) container volumes. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia.

the Durban Container Terminal is Africa's biggest and busiest - home to the state of the art, twin lift ship-to-shore cranes. Various capacity creation projects are currently underway, including deepening of berths and operational optimization. The terminal currently handles 65% of South Africa's container volumes. (Transnet Port Terminals, n.d.)

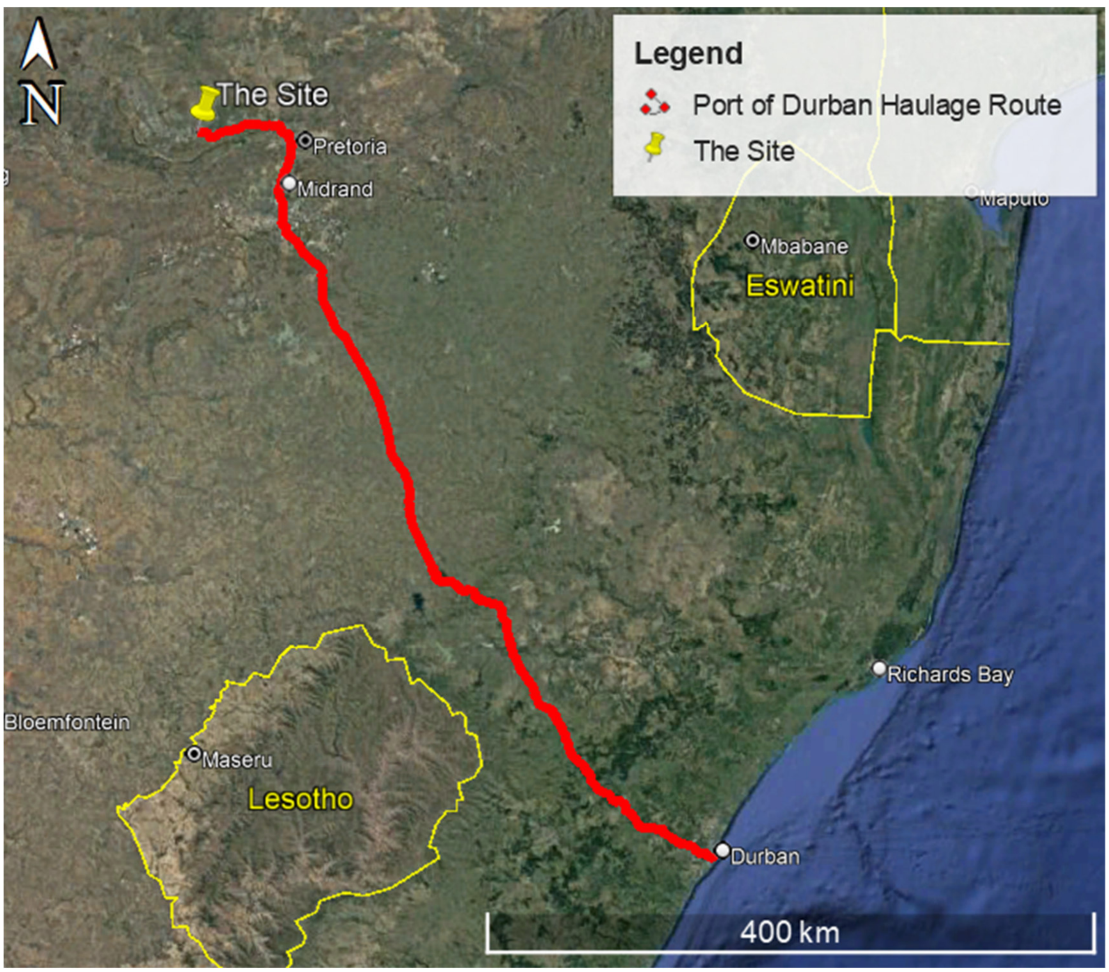

Figure 4-1: Route from the site to the Port of Durban

4.1.2 The Port of Richards Bay

The Port of Richards Bay is situated in the northern industrial hub of Kwa-Zulu Natal and accessible via rail and road. The port is a deep-sea water port with 13 berths. The Port can handle dry bulk ores, minerals and break bulk with a draft that easily accommodates Cape size and Panamax vessels.

The Port is currently creating capacity, investing in new equipment and undergoing extensive refurbishments. The Richards Bay port will not only be a deep-sea water port, but South Africa's premium bulk mineral port within the next six years. The Richards Bay Expansion Programme is currently in progress, adding new berths and extending rail capacity within the port. (Transnet Port Terminals, n.d.)

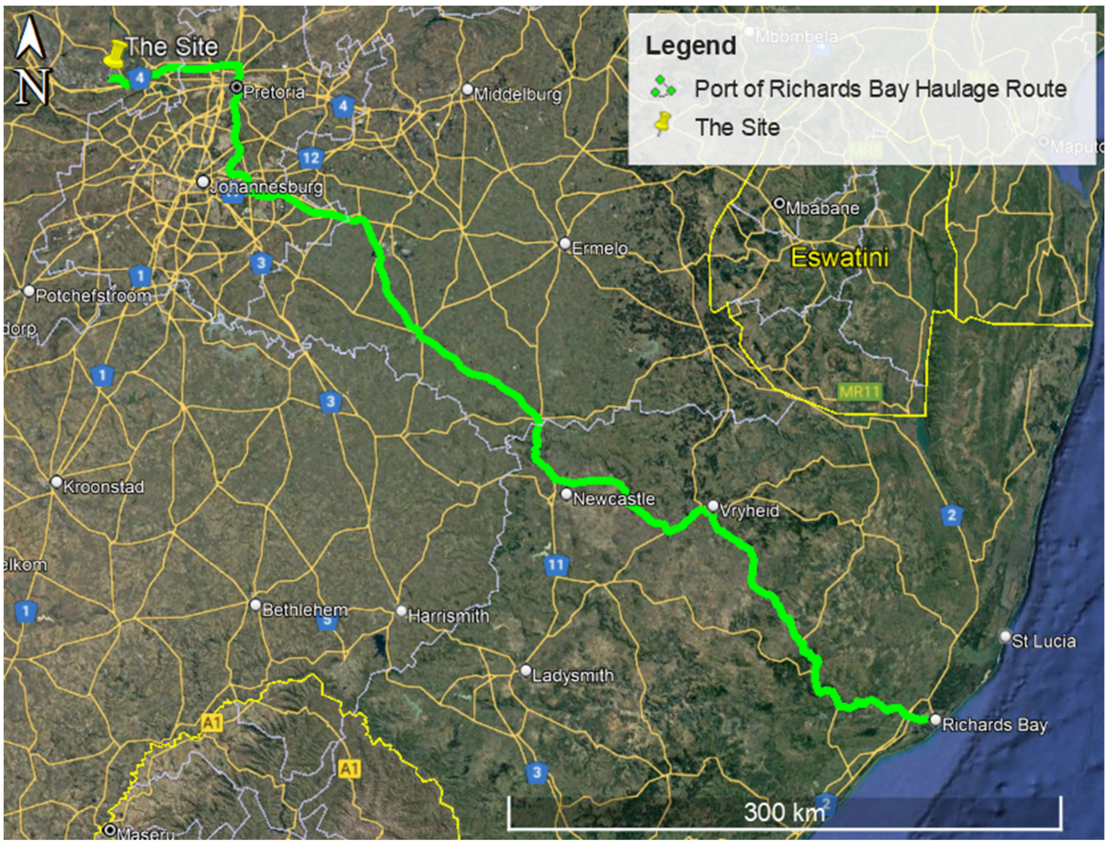

Figure 4-2: Route from the site to the Port of Richards Bay

The Port of Durban is located approximately 695km south-east of the site, and the Port of Richards Bay is located approximately 730km south-east of the site. The travel routes to the site from the ports comprise mostly high order routes and the solar PV panels are expected to be delivered by vehicles within the freight limitations. Road geometry limitations are thus not envisaged.

Due to the short travel distance to site, the Port of Durban is considered the preferred port of entry. It must however be noted that the availability at any of the considered ports will need to be confirmed with the Transnet Port authority.

4.2 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,
- Flatbed trucks transporting the solar panels, frames and the inverter, which are within the freight limitations,
- Light vehicles and buses transporting workers from surrounding areas to site,
- Drilling machines and other required construction machinery being transported by conventional trucks or via self-drive to site, and
- The transformer transported in an abnormal load,
- Abnormal mobile Crane for offloading equipment on site.

4.3 Abnormal Load Considerations

Abnormal permits are required for vehicles exceeding the following permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996) and the National Road Traffic Regulations, 2000:

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

In addition to the above, the preferred routes for abnormal load travel should be surveyed prior to construction to identify any problem areas, e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, to ensure that the vehicle can travel without disruptions. It needs to be ensured that gravel sections (if any) of the haulage routes remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.

There are bridges and culverts along the National and Provincial routes, which need to be confirmed for load bearing capacity and height clearances. However, there are alternative routes which can be investigated if the selected route or sections of the route should not be feasible.

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.

The transformer transport is the envisaged abnormal vehicle. The rest of the equipment and materials are expected to be hauled on normal loads.

4.4 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.

4.5 Permitting – General Rules

In general, 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.

4.6 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.

4.7 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.

4.8 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 components, such as electrical cables, battery energy storage compartments, pylons, inverter and switchgear, will also be transported to site during construction. The transport of these items will be conducted with normal heavy loads vehicles.

5 BASELINE ENVIRONMENTAL DESCRIPTION

5.1 General Description

A development footprint of approximately 100 ha for Marikana Solar PV has been identified within the broader combined project sites (approximately 780 ha in extent) for the development of the three Solar facilities (see **Figure 5-1**). Infrastructure associated with each solar PV facility will include the following:

The onsite infrastructure will include:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology. Once installed, the entire structure will stand up to 5m above ground level.
- Inverters and transformers.
- Cabling between the project components.
- Balance of Plant.
- On-site facility substation to facilitate the connection between the solar PV facility and Eskom electricity grid. The size and capacity of each of the on-site station will be 30MVA.
- An onsite Medium Voltage (MV) switching station forming part of the collector substation.
- 100MWh Battery Energy Storage System (BESS) per site.
- Temporary Laydown areas.
- Access roads, internal roads and fencing around the development area.
- Up to 132kV Overhead Power Lines (OHPL) – maximum of 30m height with a 15m servitude width
- Underground LV cabling will be used on the PV sites.

Figure 5-1:The Site

5.2 Project Specific Description

5.2.1 Route for Components manufactured within South Africa

In South Africa, more than half (52%) of the manufacturing industry's national workforce resides in three metros - Johannesburg, Cape Town and eThekwini. It is therefore anticipated that elements that can be manufactured within South Africa will be transported to the site from the Cape Town, Johannesburg, or Pinetown/Durban areas. Components will be 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.

1. **Route from Cape Town Area to Site – Locally sourced materials and equipment**

   Cape Town has a large manufacturing sector with twenty-six (26) industrial areas located throughout the metro.

   The proposed industrial hubs being considered to source the required materials and components is currently unknown. With quite an extensive and widespread industrial market, a specific route to the site cannot be considered at this point in time, but it is expected that a majority of the route length will be similar to the routes considered for the haulage of imported materials and equipment. No road limitations are envisaged along the route for normal load freight.

2. **Route from Johannesburg Area to Site – Locally sourced materials and equipment**

   If components from Johannesburg are considered, normal loads from Johannesburg to the site can be transported via the route as shown in **Figure 5-2** below. No road limitations are envisaged along the route for normal load freight. The distance from Johannesburg to the site is approximately 109km.

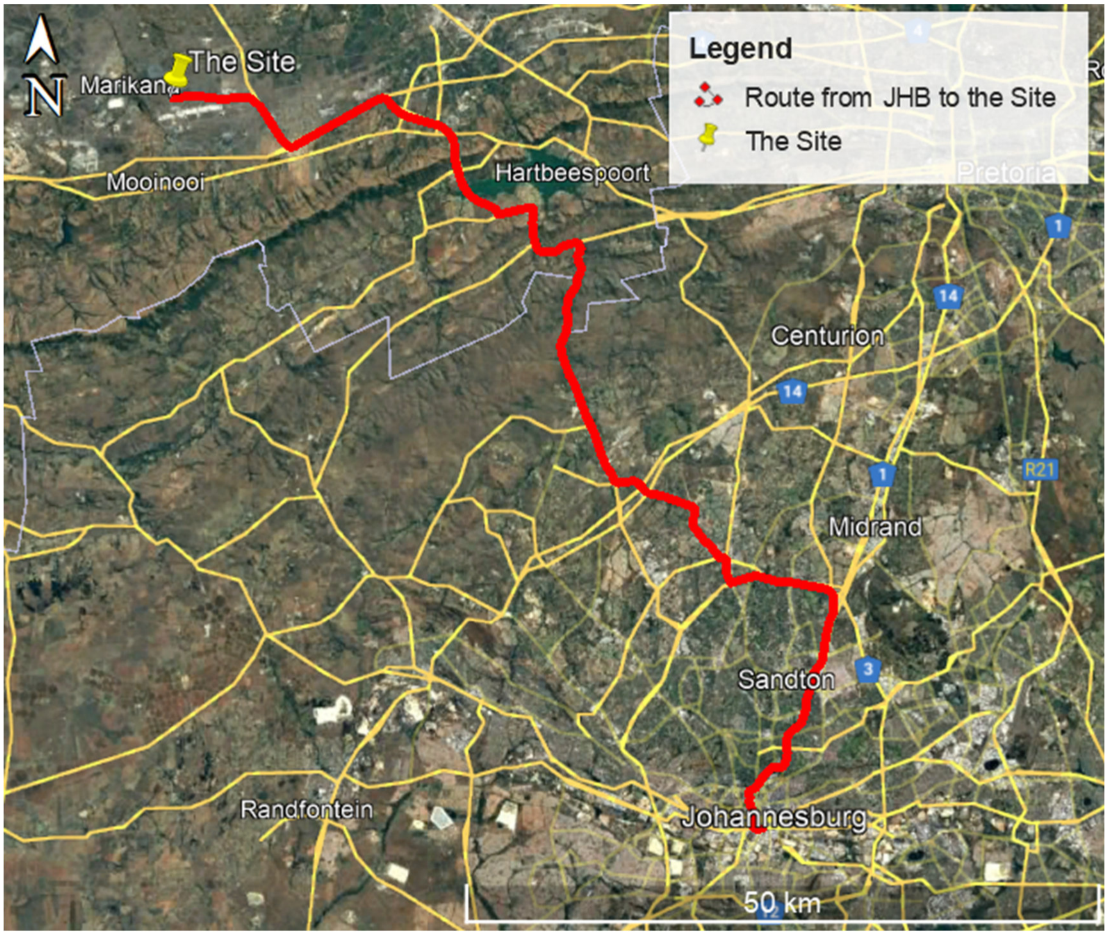

Figure 5-2:Route from Johannesburg Area to Site

3. Route from Pinetown / Durban to Site - Locally sourced materials and equipment
Normal loads can transport elements from Durban and Pinetown to the site. No road limitations are envisaged along the route for normal load freight. The shortest distance from Pinetown to the site is approximately 652km as shown in **Figure 5-3** below.

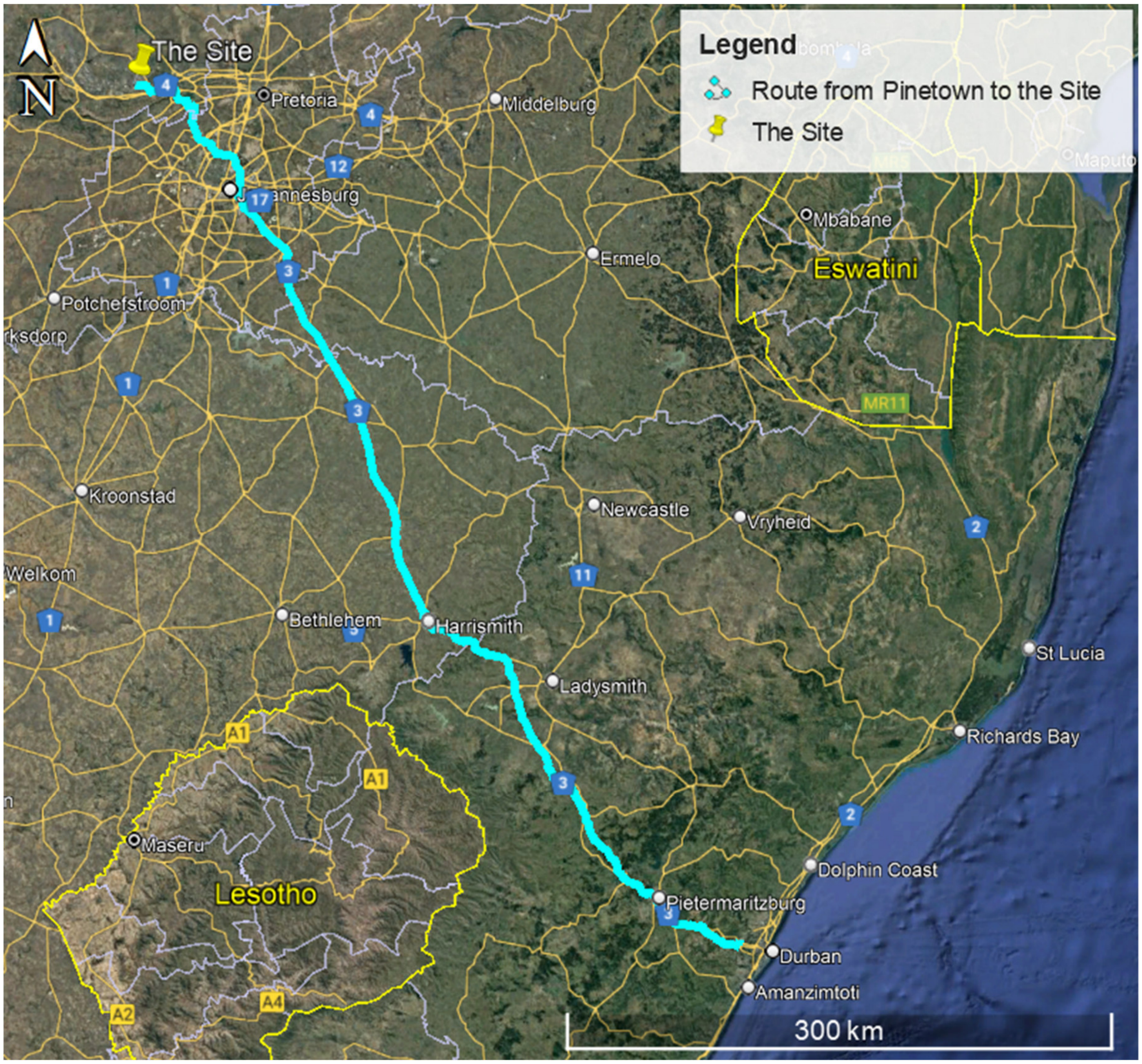

Figure 5-3:Route from Pinetown to the Site

5.2.2 Surrounding road network

The proposed site is located in Marikana, North West province. The road network surrounding the site comprises of Graeme Sinclair Road located to the south of the site (see **Figure 5-4** below).

Figure 5-4: Surrounding Road network

Based on TRH26, Graeme Sinclair Road functions as a rural Class 3 minor arterial. Graeme Sinclair Road is a surfaced road with one lane per direction and gravel shoulders. The private roads are gravel roads. There are no formalised provisions made for pedestrian facilities within the surrounding road network reserve. See **Figure 5-6** to **Figure 5-7** for existing road furniture.

Figure 5-5: Graeme Sinclair Road west approach

Figure 5-6: Private Road south approach

Figure 5-7: Private Road north approach

5.2.3 Site Access

Access to the project site is possible through the use of an existing site access point (see **Figure 5-8** below). As the site will be accessed via an existing access point, access spacing restrictions are not envisaged.

The access is located off a fairly straight road thus sight line issues are not envisaged. It is however recommended that vegetation within the road reserve and access sight triangles be kept clear to maintain visibility.

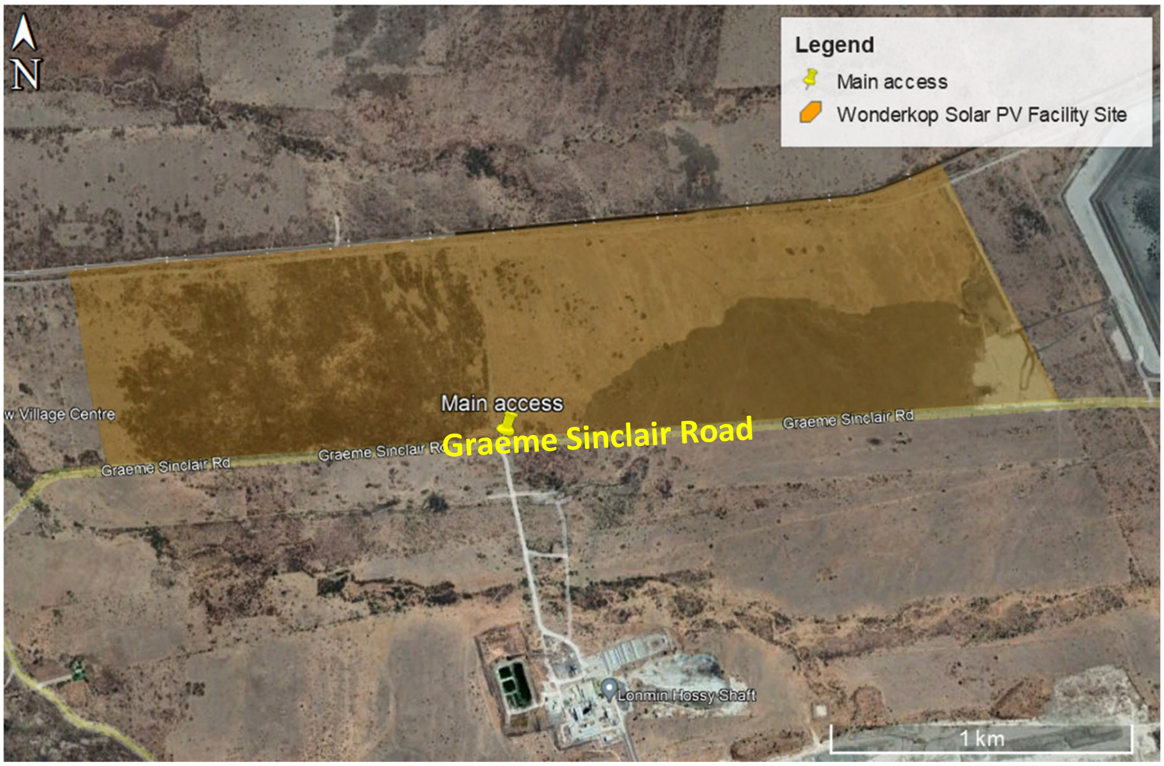

Figure 5-8: Existing Access Points

The access point to the site will need to be able to cater for construction and abnormal load vehicles. A minimum road width of 8m is recommended for the access point and the internal roads can have a minimum width of 5m. The radius at the access point needs to be large enough to allow for all construction vehicles to turn safely.

It is recommended that the site access to the gated solar PV plants be controlled via a boom and gatehouse. It is also recommended that security staff be stationed on site at the access booms during construction. A minimum stacking distance of 25m is recommended between the road edge of the external road and the boom.
All road markings and signage need to be in accordance with the South African Road Traffic Signs Manual (SARTSM).

5.2.4 Traffic volume information

To gain an understanding of the existing traffic volumes in the area, traffic volume counts were conducted on Thursday, 12 May 2022 at the two major intersections connecting off the Graeme Sinclair Road located near the site (see **Figure 5-9**).

The weekday peak was observed from 06:00 to 07:00 during the AM period and 15:15 and 16:15 during the PM peak hours (see **Figure 5-10** and **Figure 5-11**).

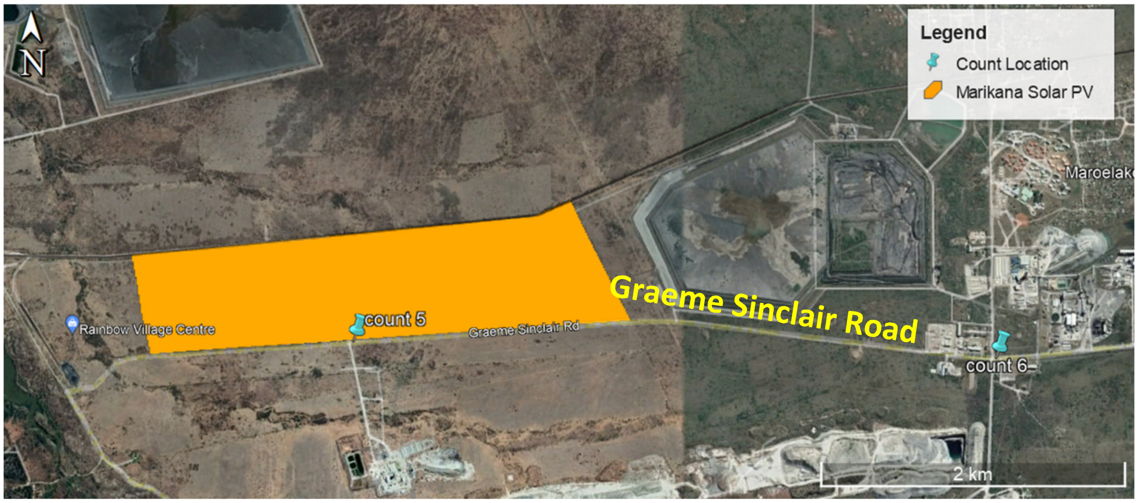

Figure 5-9: Count locations

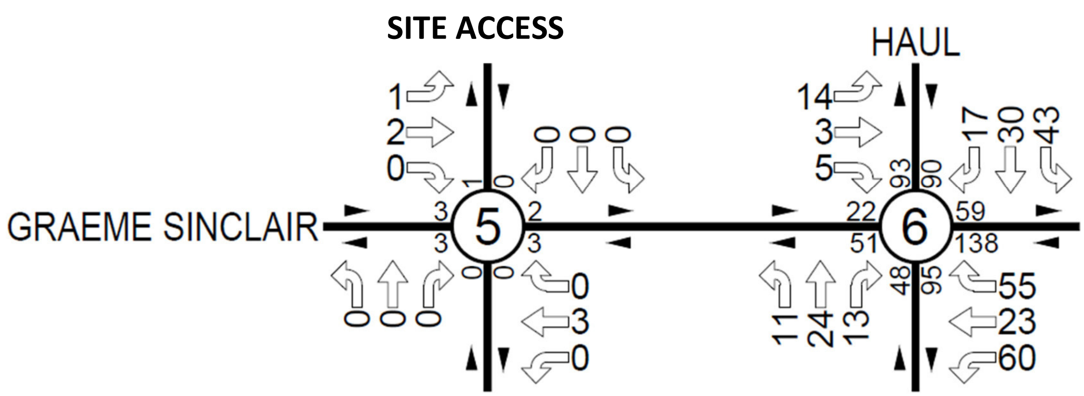

Figure 5-10: Am peak total volumes

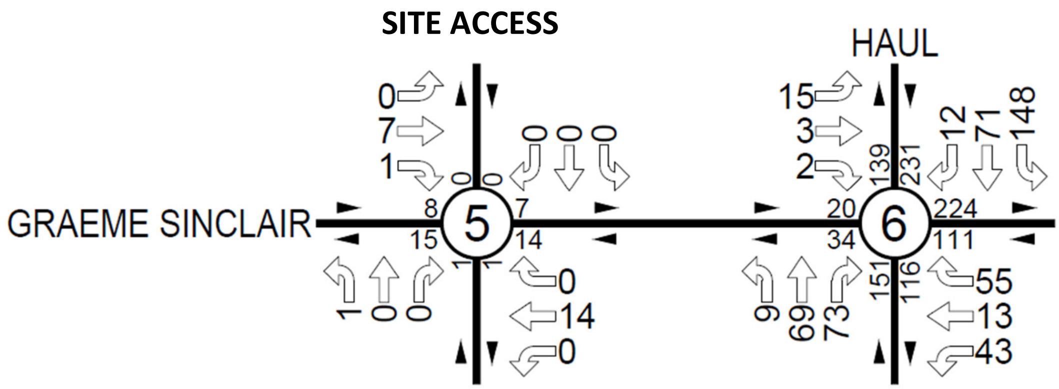

Figure 5-11: PM peak total volumes

Based on the traffic count data, the average peak link volumes along the Graeme Sinclair Road link near the site can be estimated as 39 trips during the AM peak and 38 trips during the PM peak hours.

TRH17 provides typical traffic growth rates of 3-4% for average growth areas. With the surrounding area being mostly rural, a 4% annual traffic growth rate is assumed suitable for the area. Assuming the solar PV site will be operational in five years **Table 5-1** provides

Table 5-1: Estimated future traffic

Link	**Peak link volume (2022)**		**Peak link volume (2027)**	
Graeme Sinclair Road (site frontage)	AM peak	PM peak	AM peak	PM peak
	39	38	48	47

Based on TRH26, Graeme Sinclair Road functions as a rural Class 3 minor arterial. Rural Class 3 minor arterial roads typically carry link volumes between 100 and 2000 vehicles per day. If it is further taken into consideration that peak hour traffic on rural roads typically range between 20-40% of the average daily traffic, rural Class 3 minor arterial roads can be estimated to typically carry peak hour volumes between 40 and 800.

With an expected maximum peak link volume of 48 for the year 2027, Graeme Sinclair Road is envisaged to be capable of accommodating the traffic generated by the site. It is however stressed that traffic mitigation measures be utilised as far as possible to manage and mitigate traffic congestion.

5.2.5 Internal Roads

The geometric design and layout for the internal roads from the access points needs to be established at detailed design stage. Existing structures and services, such as drainage structures, signage, street lighting and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that gravel sections remain in good condition and will need to be maintained during the additional loading of the construction phase and then reinstated after construction is completed.

The geometric design constraints encountered due to the terrain should be taken into consideration by the geometric designer. Preferably, the internal roads need to be designed with smooth, relatively flat gradients (recommended to be no more than 5 to 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

5.2.6 Transportation of Materials, Plant and People to the proposed site

It is assumed that the materials, plant and workers will be sourced from the surrounding towns as far as possible. The closest towns to the site are Rustenburg, Pretoria, and Johannesburg.

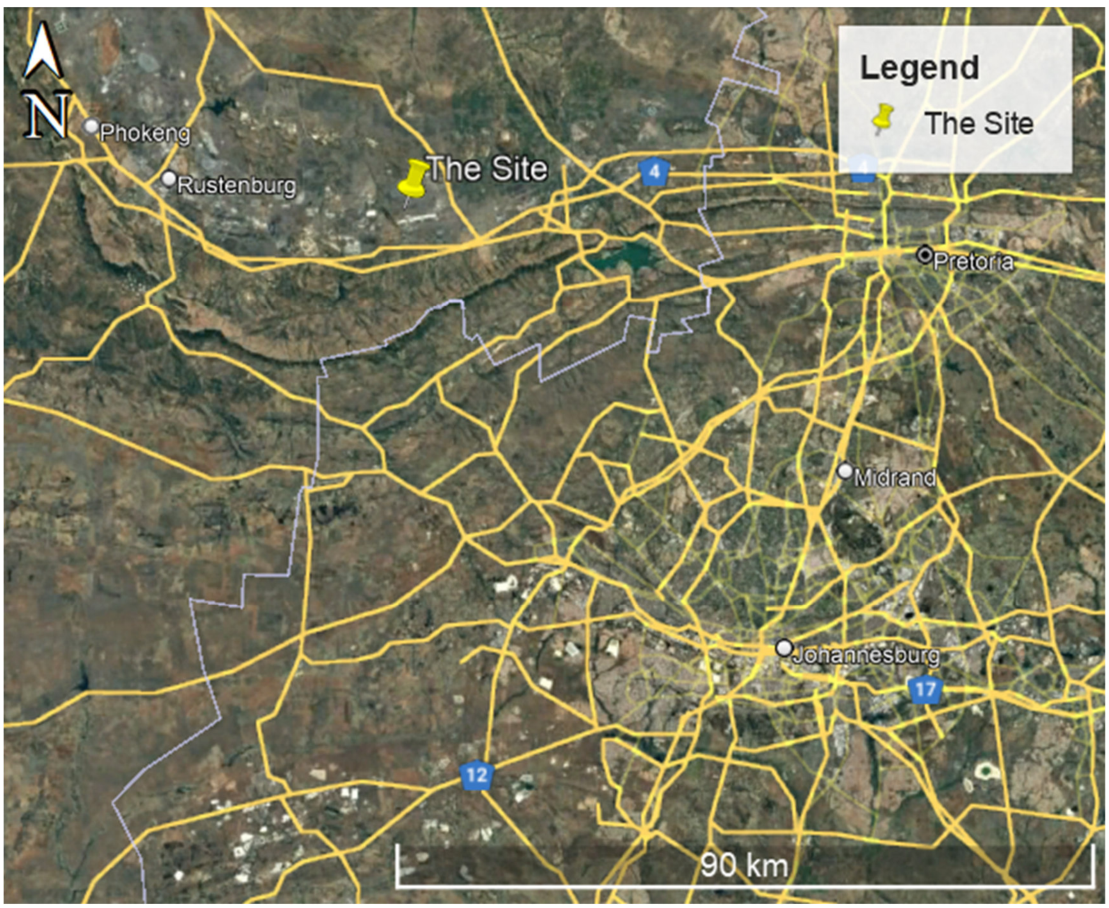

Figure 5-12:Surrounding Towns

Concrete batch plants and quarries in the vicinity could be contracted, where reasonable and feasible, to supply materials and concrete during the construction phase, which would reduce the impact on traffic on the surrounding road network. Alternatively, mobile concrete batch plants and temporary construction material stockpile yards could be commissioned on vacant land near the proposed site. Delivery of materials to the mobile batch plant and the stockpile yard could be staggered to minimise traffic disruptions.

5.2.7 Public Transport and Non-Motorised Transport

In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), it is a requirement that an assessment of the available public transport services be included in Traffic Impact Assessment. The following comments are relevant in respect to the public transport availability for the proposed development.

5.2.7.1 Public Transport

Based on the draft Integrated Development plan 2020/21, the Madibeng Local Municipality public transport consider Scholar Transport, Minibus Taxi Operations, Commuter Bus Operations, and Cross Border Operations.

Based on the traffic counts conducted near the site there are no minibus taxis or buses along Graeme Sinclair Road. Accessibility to public transport is limited, as such, the operational stage staff are assumed to use private vehicles or possibly arranged transportation.

During the construction and decommissioning stage, it is common practice for contractors to arrange transportation for workers. The use of high occupancy vehicles (i.e., buses and taxis) as an alternative to low occupancy vehicles (i.e., passenger vehicles) is supported from a traffic point of view because it reduces the traffic demand on the road network.

5.2.7.2 Non-motorised Transport (NMT)

The surrounding road network connecting to the site comprises of the Graeme Sinclair Road located to the south of the site. Graeme Sinclair Road does not accommodate formalised NMT facilities. It is recommended that the internal roads accommodate pedestrian facilities on at least one side of the road with a minim 1.5m width. Alternatively, a wide shoulder can be accommodated to allow pedestrians to travel safely outside of the vehicle travelled way. The internal road reserve must however be maintained to ensure the road infrastructure is functional and accessible.

6 Provision For Emergency Vehicles

Emergency vehicles will need to be able to enter the development site. The surrounding road network accommodates heavy vehicle traffic bound for mining facilities. The surrounding road network is therefore not envisaged to have access limitations for emergency vehicles.

The site is recommended to accommodate the parking and operation of emergency vehicles and/or equipment. The dimension of the access must be suitable for the largest emergency vehicle while the carrying capacity should cater for the heaviest emergency vehicle. The design emergency vehicle is recommended to cater for the risk of the premises and the emergency vehicle that is likely to be used on the premisses.

Any cul-de-sac and dead-end routes must be provided with a minimum turning circle at the closed end of the road capable of accommodating the largest emergency vehicle which is required to cater for the risk of the premises.

The design, marking, use and maintenance of an emergency vehicle route not forming part of a public road must comply with the requirements of the controlling authority. To prevent the obstruction of emergency vehicle routes or facilities, appropriate maps and signage to indicate emergency vehicle routes and facilities is recommended.

As a guide, the typical minimum access requirements for a fire truck is a 4m clearance width and a 4.2m heigh clearance. This however can vary based on the requirements of the controlling authority.

7 ISSUES, RISKS AND IMPACTS

7.1 Identification of Potential Impacts/Risks

The potential impacts to the surrounding environment expected to be generated from the development traffic is traffic congestion and associated noise, dust and exhaust pollution. This will be true for the construction, operation and decommissioning phase.

It must be noted that:

- The significance of the impacts is expected to be higher during the construction and decommissioning phase because these phases generate the highest development traffic.

- Traffic impacts are typically assessed for the operational stage as the long-term road infrastructure burden. The construction and decommissioning phase are expected to produce high development traffic volume and a traffic management plan document is often compiled and managed throughout these phases to help manage traffic during these phases.

- The traffic estimations and impacts discussed for the construction and decommissioning phase are only indicative because project programming, availability of materials, proximity of material sources to the site, road lengths and geometry, material delivery scheduling, abnormal load permitting, chosen solar panel technology, developable area etc, can affect the number of vehicles that visit the site. This information is typically not available until detailed design stage and/or construction planning stage.

7.1.1 Construction phase

This phase includes the transportation of people, construction materials and equipment to the site. This phase also includes clearing the site and the construction of the solar facility, including construction of footings, roads, excavations, trenching and ancillary construction works. This phase will temporarily generate the most development traffic.

Nature of impact:
The nature of the impact expected to be generated at this stage would be traffic congestion and delays on the surrounding road network as well as the associated noise, dust and exhaust pollution due to the increase in traffic.

Estimated peak hour traffic generated by the site:
Trip generation during construction is difficult to accurately estimate as it depends on the Construction programming, availability of materials, and the size of vehicles used to transport materials. The analysis below is an estimation conducted for the purposes of this study.

- **<u>Construction vehicle trips:</u>**

From experience on other projects of similar nature the number of heavy vehicles per 7MW installation is estimated to range between 200 and 300 trips depending on the site conditions and requirements. For the 30MW facility, the total trips can therefore be estimated to be between 858 and 1286 heavy vehicle trips.

Based on a 12-month estimated construction period, with ± 235 annual average working days (five-day work week), an estimated maximum 6 daily trips can be assumed to be generated by the construction vehicles.

For rural environments it is further estimated that the peak hour trips are around 20-40% of the average daily traffic. The resulting peak hour trips for the construction phase are thus estimated to be approximately 3 trips.

- **Solar Panel Delivery trips:**

It is expected that the facility will accommodate a maximum of 54 546 solar PV panels.
To provide a reference on the potential typical trips expected, a similar project was reviewed. For the reference project, one super link truck could transport 22 pallets of solar Pv panels. Assuming approximately 20 solar panels per pallet, 440 solar panels will result in a single trip generation.

At 54 546 solar panels, approximately 124 super link trucks can be estimated for solar panel delivery (total number of trucks). The peak hour trip generation from equipment and solar panel delivery cannot be estimated during the concept or design stage of the project due to the following:

- the solar panel size, the packaging configuration of the solar panels, and the delivery truck size and load capacity greatly affects how many panels can be transported on one truck. The logistics company transporting the panels would be able to provide an estimate of truck trips generated by the solar panel delivery. This information is however not available at this stage.

- The project construction programming, availability of solar panels, shipping times etc affect how may solar panels will be delivered at any one time.

Construction workers trips:
The number of construction personnel is affected by project programming and is unknow at this stage. Based on similar projects it is assumed that at the peak of construction, the project will generate jobs for around 300 construction workers. It is assumed that semi-skilled labourers and unskilled labourers will travel by bus while skilled labourers are likely to travel by passenger vehicles. Assuming 60% of the workers are unskilled labourers, 30% semi-skilled labourers, 10% skilled labourers, and a 60-passenger capacity bus, 35 total trips are estimated to be generated by staff commutes.

If it is further assumed that 20-40% of the average daily traffic occurs during the peak hour, a conservative 14 peak hour traffic trips are assumed for staff commuter trips.

It must however be noted that the above estimate has a low probability of occurrence because construction workers typically travel outside peak hours.

- **Impact Mitigation Measure Summary:**

The impacts during the construction stage are temporary and short term in nature. The impacts can be mitigated to an acceptable level. Traffic is expected to return to normal levels after construction is completed.

Noise, dust and exhaust pollution during the construction phase cannot be completely mitigated but the following mitigation measures will significantly reduce the impact:

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads during the construction phase, as required.
- The use of mobile batch plants and quarries near the site would decrease material delivery trips.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- Use of high occupancy vehicles as much as possible to reduce traffic volumes
- The preferred abnormal load travel routes should be surveyed to identify problem areas (e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification).
- Design and maintenance of internal roads. Any internal gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional.

7.1.2 Operational Phase

This phase includes the operation and maintenance of the solar PV facility throughout its life span.

Nature of impact:

The nature of the impact expected to be generated at this stage would be traffic congestion and delays on the surrounding road network, and the associated noise, dust and exhaust pollution.

Estimated peak hour traffic generated by the site:

- **Trips generated by staff traveling to the site:**

The number of permanent staff expected for the operational phase is still unknown. Based on similar studies it can be estimated that a maximum of 20 full-time employees will be stationed on site.

If it is further assumed that 20-40% of the average daily traffic occurs during the peak hour. An estimated 8 peak hour traffic trips are assumed for staff commuter trips.

The operational peak hour staff trips are therefore expected to be low and will have a negligible impact on the external road network.

- **Trips generated by material delivery:**

  Aside from operational staff, cleaning of the solar panels is expected to generate trips. The following assumptions can be made to estimate the resulting trips generated from cleaning solar panels:

  - On a commercial scale, Solar panels are typically cleaned using special cleaning agents or treated water such as distilled, deionized (DI) or reverse osmosis (RO) water. The treated water can be trucked in via water tankers or alternatively an onsite water treatment system can be installed to generate treated water.
  - Using manpower to clean solar panels can be physically tasking resulting in long hours and high staff demands for large volumes of panels (e.g., A 32 panel system on average takes 2 hours to clean (Sunpower, n.d.)).
  - Manpower/manual cleaning has a disadvantage of uneven and inconsistent pressure which can result in damaged solar panels.
  - Commercial and large solar facilities often employ mechanical cleaning systems because they have high power and efficiency, and the cleaning work has good consistency of pressure on solar panels drastically limiting solar panel damage. Mechanical systems can also work faster than manual cleaning. See **Figure 7-1** and **Figure 7-2** for examples of mechanical cleaning systems (Bluesun Solar Group, n.d.)

Figure 7-1: Mechanical Solar panel cleaning system

Figure 7-2: Cleaning robot

- The frequency at which solar panels are cleaned depends on the condition of the solar panels and the environment the solar panels are located in. On average, solar panels can be expected be cleaned every six (6) months. Mining areas tend to have high dust emissions therefore a high cleaning frequency may be required.
- With water delivery, domestic and industrial water tankers vary in size. Typical water tankers are available at capacities ranging from 5000L to 30 000L. A worst-case scenario of 5000L water tankers can be assumed for this study.
- Based on similar studies approximately 5 litres of water per panel is needed to clean one panel, once.
- Assuming the worst-case scenario of labor-intensive cleaning the following assumptions are made to provide an indicative trip generation volume:

Assumption	Resulting volumes
Assume all panels are scheduled to be cleaned in 10 days	5 455 panels are cleaned per day
32 panels can be cleaned in 2 hours	64 panels/person/day
Number of staff required to meet assumed target	86 cleaning personnel
Staff trips assuming passenger capacities of: 60 for a bus, 15 for a taxi, and 5 for a passenger vehicle.	3 trips staff + 1 trip for managers/coordinators
Assume as a worst-case scenario a weekly supply of cleaning water is delivered at once and stored on site. Limits down time. **(5L per panel and 5000L delivery truck)**	136.4kL total volume required 28 trucks for delivery Assumed peak hour trips are around 20-40% of the average daily traffic. 14 peak hour trips generated for water delivery
Total estimated peak hour trips	18

It must be noted that the trips generated for the cleaning of solar panels occurs periodically and is dependent on the cleaning method, condition of panels, availability of staff (for labor intensive methods), equipment, and availability of suitable water.

During the operational phase the maximum estimated peak hour traffic is an average 8 trips and a periodic 26 peak hour trips when solar cleaning is scheduled. With less than 50 peak hour trips the traffic impact during the operational phase is considered negligible.

- **Impact Mitigation Measure Summary:**

The impacts during the operation stage are long term in nature. The highest traffic generator during this stage is typically the cleaning of solar PV panels. Solar panels are however only cleaned periodically (i.e., at minimum 2 times a year) thus the number of occurrences of this trip generator is low. The impacts can be mitigated to an acceptable level. Traffic is expected to return to normal levels after cleaning is completed.

Noise, dust and exhaust pollution cannot be completely mitigated but the following mitigation measures will significantly reduce the impact:

- The use of mechanical or robotic cleaning methods reduces cleaning durations and cleaning staff volumes.
- On site water treatment facilities with storage to allow for on-site water sourcing rather than water delivery.
- If water delivery is to occur, the delivery of water to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods. In addition, water storage facilities can be accommodated on site to allow water delivery to be staggered.
- Dust suppression of gravel roads as required.
- Maintenance of internal roads to maintain good riding quality.

7.1.3 Decommissioning phase

This phase will have similar trip generation volumes, impacts and mitigation measures as the Construction Phase.

8 IMPACT ASSESSMENT

The potential impacts to the surrounding environment expected to be generated from the development traffic is traffic congestion and associated noise, dust and exhaust pollution. This will be true for the construction, operation and decommissioning phase.

It must be noted that a Traffic Impact Assessment is aimed at assessing impacts of the traffic volume generated by the site on the surrounding road network capacity, as such, it is not intended to assess the environmental impacts associated with traffic generation/congestion. Although traffic generation has an environmental impact, the assessment of these environmental impacts as presented in this report are only indicative. This assessment of the environmental impacts is aimed at providing input for the EIA process.

8.1 Potential Impacts during the Construction Phase

The following table assesses the impact of Noise, dust, and exhaust emissions on the road environment:

Impact Noise, dust and exhaust pollution associated with traffic congestion			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Noise caused by increase in traffic	Direct impacts: ▪ Increased road user stress levels and reduced alertness. ▪ Potential hearing impairment of road users. ▪ Masking of warning sounds such as car horns. Indirect impacts: ▪ Potential increase in accident rates.	local	None identified at this stage
Dust caused by increase in traffic	Direct impacts: ▪ Impacts on the health of road users ▪ Reduced visibility for road users in the vicinity of the site due to airborne dust. ▪ Reduced visibility of road signs and road markings due to dust covering transport routes and facilities. Indirect impacts: ▪ Potential increase in accident rates.	local	None identified at this stage
Exhaust emissions caused by increase in traffic	Direct impacts: ▪ Impacts on the health of road users ▪ Reduced visibility for road users Indirect impacts: ▪ Acid rain and smog production which can reduce road safety due to poor road visibility and deterioration of road furniture	local	None identified at this stage

Description of expected significance of impact The construction phase is a short-term occurrence and the impacts associated with increase in traffic are expected to be short term. Impacts caused by the construction traffic can be minimised through the implementation of appropriate mitigation measures (see section 7.1.1).
Gaps in knowledge & recommendations for further study ▪ Identify local and imported components ▪ Water source to be clarified – on site water sources or transported to site. ▪ If water is to be transported, information on the size of water bowser to be used ▪ Number of components ▪ Number of abnormal loads ▪ Construction period ▪ Number of site staff ▪ Fleet size **Recommendations with regards to general field surveys** ▪ Potential construction resources that can be sourced on site (water, gravel etc)

8.2 Potential Impacts during the Operational Phase

The following table assesses the impact of Noise, dust, and exhaust emissions on the road environment:

Impact Noise, dust and exhaust pollution associated with traffic congestion			
Issue	Nature of Impact	Extent of Impact	No-Go Areas
Noise caused by increase in traffic	Direct impacts: ▪ Increased road user stress levels and reduced alertness. ▪ Potential hearing impairment of road users. ▪ Masking of warning sounds such as car horns. Indirect impacts: ▪ Potential increase in accident rates.	local	None identified at this stage
Dust caused by increase in traffic	Direct impacts: ▪ Impacts on the health of road users ▪ Reduced visibility for road users in the vicinity of the site due to airborne dust. ▪ Reduced visibility of road signs and road markings due to dust covering transport routes in the long term. Indirect impacts: ▪ Potential increase in accident rates.	local	None identified at this stage
Exhaust emissions caused by increase in traffic	Direct impacts: ▪ Impacts on the health of road users ▪ Reduced visibility for road users Indirect impacts: ▪ Acid rain and smog production which can reduce road safety due to poor road visibility and deterioration of road furniture	local	None identified at this stage

Description of expected significance of impact The operational phase has low traffic volumes thus the impacts associated with increase in traffic are expected to be low. Impacts caused by the operational traffic can be minimised through the implementation of appropriate mitigation measures (see section 7.1.2).
Gaps in knowledge & recommendations for further study ▪ Project life span ▪ The number of permanent employees ▪ Water source to be clarified – on site or transported to site ▪ If water is to be transported, information on the size of water bowser to be used **Recommendations with regards to general field surveys** ▪ Potential for on-site treated water facility

8.3 Potential Impacts during the 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.

8.4 Cumulative Impacts

8.4.1 Construction phase

The following table assesses the impact of Noise, dust, and exhaust emissions on the road environment:

Nature: Noise, dust and exhaust pollution associated with traffic congestion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	short duration (2)	short duration (2)
Magnitude	moderate (6)	high (8)
Probability	highly probable (4)	Probable (3)
Significance	**Medium (36)**	**Medium (33)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: medium.		
Mitigation: Noise, dust and exhaust pollution during the construction phase cannot be completely mitigated but the following mitigation measures will significantly reduce the impact: ▪ The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.		

- Dust suppression of gravel roads during the construction phase, as required.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road networks.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- Use of high occupancy vehicles as much as possible to reduce traffic volumes
- The preferred abnormal load travel routes should be surveyed to identify problem areas (e.g., intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification).
- Design and maintenance of internal roads. Any internal gravel roads will require grading with a grader to obtain a flat even surface and the geometric design of these gravel roads needs to be confirmed at detailed design stage. This process is to be undertaken by a civil engineering consultant or a geometric design professional.

8.5 Operation phase

The following table assesses the impact of Noise, dust, and exhaust emissions on the road environment:

Nature: Noise, dust and exhaust pollution associated with traffic congestion		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Local (1)	Local (1)
Duration	long term (4)	long term (4)
Magnitude	small (0)	minor (2)
Probability	highly probable (4)	highly probable (4)
Significance	**low (20)**	**low (28)**
Status (positive or negative)	Negative	Negative
Reversibility	High	High
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation: Noise, dust and exhaust pollution cannot be completely mitigated but the following mitigation measures will significantly reduce the impact: ▪ The use of mechanical or robotic cleaning methods reduces cleaning durations and cleaning staff volumes. ▪ On site water treatment facilities to allow for on-site water sourcing rather than water delivery. ▪ If water delivery is to occur, the delivery of water to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.		

▪ Dust suppression of gravel roads as required. ▪ Maintenance of internal roads to maintain good riding quality.

8.6 Decommissioning phase

This phase will have similar trip generation volumes, impacts and mitigation measures as the Construction Phase.

8.7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed development 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 energy demands. **Hence, the no-go alternative is not a preferred alternative.**

9 REFERENCES

- Bluesun Solar Group. (n.d.). *Common cleaning methods for solar panel modules*. Retrieved May 17, 2022, from Bluesunpv.com: https://www.bluesunpv.com/blog/common-cleaning-methods-for-solar-panel-modules_b101
- Sunpower. (n.d.). *Home-solar-panel-cleaning-tips-checklist*. Retrieved May 18, 2022, from us.sunpower.com: https://us.sunpower.com/home-solar-panel-cleaning-tips-checklist

APPENDIX A - SPECIALIST EXPERTISE

IRIS SIGRID WINK

Profession	*Civil Engineer (Traffic & Transportation)*
Position in Firm	*Associate*
Area of Specialisation	*Manager: Traffic & Transportation Engineering*
Qualifications	*PrEng, MSc Eng (Civil & Transportation)*
Years of Experience	*20 Years*
Years with Firm	*10 Years*

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156). She joined JG Afrika (Pty) Ltd. in 2012. Iris obtained a Master of Science degree in Civil Engineering in Germany and has more than 20 years of experience in a wide field of traffic and transport engineering projects. Iris left Germany in 2003 and has worked as a traffic and transport engineer in South Africa and Germany. She has technical and professional skills in traffic impact studies, public transport planning, non- motorised transport planning and design, design and development of transport systems, project planning and implementation for residential, commercial and industrial projects and providing conceptual designs for the abovementioned. She has also been involved with transport assessments for renewable energy projects and traffic safety audits.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng	-	Registered with the Engineering Council of South Africa No. 20110156 Registered Mentor with ECSA for the Cape Town Office of JG Afrika
MSAICE	-	Member of the South African Institution of Civil Engineers
ITSSA	-	Member of ITS SA (Intelligent Transport Systems South Africa)
SAWEA	-	Member of the South African Wind Energy Association
SARF	-	South African Road Federation: Committee Member of Council
SARF WR	-	South African Road Federation Western Region – Chair
SARF RSC	-	South African Road Federation National Road Safety Committee
IRF	-	Registered as International Road Safety Audit Team Leader

EDUCATION

1996 - Matric – Matric (Abitur) – Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma as Draughtsperson – Lower Saxonian State Office for Road and Bridge Engineering
2003 - MSc Eng (Civil and Transportation) – Leibniz Technical University of Hanover, Germany

SPECIFIC EXPERIENCE (SELECTION OF PROJECTS)

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2016 – Present
Position – Associate / Division Head: Traffic & Transport Engineering

Transport Impact Assessments and Traffic Management Plans for several renewable energy projects in South Africa, such as Great Karroo RE Cluster, Ummbila Emoyeni Solar Project, Poortjie Wind&Solar, etc. – Client: various

Traffic Impact Assessment and Intersection Analyses for St Francis Road Upgrade, Jeffreys Bay – Client: Kouga Municipality

Road Safety Assessments for the Province of Limpopo, Client: Road Agency of Limpopo

Transport Impact Assessments and Management Plan for the Euronotus Wind&Solar Energy Cluster in the Western Cape, Client: WSP on behalf of G7 Energies

Transport Impact Assessment for De Aar Solarfarm, Client: Mulilo

Transport Impact Assessments for the Mpumalanga Windfarms, Client: Enertrag

Transport Impact Assessment for the Hyperion Thermal Plant, Client: Red Rocket

Transport Impact Assessment for the Richards Bay Gas to Power Facility, Client: Savannah

Transport Impact Assessment for the Pienaarspoort Wind Energy Facility, Client: Savannah

Transport Impact Assessment for Oya Black Mountain Solar Farm, Client: G7 Energies

Traffic Impact Assessment for the Nooiensfontein Housing Development, Client: City of Cape Town

Road Safety Audit for N7 Section 3 Moorreesburg to Piketberg, Client: THM on behalf of SANRAL

Road Safety Audit for N3 Section 20 Key Ridge to Hammarsdale, Client: BVI on behalf of SANRAL

Traffic Risk Assessment for Legoko Solarfarms, Client: Atlantic Renewable Energy Partners (Pty) Ltd

Road Safety Audits for N2 Wildcoast Toll Roads, Eastern Cape/Natal, Client: Aurecon/Knight Piesold on behalf of SANRAL **Traffic Risk Studies** for the Kuruman Windfarm (450MW) in the Northern Cape, Client: CSIR on behalf of Mulilo

Beau Constantia and Constantia Glen Winefarms – Detailed Access Design, Client: private

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

Road Safety Audit for N2 Section 20 Wild Coast Toll Road Project – Client: Knight Piesold & Aurecon on behalf of SANRAL

Road Safety Audit Appraisals on roads in the Mpumalanga Province for the Department of Transport Mpumalanga - Client: AFRISA on behalf of DoT Mpumalanga

Traffic and Parking Audits for the Suburb of Groenvallei in Cape Town – Client: City of Cape Town Department of Property Management.

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 Piekenierskloof pass) – Client: SANRAL

Road Safety Appraisals for Northern Region of Cape Town – Client: Aurecon on behalf of City of Cape Town (TCT)

Traffic Engineering Services for the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality

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

Traffic Engineering Services for the Kosovo Informal Settlement (which is part of the Southern Corridor Upgrade Programme), Client: Western Cape Government

Traffic and Road Safety Studies for the proposed Kosovo Informal Housing Development (part of the Southern Corridor Upgrade Program), Client: Western Cape Government.

Road Safety Audit Stage 3 – Upgrade of the R573 Section 2 between Mpumalanga/Gauteng and Mpumalanga/Limpopo, Client: AECOM on behalf of SANRAL

Road Safety Audit Stage 1 and 3 – Upgrade of the N2 Section 5 between Lizmore and Heidelberg, Client: Aurecon on behalf of SANRAL

Traffic Safety Studies for Roads Upgrades in Cofimvaba, Eastern Cape – Client: Cofimvaba Municipality

Road Safety Audit Stage 1 and 3 – Improvement of Intersections between Olifantshoek and Kathu, Northern Cape, Client: Nadeson/Gibb on behalf of SANRAL

Road Safety Audit Stage 3 – Upgrade of the Beacon Way Intersection on the N2 at Plettenberg Bay, Client: AECOM on behalf of SANRAL

Traffic Impact Assessment for a proposed Primary School at Die Bos in Strand, Somerset West, Client: Edifice Consulting Engineers

Road Safety Audit Stage 1 and 3 – Improvement of R75 between Port Elizabeth and Uitenhage, Eastern Cape, Client: SMEC on behalf of SANRAL

Road Safety Audit Stage 1 and 3 – Upgrade of the N2 between Heidelberg and Riversdale, Western Cape, Client: Aurecon on behalf of SANRAL

Traffic Impact Assessment and Site Safety Studies for the Extension of the Farewell King Site in the Durban Container Terminal, Client: Vopak

Road Safety Audit Stage 1 and 3 – Pedestrian Facilities at De Doorns on National Route 1 Section 3, Client: Aurecon on behalf of SANRAL

Road Safety Audit Stage 1 - Upgrade of the R63 Section 13 between Fort Beaufort and Alice, Client V3 Consulting on behalf of SANRAL

Traffic and Pedestrian Safety Studies for the Upgrade of the R63 Section 13 between Fort Beaufort and Alice, Client: V3 Consulting on behalf of SANRAL

Traffic Impact Assessment for the Crawford Campus of the College of Cape Town, Client: College of Cape Town

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)

2012 – 2016
Position – Senior Traffic & Transportation Engineer

Traffic Impact Study for the Campsdrift Msunduzi Waterfront Housing Development, Pietermaritzburg, Client: Private

N2 Section 19 – **Traffic and Pedestrian Safety Studies** as part of the upgrading project, Mthatha to Qumbu, Eastern Cape, Client: UWP on behalf of SANRAL
Bloemsmond Solarfarms – **Transport Impact Assessment** for two solarfarms close to Upington in the Northern Cape, Client: Atlantic Energy Partners

Scatec Solarfarms – **Detailed design of access roads** for three solarfarms close to Upington, Client: Scatec Solar

Gravel Roads Upgrade for Fezile Dabi District, Free State, **Traffic Impact Investigation**, Client: Free State Province

R63 Rehabilitation between Alice and King Williams Town – **Traffic & NMT Study** for several intersections and accesses along this 60km long road in regards to pedestrian safety, Client: SANRAL

Zambia RD Rehabilitation – **Traffic Study and Advice** for the Rehabilitation of a 320km stretch of road in Zambia, Client: Government of Zambia

N2 Caledon to Riviersonderend – **Traffic and NMT safety audit** as part of the N2 Upgrade between Caledon and Riviersonderend, Client: SANRAL

MR529 Rehabilitation, Western Cape - **Conceptual designs for possible upgrades** to the intersections of the R27 and Voortrekker Street in Veldrift and the intersection of MR527 and MR529 close to Piketberg. Client: Western Cape Government (WCG)

SANRAL R61 Rehabilitation, Eastern Cape – **Traffic input into upgrading** requirements regarding NMT and public transport facilities, such as sidewalks, pedestrian bridges, taxi/bus stops. Client: SANRAL

Delft Housing Development – **Conceptual Planning of the Site Development Plan and Transport Impact Assessment** for a 700-residential unit development, Client: Onke Consulting

Nyanga Public Transport Node – **Traffic Study including Non-motorised Transport (NMT) and Public Transport Planning** as part of the Upgrade of the Nyanga Public Transport Node and surrounding area, Client: City of Cape Town

Durban RoRo Terminal Capacity Expansion – **Traffic Management Plan and Transport Impact Assessment** for the Expansion of Transnet's RoRo Terminal in the Durban Port, Client: Transnet Capital Projects

Transnet Traffic Management Plan – **Traffic Management Plan and Impact Assessment** for the Resurfacing of the Transnet Park Site in Port Elizabeth, Client: Transnet

Mthatha Landfill Site – **Traffic Impact Assessment** for the Development of a landfill site at Mthatha, Eastern Cape, Client: PASCO Waste & Environmental

Bellville Medical Centre, Bellville CBD – **Transport Impact Assessment** for the development of an educational medical facility for 2000 nursing students. Client: University of the Western Cape

Bloekombos District Hospital, Joostenberg – **Transport Impact Assessment** for the proposed development of a 300-room hospital and ambulant station including circulation of emergency vehicles, parking, access assessments, etc. Client: Western Cape Government

Stellenbosch School Precinct – **Transport Advice regarding improving traffic** operation of several intersections along Strand Street (R44), Van Rheede Street and Doornbosch Street including **assessment of accessibility**, possible pedestrian links between schools, recommendations on intersection upgrades and signal timing plans. Client: Stellenbosch Municipality

Secunda **Traffic Signals**, Mpumalanga - Investigating all signalized intersections in Secunda including site visits, capturing and analysing intersections and establishing the timing plans and upgrades needs for SASOL Secunda. Client: SASOL

Transport Risk Assessments for Wind Farms, Western Cape - Conducting the transport risk assessments for the Trouberg, Bakenskop and Harpuisberg sites for Windlab including route assessments, abnormal load investigations and recommendation regarding port of entry and permits. Client: Windlab

Transport Risk Assessment for seven Solar Farms in the Western Cape - Conducting the route assessment including all relevant transportation matters for proposed sites close to De Doorns, Wolseley, Eendekuil, Riebeek Kasteel, McGregor, Bonnievale and Klipheuwel. Client: Sunspot

Traffic Impact Study for the Hintsabe Project, Eastern Cape - Conducting the traffic impact study for the Hintsabe Peddie mixed land use development close to East London. Client: GIBB Consulting / Eastern Cape Development Corporation (ECDC)

Bardale Village Phase 7, Western Cape - **Traffic engineering input** into the Site Development Plan including all key issues, such as accommodation of Public Transport and Non-motorised Transport services and facilities, among others. Client: Integrated Housing Development

Traffic Impact Study for Malabar Ext.6, Eastern Cape - Conducting the traffic impact study for the mixed land use development Malabar Extension 6 in Port Elizabeth including all transportation key Client: Nelson Mandela Bay Municipality (NMBM)

Traffic and Transportation Advice, Hiddingh Campus UCT, Cape Town - Traffic engineering advice for the revamp of the Hiddingh Campus of the University of Cape Town, Gardens. Client: University of Cape Town (UCT)

Transport Study for Industrial Development, Joostenberg Vlakte - Conducting transport study including capacity analyses, access management and input into SDP. Client: ASLA Developments

TR28/1 Dualing, Hermanus - Traffic signals and timing for several intersections along TR28/1. Client: WCG

Arup (Pty) Ltd

2012
Position – Senior Traffic & Transportation Engineer (from 2010)

Inner City Transport Plan for the City of Cape Town (CoCT) - Preparation of an **Inner City Transport Plan** creating a framework to allow stakeholders to understand priorities and process of the CoCT. Client: CoCT

Transport Assessments and Reviews for Renewable Energy Projects - Conducting transport assessments and reviews for a wide range of wind farm, solar and CSP farm projects in the Eastern, Northern and Western Cape, such as Renosterberg, Coega, St Helena Bay and Boschfontein. Clients: various

2006 – 2012
Position – Leading Traffic & Transportation Engineer

Eikestad Urban Renewal, Stellenbosch - Leading traffic engineer for Eikestad Urban Renewal responsible for all **traffic related matters** concerning this project including conducting the **traffic impact study**, input and assistance in ramp designs, access and parking layouts, upgrades of surrounding roads, implementation of improved NMT facilities, delivery management plans, design of loading areas, intermediate between client and municipality, etc. Client: Eikestad (Pty) Ltd

2004 – 2012
Position – Traffic & Transportation Engineer

Wide range of **Traffic Studies** in South Africa - Conducted a wide range of studies for projects in the Western Cape as well as Johannesburg, Pretoria and Mauritius including trip generation, trip distribution, traffic analyses, queuing analysis, ramp design calculations, conceptual designs and recommendations, such as Rosebank Gardens, Rosebank Mall, Ferndale Erf 389. Client: various

2009 – 2011
Position – Traffic & Transportation Engineer

Central Park Business Development, Vergenoegd Farm, Somerset West - **Traffic Study and traffic engineering advice** for the development of Farm 653/15, Vergenoegd for business purposes, including access control, advise in public transport and Non-motorised transport facilities, conceptual designs of the recommended upgrades of the surrounding road network as well as input into the EIA. Client: Urban Dynamics Western Cape (UDWC)

Gaborone NMT Facilities, Botswana - **Conceptual design of cycle and pedestrian facilities** as well as preparing the schedule of quantities Client: Gaborone City Council.

2008 – 2009
Position – Traffic & Transportation Engineer
West Coast IRT Corridor: NMT Integration, South Africa - **Development of conceptual designs of the non-motorised transport** components along the link roads within a 500m radius from the proposed IRT stations (Paarden Eiland, Milnerton, Tableview). Client: CoCT

DFA Campus, Tshwane - **Design and coordination of traffic signals** of existing intersections and the new access to the development along Soutpansberg Road as part of the new Department of Foreign Affairs (DFA) Head Office. Client: DFA

K29 Cosmo City, Johannesburg - **Design and coordination of signal timing plans** for the intersections of Hans Strijdom Road / Access Road A4 and Hans Strijdom Road / South Africa Drive. Client: City of Johannesburg

Traffic Signal Design, Cape Town - Detailed calculation of timing plans for signalized intersections including legal aspects, warranties, etc. for several projects around Cape Town. Client: various

2005 – 2008
Position – Graduate Traffic & Transportation Engineer

Klipfontein Corridor, Cape Town - **Traffic capacity analyses of intersections** with aaSIDRA software and assisting in establishing a model of the Klipfontein Corridor Spine with SATURN, conducting travel time surveys. Client: CoCT

Traffic Impact Review and Parking Assessment, Grand West Casino Extension, Cape Town - Reviewing the external traffic situation and impact by the development traffic for the extension of the Grand West Casino & Entertainment World, Cape Town. Parking assessment and review of internal traffic situation. Client: Grand West Casino

Presentation of RAIL CPTR Information for the City of Cape Town - Updating of the CPTR (Current Public Transport Record) information of the rail network for the City of Cape Town; sourcing all required data and studies; responsible for implementing the City of Cape Town rail network in electronic format. Client: CoCT

Schmidt Ingenieursbüro, Hanover, Germany

2000
Position – Engineering Assistant

Research, consultation and investigation of legal matters for several projects in line with the VOB/B (German Law of Construction Services). Clients: various

Leibniz University of Hanover, Germany (Institutes for Road & Railway Engineering)

2000
Position – Engineering Assistant

Upgrading of the B6 Expressway in Hanover, NLStb - **Conceptual designs for the bridge construction** at an intersection in Hanover/Garbsen. Client: Lower Saxonian State Office

2000 - 2003
Position – Scientific Research Assistant

Simulation of Railway Operations in the European Rail Network - Illustration of infrastructure costs, research of the circumference of facilities of the track support layer work and analyzing the feasibility of different extensive databases. Client: Deutsche Bahn (German Railway Company)

Technical University of Berlin & German Railroad Company (Die Bahn), Germany

2003
Position – Scientific Research Assistant, Master Thesis

Investigation of the allocation of access rights to the European rail network infrastructure - Research of the feasibility of the different bidding processes to allocate access rights of railway operators in the European railway market. Client: Technical University of Berlin and German Railway Company.

CONTINUED PROFESSIONAL DEVELOPMENT

Courses

2006 - Highway Capacity Analysis (SARF)

2006 - Management of Transport Supply and Demand (UCT)

2007 - Traffic Signal Design (SARF)

2008 - Preparation of Contract Documentation (SARF)

2008 - Traffic Calming and Road Safety (SARF)

2009 - Geometric Design of Urban and Rural Roads (SARF)

2009 - Non-motorised Transport (SARF)

2010 - An IRT System for Cape Town (SARF)

2010 - HCM 2010 Seminar (SAICE)

2010 - SADC Road Traffic Signs Manual (SARF)

2010 - ITS Workshop (ITS SA)

2010 - Road Marking (SARF)

2010 - Public Transport Options (SARF)

2011 - EIA for Roads in South Africa (SARF)

2011 - Transport Demand and Supply (UCT)

2012 - BRT Lessons Learnt (SARF)

2012 - Handling Projects in a Consulting Engineering Practise (CESA/SAICE)

2013 - Optimizing Intersections (SARF)

2013 - Winning Tenders (CESA)

2013 - Transport Logistics: Wind Turbines (SARF)

2014 - Traffic Safety Officer & Roads Audit Course (SARF)

2014 - Traffic Signal Optimization (SARF)

2015 - Road Safety Auditor Course (SARF)

2015 - Non-motorised Transport Planning (SARF)

2016 - SATC Road Safety Audit Workshop Pretoria (SARF)

2018 – Road Safety in Engineering (SARF) – Presenter

2018 – African Road Conference (IRF/SARF/PIARC)

2020 – Road Safety Auditor Course (SARF) – Co-Lecturer

2020 – Understanding Road Accidents (SARF)

2021 – Legal Obligations / Road Safety Act (SARF) – Presenter

2021 – Road Safety Audit Course (IRF) – Guest Speaker

2021 – SARF KZN Road Safety Considerations (SARF) – Guest Speaker

2022 – Non-motorised Transport Seminar (SARF) – Programme director / Speaker

2022 – International Traffic Safety Conference, Doha - Speaker

PERSONAL DETAILS

Nationality – German (permanent Residency in RSA)
Date of Birth – 1976-10-12
Domicile – Cape Town, South Africa

Languages
English – Very Good
German – Native Language
Afrikaans – Fair

APPENDIX B - SPECIALIST STATEMENT OF INDEPENDENCE

I, Iris Sigrid Wink, declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of the Specialist: ___I Wink___

Name of Company: JG Afrika (Pty) Ltd

Date: 23 May 2022

APPENDIX C- 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.

<u>Example of Scoping evaluation table summarising the impacts identified</u>

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	

<table>
<tr><td colspan="4">Mitigation/Enhancement Measures</td></tr>
<tr><td colspan="4">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.</td></tr>
<tr><td colspan="4">Post Mitigation/Enhancement Measures</td></tr>
<tr><td>Duration</td><td>Short-term (1)</td><td>Pressure will only be added on the local municipality to provide housing for outsourced construction workers.</td><td rowspan="4">Low Positive (8)</td></tr>
<tr><td>Extent</td><td>Local (1)</td><td>The increase in demand for affordable accommodation should be mitigated if external construction crews are provided with onsite accommodation.</td></tr>
<tr><td>Magnitude</td><td>Minor (2)</td><td>The possibility of the impact on the provision of affordable accommodation is very low.</td></tr>
<tr><td>Probability</td><td>Improbable (2)</td><td>A reduced amount of pressure will be added on the local municipality to provide housing for outsourced construction workers.</td></tr>
<tr><td colspan="4">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.</td></tr>
<tr><td colspan="4">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).</td></tr>
</table>

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.		