iWink Consulting
Traffic & Transport Engineering
Road Safety

TOURNEE 2 SOLAR PV FACILITY
MPUMALANGA PROVINCE

Transport Impact Assessment

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TOURNEE 2 SOLAR PV FACILITY
TRANSPORT IMPACT ASSESSMENT

TABLE OF CONTENTS

EXECUTIVE SUMMARY 1

1 INTRODUCTION 2

1.1 Project Description 2
1.2 Scope and Objectives 6
1.3 Details of Specialist 7
1.4 Terms of Reference 7

2 APPROACH AND METHODOLOGY 9

2.1 Information Sources 9
2.2 Assumptions, Knowledge Gaps and Limitations 10
2.3 Consultation Processes Undertaken 10

3 LEGISLATIVE AND PERMIT REQUIREMENTS 11

4 DESCRIPTION OF THE PROPOSED DEVELOPMENT 12

4.1 General Description 12
4.2 Alternatives 13
4.3 Proposed Accesses 14
4.4 Internal Roads 22

5 DESCRIPTION OF THE TRANSPORT ROUTES TO SITE 23

5.1 Port of Entry 23
5.2 Transportation requirements 25
5.3 Abnormal Load Considerations 25
5.4 Further Guideline Documentation 26
5.5 Permitting – General Rules 26
5.6 Load Limitations 26
5.7 Dimensional Limitations 27

6 ISSUES, RISKS AND IMPACTS 33

6.1 Identification of Potential Impacts/Risks 33
6.2 Construction phase 33
6.3 Operational Phase 34

7 IMPACT ASSESSMENT 39

7.1 Potential Impact during the Construction Phase 39
7.2 Potential Impact (Operational Phase) 39
7.3 Potential Impacts during the Decommissioning Phase 39

7.4 Cumulative Impacts during the Construction Phase 39
7.5 Impact Assessment Summary 39
8 NO-GO ALTERNATIVE 42
9 CONCLUSION AND RECOMMENDATIONS 42
10 REFERENCES 43

TABLES

Table 1-1:Project information 5
Table 6-1: Estimation of daily staff trips 34
Table 6-2: Estimation of daily site trips 34
Table 6-3: Approved and planned projects in a 30 km radius of the proposed Tournée 2 Solar PV site 38
Table 7-1: Summary of overall Impact Significance 39
Table 7-2: Impact Table – Construction Phase / Decommissioning Phase 40
Table 7-3: Impact Table – Operational Phase 40
Table 7-4: Impact Table – Cumulative Assessment 41

FIGURES

Figure 1-1: Aerial View of Location of proposed Tournée 2 Solar PV site 3
Figure 1-2: Aerial View of Tournée 2 and 2 Solar PV Sites 4
Figure 4-1: Aerial View of the proposed Tournée 2 Solar PV site and Farm properties 12
Figure 4-2: Aerial view of proposed access points and roads to proposed site 15
Figure 4-3: Existing surfaced access road at Access point 1 towards the proposed site 16
Figure 4-4: Sight distances in an eastern direction from access point 1 17
Figure 4-5: Sight distances in a western direction from access point 1 17
Figure 4-6: Distance between Access points 1 and 2 18
Figure 4-7: Sight distances from access point 2 in a south-western direction 18
Figure 4-8: Sight distances from access point 2 in a north-eastern direction 19
Figure 4-9: Access road towards the site arriving from north 20
Figure 4-10: Recommended location of site access 21
Figure 5-1: Route from Port of Richards Bay to proposed site 23
Figure 5-2: Route from Port of Durban to proposed site 24
Figure 5-3: Route from Cape Town area to proposed site 28
Figure 5-4: Route from Johannesburg area to proposed site 29
Figure 5-5: Route from Pinetown to the proposed site 31
Figure 6-1: Geographic area showing 30 km radius around the proposed Tournée 2 SOLAR PV site 37

ANNEXURES

Annexure A: Specialist Expertise
Annexure B: Specialist Statement of Independence
Appendix Annexure C: Impact Assessment Methodology

EXECUTIVE SUMMARY

This report serves as the Transport Impact Assessment aimed at determining the traffic impact of the proposed Tournée 2 Solar PV Facility near Thuthukani in the Mpumalanga Province. The Tournée 2 Solar PV facility is part of the Tournée Solar PV Cluster, which comprises two 150MW PV solar energy facilities (i.e., Tournée 1 and Tournée 2 Solar PV). The Tournée 2 Solar PV facility will be dealt with in a separate report.

The two solar projects are proposed to be located within the Lekwa Local Municipality and the Gert Sibande District Municipality of the Mpumalanga Province of South Africa. The sites will respectively accommodate a solar power facility and associated support structures and facilities to allow for the generation and evacuation of electricity.

Two access routes are recommended for this development for the construction phase. These recommended access points were assessed considering sight lines, access spacing requirements and road safety aspects. It is recommended to ensure that the access points are kept clear of vegetation and any other obstructions to ensure sight lines are kept.

In general, non-motorised transportation (NMT) is a dominant mode of transportation in rural areas, with private cars and minibus/taxis being the second-most used mode of transport, followed by buses. Currently, there are no known future planned public transport facilities in the vicinity of the site. However, generally the developer of a renewable energy project will provide shuttle busses for workers during the construction phase.

The highest trip generator for the project is expected during the construction phase. The actual construction stage peak hour trips are dependent on the construction period, construction programming, material availability, component delivery, abnormal load permitting etc. The decommissioning phase is expected to generate similar trips as the construction phase. The traffic impact during the operational phase is considered negligible.

For the construction, operational and decommissioning phases, the impact expected to be generated by the vehicle trips is an increase in traffic and the associated noise, dust, and exhaust pollution. Based on the high-level screening of impacts and mitigation, the project is expected to have a negative low impact during the construction and decommissioning stages.

TOURNEE 2 SOLAR PV FACILITY

1 INTRODUCTION

1.1 Project Description

Tournée 2 Solar (Pty) Ltd is proposing the development of a commercial solar power energy facility, namely Tournée 2 Solar PV Facility and associated infrastructure on farm portions located approximately 25 kms north-east of Standerton and 10 kms east of Thuthukani within the Lekwa Local Municipality and Gert Sibande District Municipality in the Mpumalanga Province (see **Figure 1-1)**. Tournée 2 Solar PV will comprise of a contracted capacity of up to 150 MW.

The Tournée 2 Solar PV facility forms part of the proposed Tournée Solar PV Cluster, which comprises two solar developments (i.e., Tournée 1 and Tournée 2 Solar PV) (see **Figure 1-2)**. Development areas have been identified for each of these two proposed developments. Within these identified development areas, development footprints have been defined in a manner which has considered the environmental sensitivities present on the affected property and intentionally remains outside of highly sensitive areas.

The preferred project site is approximately 505.15 ha for the Tournée 2 Solar PV facility, and the affected farm portions are:

- Remaining Portion of Portion 3 of Farm Dwars-in-die-Weg 350 IS; and
- Portion 6 of Farm Dwars-in-die-Weg 350 IS.

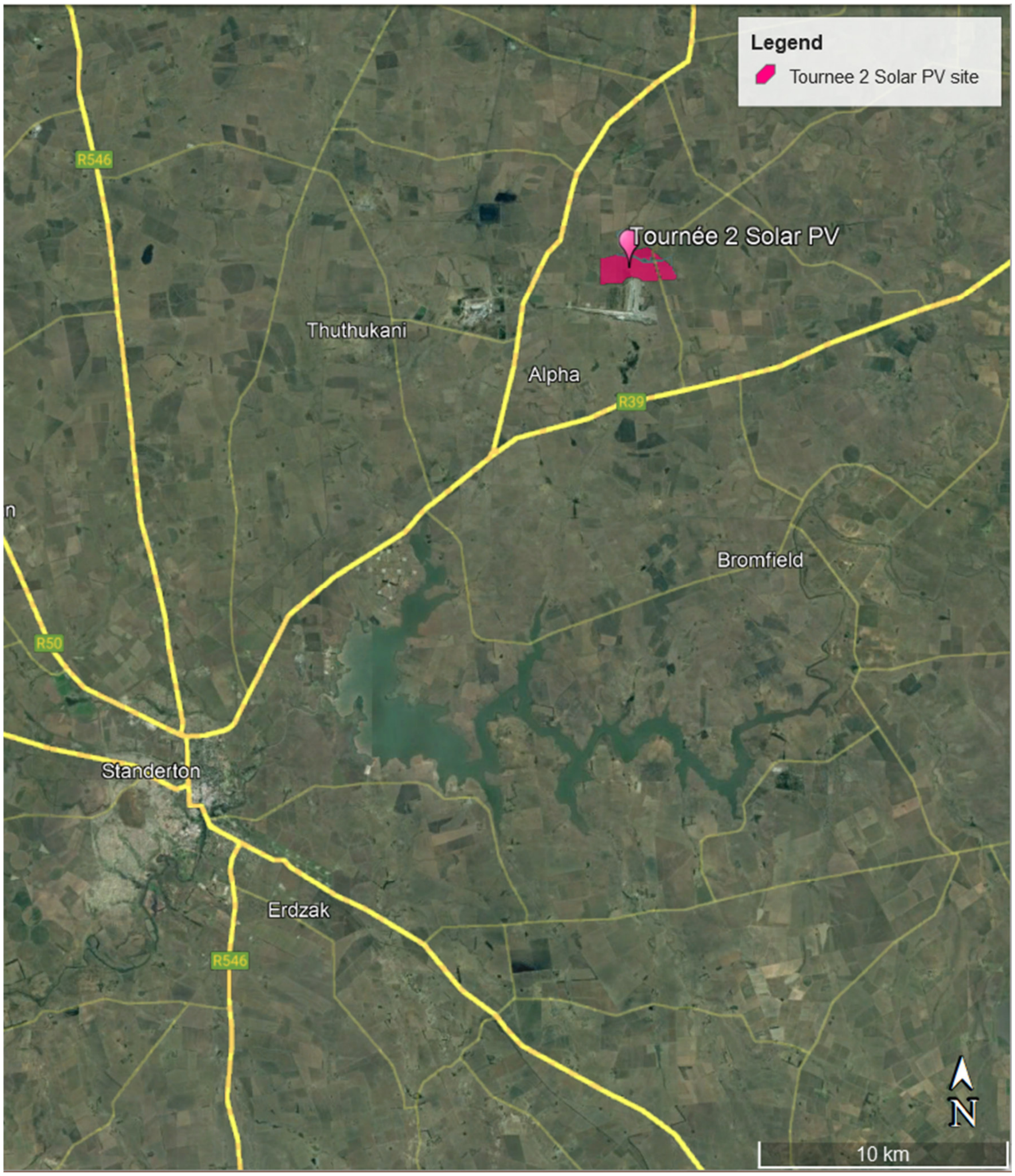

Figure 1-1: Aerial View of Location of proposed Tournée 2 Solar PV site

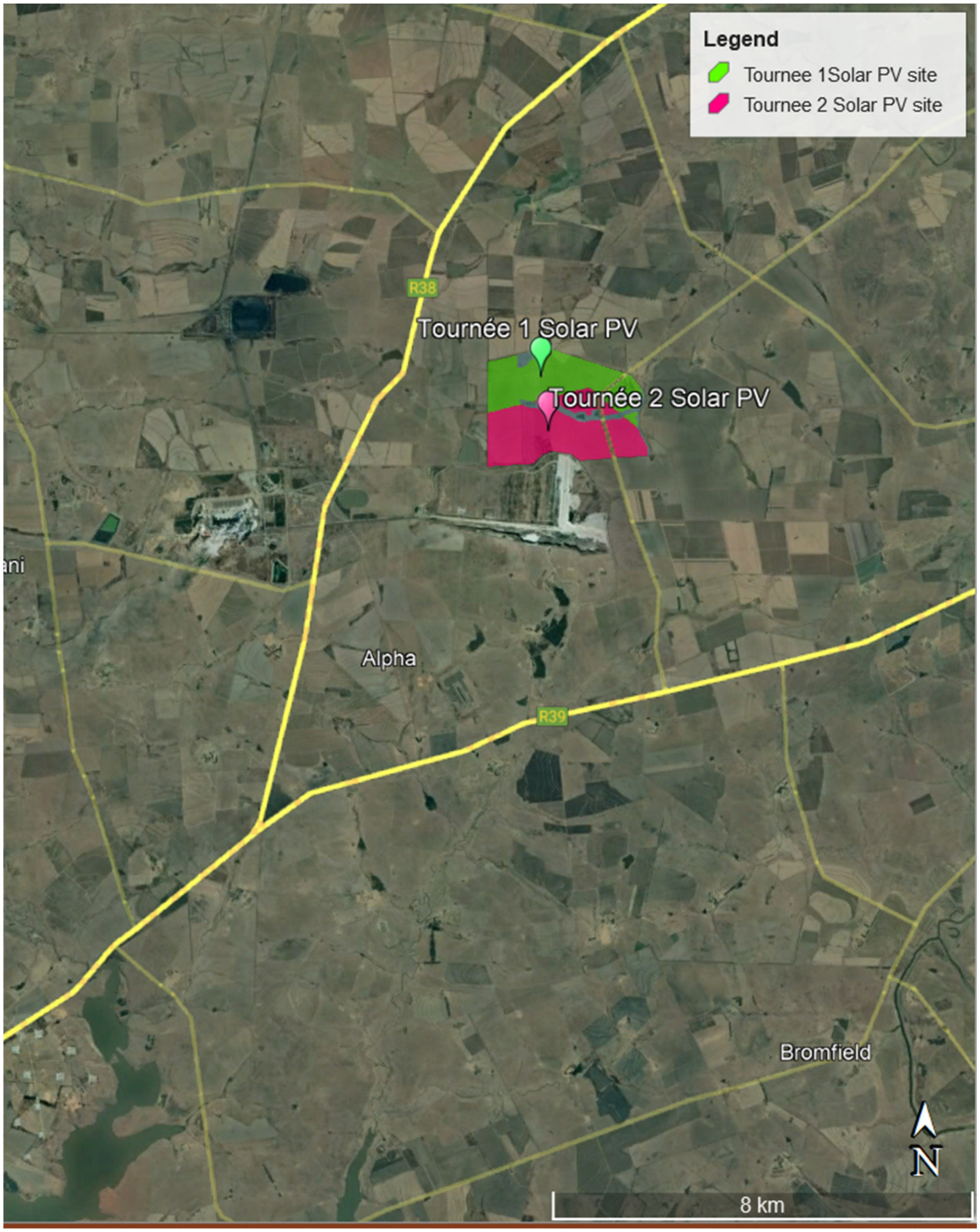

Figure 1-2: Aerial View of Tournée 2 and 2 Solar PV Sites

The proposed projects details are summarized in **Table 1-1.**

Table 1-1:Project information

Facility Name:	Tournée 2 Solar Photovoltaic Solar Energy Facility
Applicant:	Tournée 2 Solar (Pty) Ltd
Municipality:	Lekwa Local Municipality Gert Sibande District Municipality
Affected Farms for the solar component:	Portion 7 (Portion of Portion 3) of the Farm Dwars-in-die-Weg 350 IS Portion 6 of the Farm Dwars-in-die-Weg 350 IS
Extent:	~515 ha / Area of PV array – 227 ha (development footprint)
Capacity:	Up to 150 MW
Number of panels:	Estimated 375 000 panels
Type of Technology:	Photovoltaic
Structure orientation:	It is assumed that the panels will either be fixed to a single-axis horizontal tracking structure where the orientation of the panel varies according to the time of the day, as the sun moves from east to west or tilted at a fixed angle equivalent to the latitude at which the site is located in order to capture the most sun.
BESS:	It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, or Lithium Nickel Manganese Cobalt oxides will be considered as the preferred battery technology. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers. Footprint of BESS: ~3 ha Footprint of Back-to-Back substation: ~2.5 ha
Inverter:	Sections of the PV array will be wired to inverters. The inverter is a pulse width mode inverter that converts direct current (DC) electricity to alternating current (AC) electricity at grid frequency. Cabling will comprise communication, AC and DC cables.
Operations and Maintenance (O&M) building footprint:	Approximately 1 500m^2 (expected to include gate house, ablutions, workshops, storage and warehousing areas, site offices).
Batching plant (temporary):	It is expected that gravel and sand will be stored in separate heaps whilst the cement will be contained in a silo. Alternatively, ready mix trucks may be utilized.

Construction Camp and Laydown area:	The typical construction camp area will be 100 m x 50 m (~5 000 m^2). Typical laydown area will be 100 m x 200 m (~2 000m^2). Sewage - portable toilets and septic tanks.
Internal Roads:	Internal roads need to be provided to the site and between project components inclusive of stormwater infrastructure. As far as possible, internal roads should follow existing gravel farm roads, of which some may require widening (up to 10 m). Further internal roads will need to be constructed with a minimum width of 5 m (preferred width of 6 m). The length of internal roads will be approximately 8 kms. Where required for turning circle/bypass areas, access or internal roads need to be up to 20 m wide to allow for larger component transport to navigate safely.
Fencing height:	Generally, approximately 2.5 m minimum height required.
Grid infrastructure / Substation:	Connecting the array to the electrical grid requires transformation of the voltage from 480V to 33kV to 132kV. The normal components and dimensions of a distribution rated electrical substation will be required. Output voltage from the inverter is 480V and this is fed into step up transformers to 132kV. A substation will be required to step the voltage up to 132kV, after which the power will be evacuated into the national grid. The associated BESS storage capacity will be up to 150 W/600MWh with up to four hours of storage.
Site access:	Access from the R39 or R38 towards the site.

1.2 Scope and Objectives

The Transport Impact Assessment is aimed at determining the traffic impact of the proposed land development proposal and whether such development can be accommodated by the external transportation system.

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

- The proposed development;
- The existing road network and any future road planning proposals;
- Trip generation for the proposed development during the construction, operation, and decommissioning phases of the facility;
- Anticipated traffic impact of the proposed development;
- Access requirements and feasibility of proposed access points;
- Determine a main route for the transportation of components to the proposed project site;

- Determine a preliminary transportation route for the transportation of materials, equipment and people to site;
- Recommend alternative or secondary routes, where possible and required;
- Assess Public Transport accessibility;
- Assess Non-motorised Transport availability; and
- Recommended high-level upgrades to the road network, if necessary.

1.3 Details of Specialist

Iris Sigrid Wink of iWink Consulting (Pty) Ltd. is the Traffic & Transportation Engineering Specialist appointed to provide a Transport Impact Assessment for the proposed Tournée 2 Solar PV Facility. 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 report.

A signed Specialist Statement of Independence is included in **Appendix B**.

1.4 Terms of Reference

There is no protocol relevant to traffic impact assessments and therefore the specialist study is undertaken according to Appendix 6 of the EIA Regulations (GNR 982, as amended). A transport specialist report should contain the following:

(a) details of-
  (i) the specialist who prepared the report; and
  (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
(c) an indication of the scope of, and the purpose for which, the report was prepared;
  (cA) an indication of the quality and age of base data used for the specialist report
  (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
(d) the duration date and season of the site investigation and the relevance of the season to the outcome of the assessment;
(e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
(f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
(g) an identification of any areas to be avoided, including buffers;
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
(i) a description of any assumptions made and any uncertainties or gaps in knowledge;
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
(k) any mitigation measures for inclusion in the EMPr;

(l) any conditions for inclusion in the environmental authorisation;
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
(n) a reasoned opinion-
   (i) whether the proposed activity, activities or portions thereof should be authorised; and (considering impacts and expected cumulative impacts).
   (iA) regarding the acceptability of the proposed activity or activities, and
   (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
(o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
(q) any other information requested by the competent authority.

Specific:

- Extent of the transport study and study area;
- The proposed development;
- Trip generation for the facility during construction and operation;
- Traffic impact on external road network;
- Accessibility and turning requirements;
- National and local haulage routes;
- Assessment of internal roads and site access;
- Assessment of freight requirements and permitting needed for abnormal loads; and
- Traffic accommodation during construction.

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:

<u>Project Assessment</u>

- Communication with the project team to gain sound understanding of the projects.
- 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.

<u>Access and Internal Roads Assessment</u>

- 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

<u>Haulage Route Assessment</u>

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

<u>Traffic Estimation and Impact</u>

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

<u>Report (Documentation)</u>

- Reporting on all findings and preparation of the report.

2.1 Information Sources

The following guidelines have been used to determine the extent of the traffic study:

- Project Information provided by the Client;
- Google Earth.kmz provided by the Client;
- Google Earth Pro Satellite Imagery;
- 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
- Manual for Traffic Impact Studies, Department of Transport, 1995;
- TRH26 South African Road Classification and Access Management Manual, COTO; and
- TMH 16 South African Traffic Impact and Site Traffic Assessment Manual (Vol 1/Vol2), COTO, August 2012.

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 as available at commencement of the Scoping Phase.
- 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 5 000 mm, total maximum width 4 300 mm and total maximum length 10 500 mm. 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. The transport of a mobile crane and the transformer are the only abnormal loads envisaged. The crane will be utilised for offloading equipment, such as the transformer.
- Maximum vertical height clearances along the haulage route are 5.2 m 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 in 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.
- The final access points are to be determined during the detailed design stage. Only recommended access points at conceptual level can be given at this stage.
- Projects in the vicinity of the site to be considered as part of the EIA cumulative impacts are listed in Table 6-3.
- An 18-months construction period is assumed with some of the construction period dedicated to site prep and civil works.

2.3 Consultation Processes Undertaken

The Transport Impact Assessment is based on available project information and consultation with the developer.

3 LEGISLATIVE AND PERMIT REQUIREMENTS

Key legal requirements pertaining to the transport requirements for the proposed project 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 THE PROPOSED DEVELOPMENT

4.1 General Description

The site for the proposed Tournée 2 Solar PV Facility is located approximately 10 kms east of Thuthukani within the Lekwa Local Municipality and the Gert Sibande District Municipality in the Mpumalanga Province on the following farm portions (see **Figure 4-1**):

- Portion 7 (Portion of Portion 3) of the Farm Dwars-in-die-Weg 350 IS and Portion 6 of the Farm Dwars-in-die-Weg 350 IS.

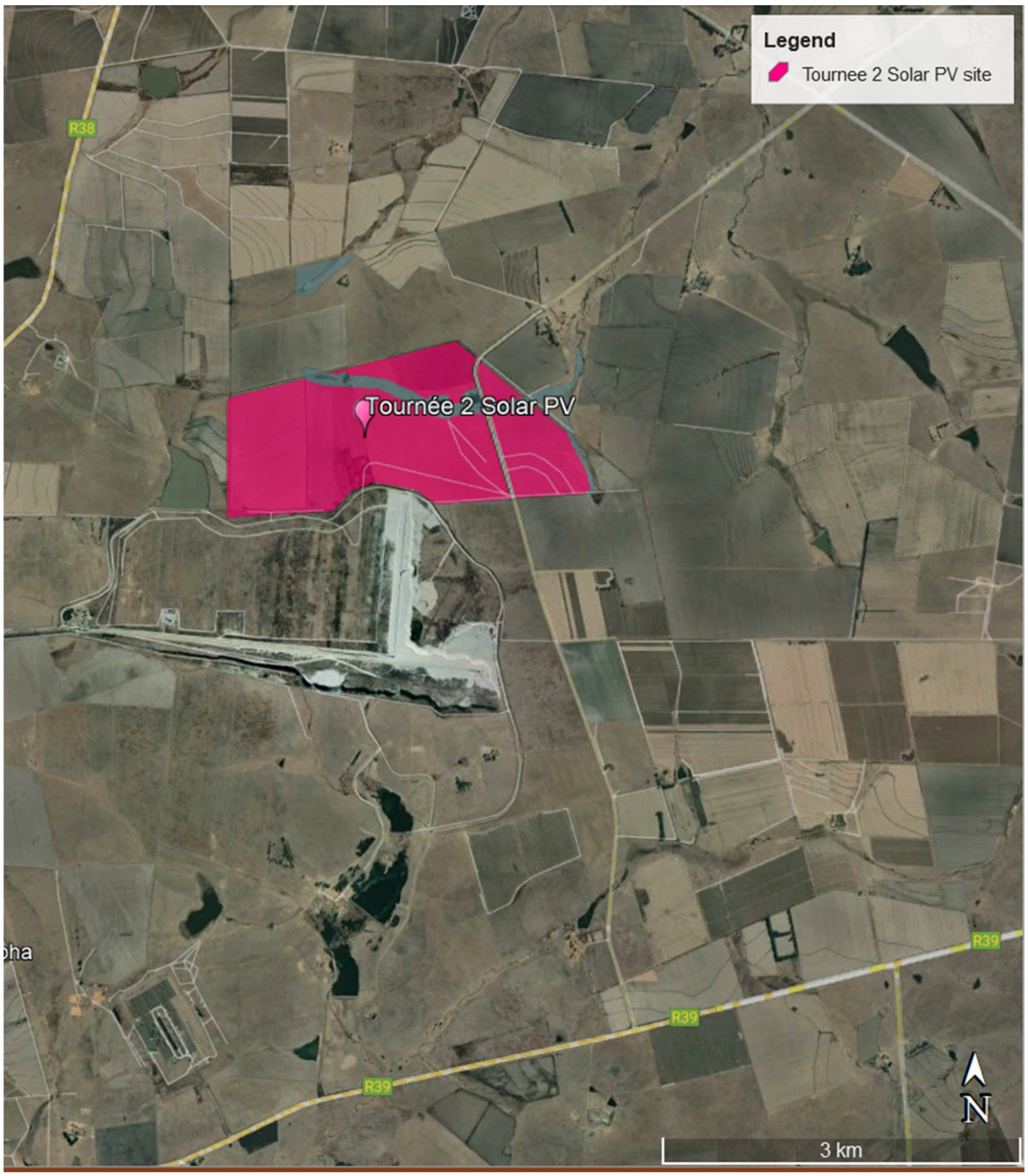

Figure 4-1: Aerial View of the proposed Tournée 2 Solar PV site and Farm properties

The development footprint will contain the following infrastructure to enable the Tournée 2 SOLAR PV Solar Energy Facility to generate up to 150 MW:

- PV modules and mounting structures
- Inverters and transformers
- Battery Energy Storage System (BESS)
- Back-to-Back Substation
- Site and internal access roads
- Operation and Maintenance buildings including a gate house and security building, control centre, offices, warehouses and workshops for storage and maintenance
- Temporary and permanent laydown areas

4.2 Alternatives

The Department of Environmental Affairs and Tourism (DEAT) 2006 guidelines on 'assessment of alternatives and impacts' proposes the consideration of four types of alternatives, namely, the no-go, location, activity, and design alternatives. It is, however, important to note that the regulation and guidelines specifically state that only 'feasible' and 'reasonable' alternatives should be explored. It also recognizes that the consideration of alternatives is an iterative process of feedback between the developer and EAP, which in some instances culminates in a single preferred project proposal. An initial site assessment was conducted by the developer and the farm portion was found favorable due to its proximity to grid connections, solar radiation, site access and relative flat terrain. These factors were then taken into consideration and avoided as far as possible, where required.

The following alternatives were considered in relation to the proposed activity:

<u>Location Alternatives</u>
The site selection process for a PV facility is almost always underpinned by a good solar resource. Other key considerations include environmental and social constraints, proximity to various planning units and strategic areas, terrain and availability of grid connection infrastructure.

Based on the above site-specific attributes, the study area is considered to be highly preferred in terms of the development of a solar PV facility. As such, no property / location alternatives will be considered.

<u>BESS</u>
As technological advances within battery energy storage systems (BESS) are frequent, two BESS technology alternatives are considered: Solid state battery electrolytes and Redox-flow technology. Solid state battery electrolytes, such as lithium-ion (Li-ion), zinc hybrid cathode, sodium ion, flow (e.g., zinc iron or zinc bromine), sodium sulphur (NaS), zinc air and lead acid batteries, can be used for grid applications. Compared to other battery options, Li-ion batteries are highly efficient, have a high energy density and are lightweight. As a result of the declining costs, Li-ion technology now accounts for more than 90% of battery storage additions globally (IRENA, 2019). Flow batteries use

solid electrodes and liquid electrolytes. The most used flow battery is the Vanadium Redox Flow Battery (VRFB), which is a type of rechargeable flow battery that employs vanadium ions in different oxidative states to store chemical potential energy.

Design and layout alternatives

It is customary to develop the final/detailed construction layout of the solar PV facility only once an Independent Power Producer (IPP) is awarded a successful bid under the Renewable Energy Independent Power Producer Procurement Programme (REIPPPP) or an alternative programme, after which major contracts are negotiated and final equipment suppliers identified.

For the purpose of the Environmental Impact Assessment (EIA), site layout alternatives will not be comparatively assessed, but rather a single layout will be refined as additional information becomes available throughout the EIA process (e.g., specialist input, additional site surveys, ongoing stakeholder engagement).

The development area presented in the Scoping Report has been selected as a practicable option for the facility, considering technical preference and constraints, as well as initial No-Go layers informed by specialist site surveys.

Following further site screening by the specialists (scheduled to take place during the EIA phase), the development footprint will be finalised for impact assessment.

Technology alternatives: Solar panels

There are several types of semiconductor technologies currently available and in use for PV solar panels. Two, however, have become the most widely adopted, namely crystalline silicon (Mono-facial and Bi-facial) and thin film. The technology that (at this stage) proves more feasible and reasonable with respect to the proposed solar facility is crystalline silicon panels, due to it being non-reflective, more efficient, and with a higher durability.

Due to the rapid technological advances being made in the field of solar technology the exact type of technology to be used, such as bifacial panels, will only be confirmed at the onset of the project.

No-go alternative

This alternative considers the option of 'do nothing' and maintaining the status quo. The site is currently zoned for agricultural and mining land uses. Should the proposed activity not proceed, the site will remain unchanged and will continue to be used for agricultural purposes. The potential opportunity costs in terms of alternative land use income through rental for energy facility and the supporting social and economic development in the area would be lost if the status quo persist.

4.2.1 Specialist comment regarding alternatives

From a transport engineering perspective, the alternatives listed above (i.e., electrical infrastructure location alternatives and the technology options for the BESS) are equally acceptable as it does have a nominal impact on the traffic on the surrounding road network.

4.3 Proposed Accesses

Two access points and roads are recommended towards the site – one via the R39 and one via the R38 (see **Figure 4-2**). Both access roads follow established routes and are partially surfaced and partially gravel surfaced. The accesses have been assessed in line with access spacing requirements, required sight lines and road safety considerations.

The route via Access Point 2 will be slightly longer from the ports of entry and possible manufacturing centres but this access point can function as a secondary access for the proposed development.

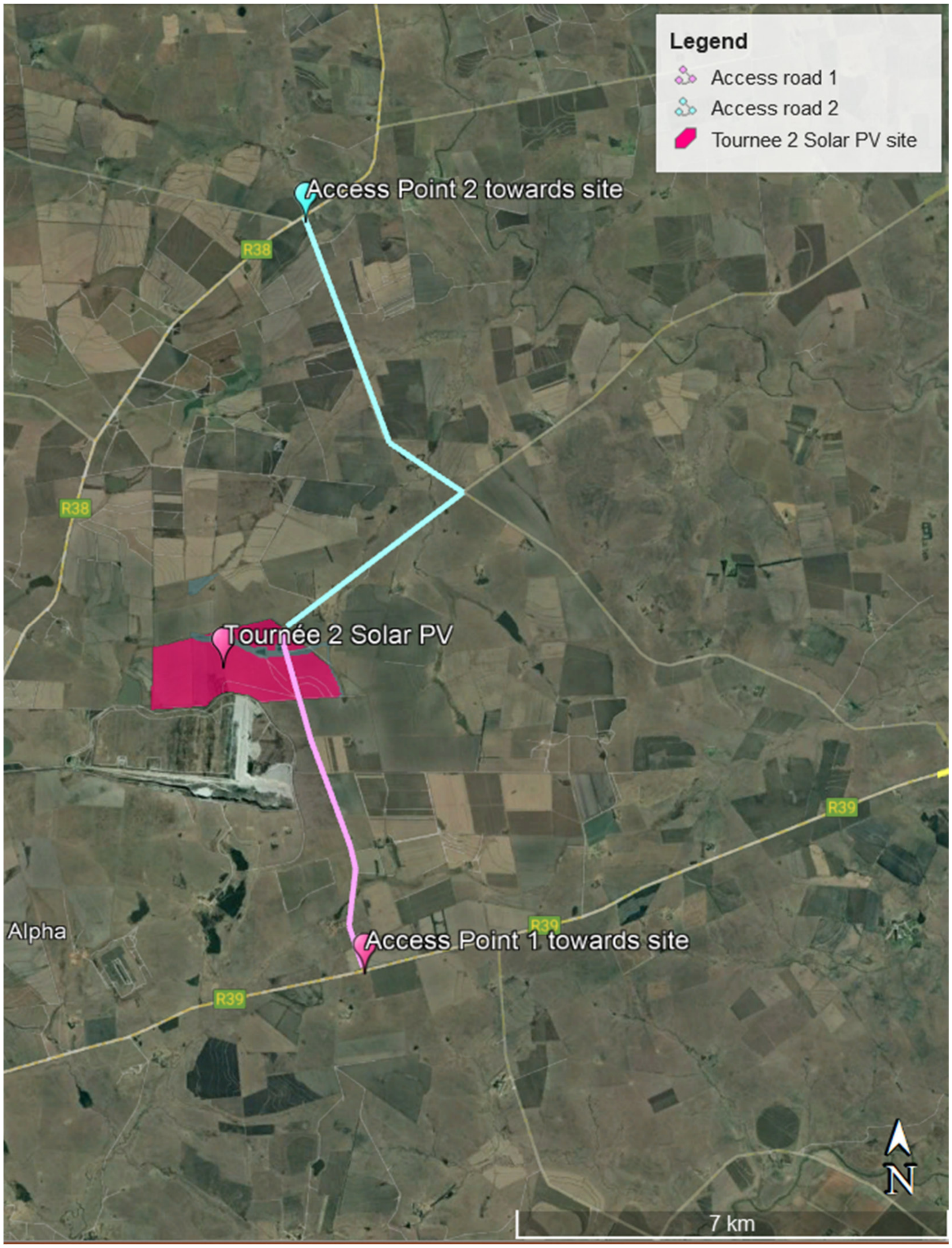

Figure 4-2: Aerial view of proposed access points and roads to proposed site

4.3.1 Access Point 1

The proposed access route from access point 1 is shown in **Figure 4-3.**

Figure 4-3: Existing surfaced access road at Access point 1 towards the proposed site

This access point is well suited from a sight distances point of view (see **Figure 4-4** and **Figure 4-5**).

Figure 4-4: Sight distances in an eastern direction from access point 1

Figure 4-5: Sight distances in a western direction from access point 1

4.3.2 Access Point 2

The access road from Access point 2 towards the site is shown in **Figure 4-6** and is unsurfaced gravel road. Sight distances are good in both directions at Access point 2 (see **Figure 4-7** and **Figure 4-8**).

Figure 4-6: Distance between Access points 1 and 2

Figure 4-7: Sight distances from access point 2 in a south-western direction

Figure 4-8: Sight distances from access point 2 in a north-eastern direction

This access route will follow the gravel road and takes a right-turn towards the site (see *Access road 2* in **Figure 4-2**). This last section of the access road towards the site is shown in **Figure 4-9**. This road will require upgrading due to being partially overgrown and not meeting the minimum road width required for large haulage vehicles.

Figure 4-9: Access road towards the site arriving from north

4.3.3 General

The access roads leading from the external roads (R38 and R39) towards the site need to be maintained if damaged by haulage vehicles.

The direct access onto the sites should be located at a straight section of road (see recommended location in **Figure 4-10**, which is at existing farm gates). The radii at the access onto the site need to be large enough to allow for all construction vehicles to turn safely.

It is further recommended that the site access be security controlled during the construction phase.

Figure 4-10: Recommended location of site access

It is recommended to consider making use of both access points 1 (from R39) and 2 (from R38) for the duration of the construction phase to reduce the risk of traffic congestion, especially if the Tournée 1 and Tournée 2 Solar PV Facilities are planned to be constructed at the same time.

4.4 Internal Roads

The geometric design and layout for the internal roads from the recommended access points need to be established at detailed design stage. Existing structures and services, such as drainage structures, signage and pipelines will need to be evaluated if impacting on the roads. It needs to be ensured that the 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 8%) to allow a larger transport load vehicle to ascend to the respective laydown areas.

4.4.1 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, such as from Thuthukani.

4.4.2 Public Transport and Non-Motorised Transport

In terms of the National Land Transport Act (NLTA) (Act No.5 of 2009), the assessment of available public transport services is included in this report. The following comments are relevant in respect to the public transport availability for the proposed developments.

It is expected that minibus taxis frequent the R38 and R39, which are located approximately 8 kms and 5 kms from the site. However, the developer of a large-scale project, such as many renewable energy projects, will provide shuttle buses or similar for workers during the construction phase.

5 DESCRIPTION OF THE TRANSPORT ROUTES TO SITE

5.1 Port of Entry

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

5.1.1 Port of Richards Bay

The Port of Richards Bay is situated on the coast of KwaZulu-Natal and is a deep-sea water port boasting 13 berths. The terminal handles dry bulk ores, minerals and break-bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The Port is operated by Transnet National Ports Authority. The Port of Richards Bay is located approximately 490 kms from the proposed Tournée 2 Solar PV site (see **Figure 5-1**).

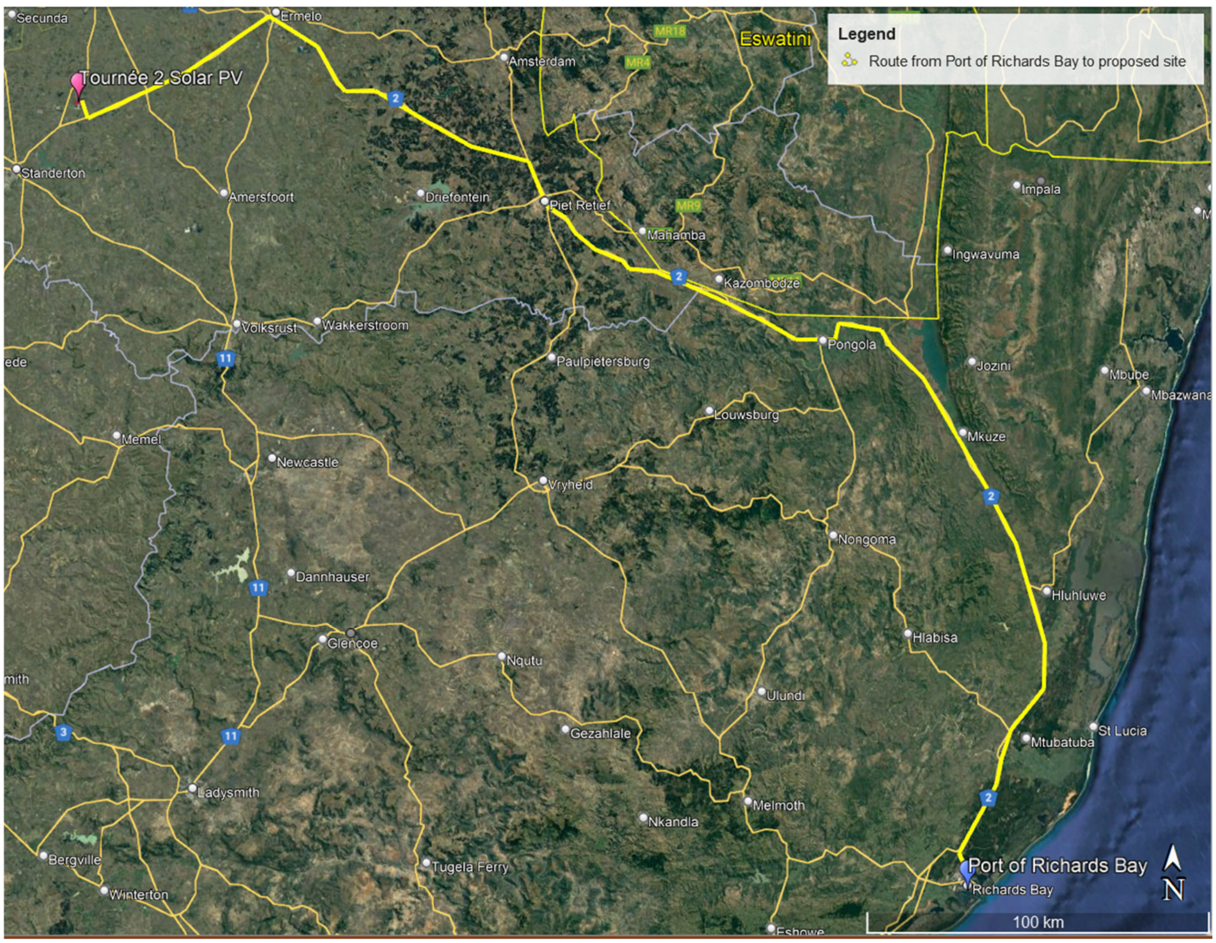

Figure 5-1: Route from Port of Richards Bay to proposed site

5.1.2 The Port of Durban

The Durban container terminal is one of the largest container terminals in the African continent and operates as two terminals Pier 1 and Pier 2. It is ideally located to serve as a hub for containerized cargo from the Indian Ocean Islands, Middle East, Far East and Australia. 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).

The Port of Durban is located approximately 510 kms via the N3 from the proposed project site (**Figure 5-2**).

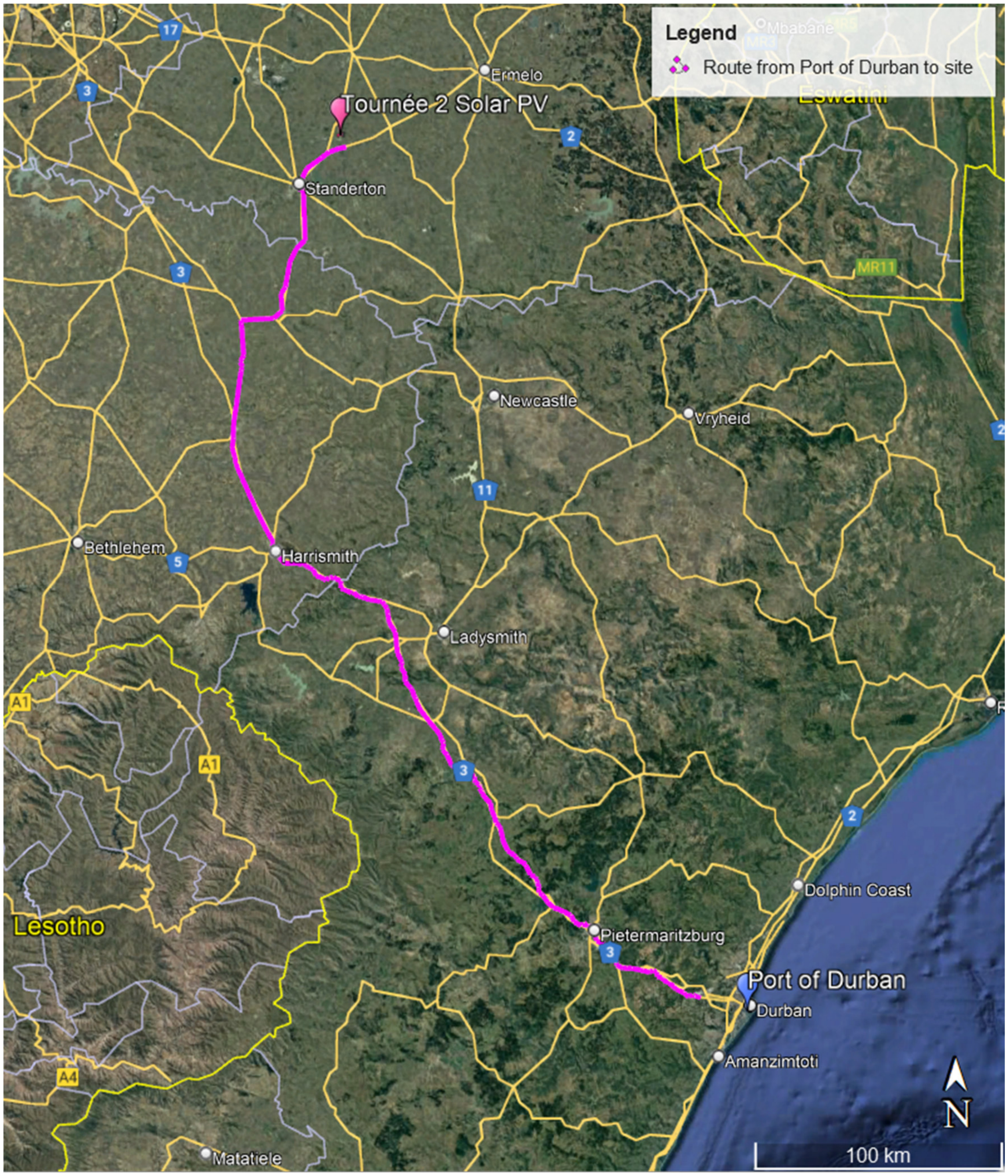

Figure 5-2: Route from Port of Durban to proposed site

5.2 Transportation requirements

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

Solar PV:

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar modules, frames, and the inverter, which are within freight limitations;
- Flatbed trucks transporting the solar modules and frames, which are within the freight limitations;
- Light Differential Vehicle (LDV) type vehicles 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 transformers will be transported as abnormal loads.

Grid/power Line:

- Conventional trucks within the freight limitations to transport building material to the site,
- 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 the site,
- The transformer transported in an abnormal load,
- Abnormal mobile crane for assembly on site, and
- Transmission tower sections transported by abnormal load.

5.3 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: 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: 4.3m measured from the ground. Possible height of load – 2.7 m.
- 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, which 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 5.1 m), e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles.

5.4 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.

5.5 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.

5.6 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.

5.7 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.

5.7.1 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.

5.7.1.1 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. The estimated route with a travel distance of around 1 480 kms via the N1 is shown in **Figure 5-3**.

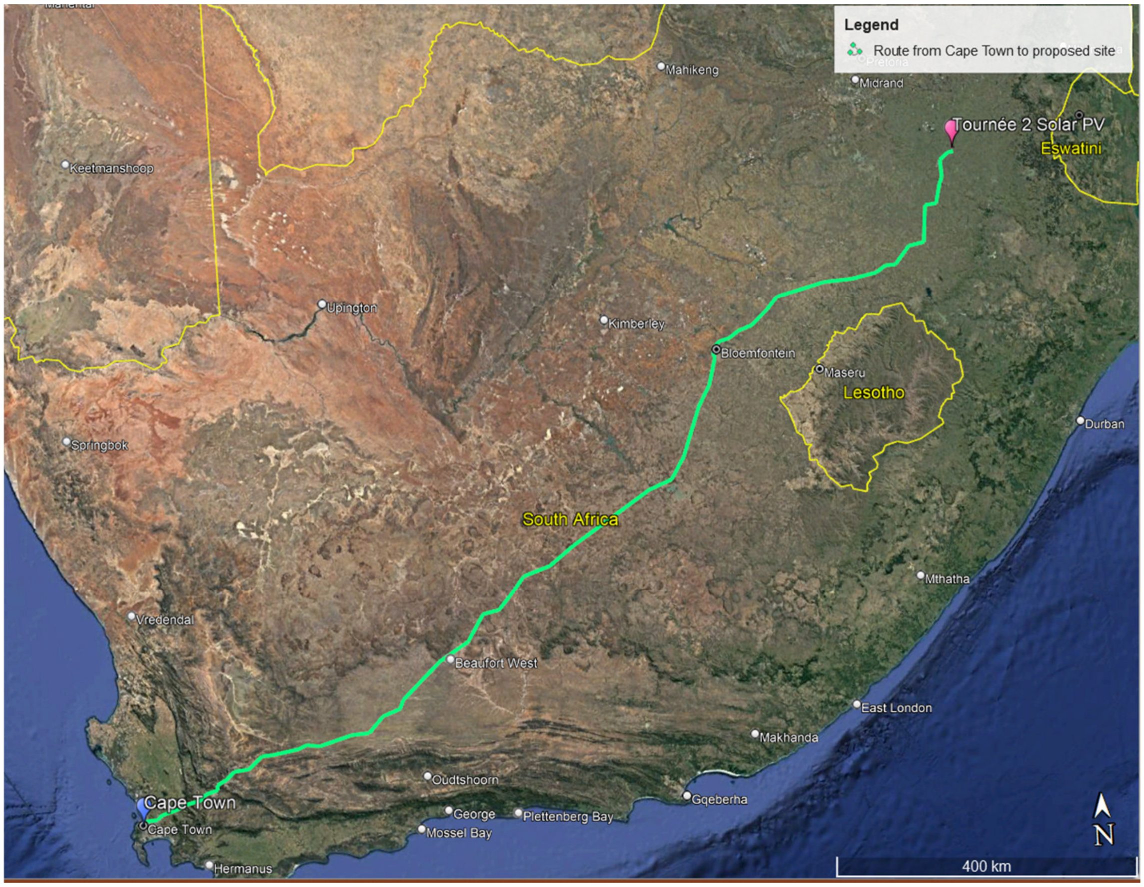

Figure 5-3: Route from Cape Town area to proposed site

5.7.1.2 Route from Johannesburg Area to Site – Locally sourced materials and equipment

If components from Johannesburg are considered, normal loads from Johannesburg to the proposed site can be transported via the route as shown in **Figure 5-4** below. No road limitations are envisaged along the route for normal load freight. The distance from the Johannesburg area to the site is approximately 180 kms via the N17.

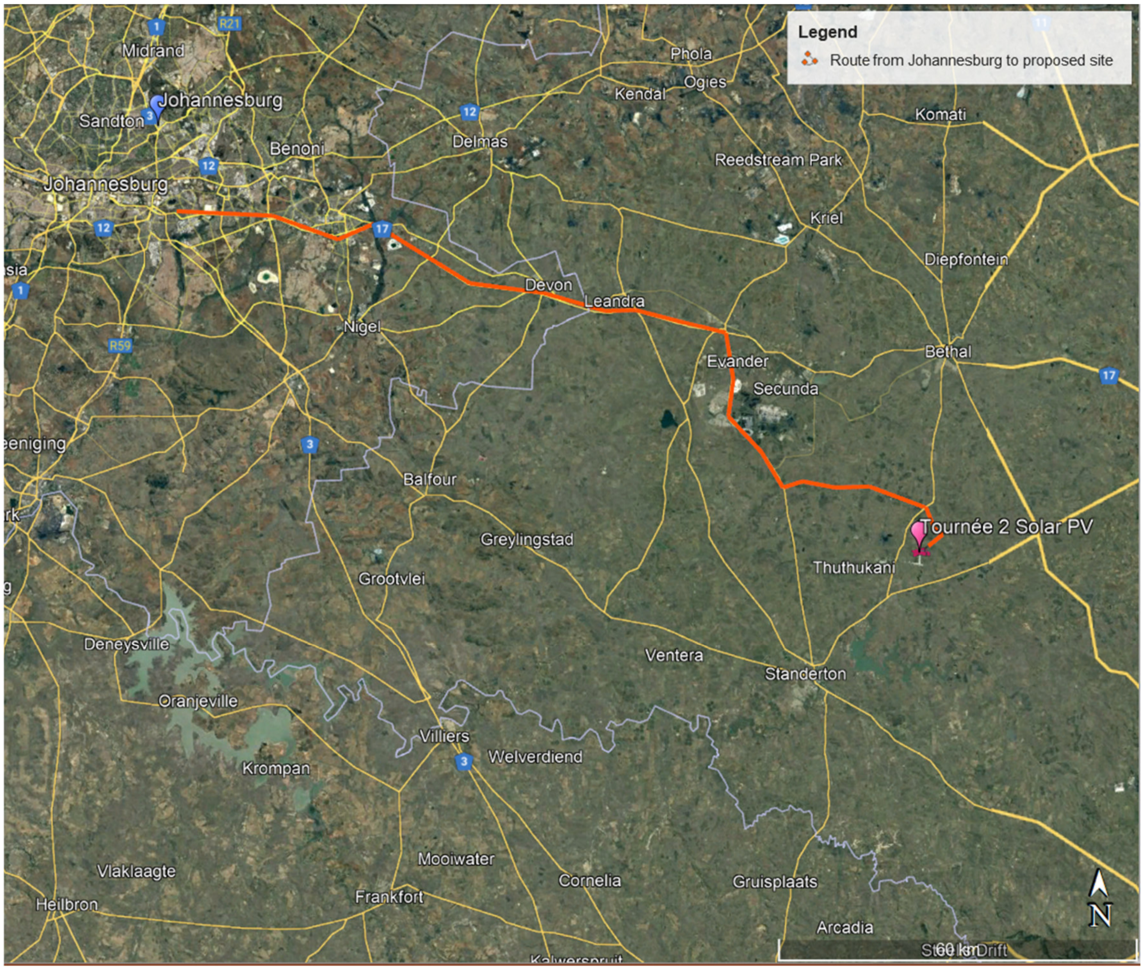

Figure 5-4: Route from Johannesburg area to proposed site

5.7.1.3 Route from Pinetown / Durban to Site - Locally sourced materials and equipment

Normal loads can transport elements via two potential routes 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 via the National Routes N3 with approximately 490 kms as shown in **Figure 5-5**.

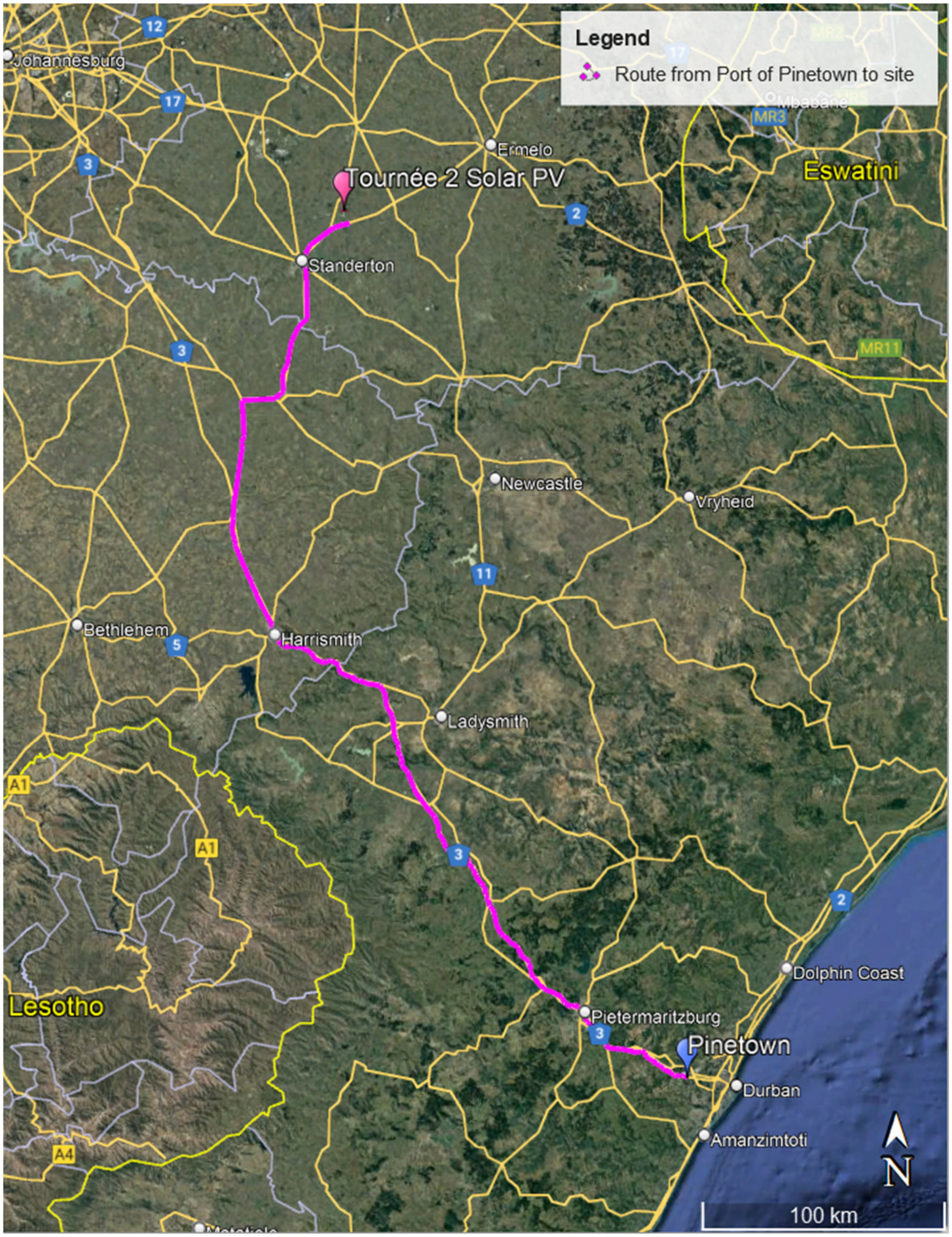

Figure 5-5: Route from Pinetown to the proposed site

5.7.2 Surrounding road network

The construction vehicles for the proposed Tournée 2 Solar PV Facility will take access either via the R38 or via the R39 towards the site as described under 4.3.

According to the road classification of the surrounding road network as per the *Road Infrastructure Strategic Framework for South Africa (RISFSA)* and *COTO's TRH26 South African Road Classification and Access Management Manual*, the R38 and R39 can be classified as **Class 2 rural major arterials**, which typically carries inter-regional traffic between:

- Smaller cities and medium to large towns;
- Smaller border posts;
- Class 1 and Class 2 arterials; and
- Smaller centres when travel distances are very long (i.e., longer than 200 km).

6 ISSUES, RISKS AND IMPACTS

6.1 Identification of Potential Impacts/Risks

The potential impact on the surrounding environment is expected to be generated by the development traffic, of which traffic congestion and associated noise, dust, and exhaust pollution form part. It must be noted that the significance of the impact is expected to be higher during the construction and decommissioning phases because these phases generate the highest development traffic.

6.2 Construction phase

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

6.2.1 Nature of impact

The nature of the impact expected to be generated at this phase 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.

6.2.2 Significance of impact without mitigation measures

Traffic generated by the construction of the solar facility will have a notable impact on the surrounding road network. The exact number of trips generated during construction can only be determined later in the project when the contractor and the haulage company are appointed and once more detail is available regarding the staff requirements and where equipment is sourced from. In the interim, an estimate will be made as follows for the purpose of this report.

6.2.3 Estimated peak hour traffic for the solar panel components

From experience with renewable energy projects of a 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 150 MW, the trips can therefore be estimated to be between 4 286 and 6 429 heavy vehicle trips. It is assumed that the construction period will be around 18-months. Choosing the worst-case scenario of 6 429 construction vehicles trips over the 18-month period, travelling on an average of 22 working days per month, **the resulting daily number of vehicle trips for the solar panel components is 17**. Considering that the number of vehicle trips during peak hour traffic can roughly be estimated to be around 20-40% of the average daily traffic, the resulting peak hour vehicle trips for the construction phase are between 4 and 7 trips.

If the panels are imported instead of manufactured within South Africa, the respective shipping company will be able to indicate how the panels can be packed (for example using 2 MW packages and 40 ft containers). These can then be stored at the port and repacked onto flatbed trucks.

6.2.4 Estimated staff trips

From experience with similar projects, a maximum of 300 workers is estimated to be active on-site during construction and **the resulting daily staff trips are then 66** (shown in **Table 6-1**).

Table 6-1: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Max. Number of Employees
Car	10	10 (assuming 1 occupant)
Bakkie	20	30 (assuming 1.5 occupants)
Taxi – 15 seats	12	180
Bus – 80 seats	1	80
Total	***43***	***300***

6.2.5 Estimated material trips

The exact number of vehicle trips for the transportation of materials during the construction phase depends on the type of vehicles, planning of the construction, source/location of construction material, etc. However, for the purpose of this study, it was estimated that at the peak of construction, **approximately 100 construction vehicle trips will access the site per day**.

The total estimated daily site trips, at the peak of construction, are shown in **Table 6-2** below.

Table 6-2: Estimation of daily site trips

Activity	Number of daily trips
Solar panel component delivery	17
Staff transport	43
Material delivery	100
Total	**160**

The impact on the surrounding road network and the general traffic is deemed nominal, with mitigation, as the 160 trips will be distributed over a 9-hour workday. The majority of the trips will occur outside the peak hours.

It must also be noted that vehicle trips from material delivery vary depending on the construction task/program, fuel supply arrangements, as well as distance from the material source to the site. Project planning can be used to reduce material delivery during peak hours.

The development traffic impact during the construction phase can be assessed as manageable, considering that the construction phase is temporary in nature and mitigation measures, mentioned in this report, are adhered to and keep the impact level low.

6.3 Operational Phase

This phase includes the operation and maintenance of the Tournée 2 Solar PV Facility throughout its life span.

6.3.1 Nature of impact:

The nature of the impact expected to be generated at this phase would be traffic and the associated noise, dust and exhaust pollution due to the operational traffic trips.

6.3.2 Estimated peak hour traffic generated during operation

The exact number of permanent staff expected for the operational phase is still unknown. Based on similar studies, it can be estimated that approximately 50 full-time employees will be stationed on site. Assuming a worst-case scenario of 40% of the trips occurring during peak traffic periods, approximately 20 peak hour trips are estimated for the operational phase, which will have a nominal impact on the external road network.

It is assumed that the solar modules would need to be cleaned twice a year. No further information on which cleaning method and technology will be used is available at this point in time. The following assumptions have been made to estimate the resulting trips generated from transporting water to the site:

- 5 000-liter water bowsers to be used for transporting the water;
- Approximately 5 litres of water needed per panel;
- Assuming that a maximum of 375 000 panels are used, this would amount to approximately 375 vehicle trips; and
- Solar modules will be cleaned twice a year.

To limit any traffic impact on the surrounding road network, it is recommended to schedule these trips outside of peak traffic periods and to clean the solar modules over the course of a few days i.e., spread the trips over a work week, which would reduce the daily trips to 75. Additionally, the provision of rainwater tanks on site or borehole water would decrease the number of trips.

6.3.3 Proposed general mitigation measures

The following are general mitigation measures to reduce the impact that the additional traffic will have on the road network and the environment:

- 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 located within the site boundary, including the main access road to the site and the site access roads, during the construction phase, if required.
- Regular maintenance of gravel roads located within the site boundary, including the access roads to the site, by the Contractor during the construction phase and by the Owner/Facility Manager during the operational phase, if required.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods as far as possible.
- The Contractor is to ensure that all drivers entering the site adhere to the traffic laws.
- Vehicular movements within the site boundary are the responsibility of the respective Contractor and the Contractor must ensure that all construction road traffic signs and road markings (where applicable) are in place. It should be noted that traffic violations on public roads is the responsibility of Law Enforcement, and the public should report all transgressions to Law Enforcement and the Contractor.
- If required, low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved (to be arranged by haulage company) to accommodate the abnormal load vehicles. The Contractor and the Developer is to ensure that the haulage company is aware of this requirement.

- The haulage company is to provide evidence to the Contractor and the Developer that any affected overhead lines have been moved or raised.
- The preferred route 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, which may require modification). After the road modifications have been implemented, it is recommended to undertake a "dry-run" with the largest abnormal load vehicle, prior to the transportation of any components, to ensure that delivery will occur without disruptions. This process is to be undertaken by the haulage company transporting the components and the contractor, who will modify the road and intersections to accommodate abnormal vehicles. The "dry-run" should be undertaken within the same month that components are expected to arrive. The haulage company is to provide evidence that the route has been surveyed and deemed acceptable for the transportation of the abnormal load.
- The Contractor needs to ensure that the gravel sections of the haulage routes (i.e., the site access road and the main access road to the site) remain in good condition and will need to be maintained during the additional loading of the construction phase and reinstated after construction is completed.
- Design and maintenance of internal roads. The internal gravel roads will require grading with a grader to obtain a camber of between 3% and 4% (to facilitate drainage) and regular maintenance blading will also be required. 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.

6.3.4 Significance of impact with mitigation measures

It should be noted that the construction phase is temporary and short term in nature and the associated impacts can be mitigated to an acceptable level.

The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network and the impact on the local traffic will be low as the existing traffic volumes are deemed to be low. Dust suppression will result in significantly reducing the impact.

6.3.5 Decommissioning phase

This phase will have similar impacts and generated trips as the Construction Phase.

6.3.6 Cumulative Impacts

To assess a cumulative impact, it is generally assumed that all currently approved and authorized projects within a 30 km radius would be constructed at the same time (see **Figure 6-1**).

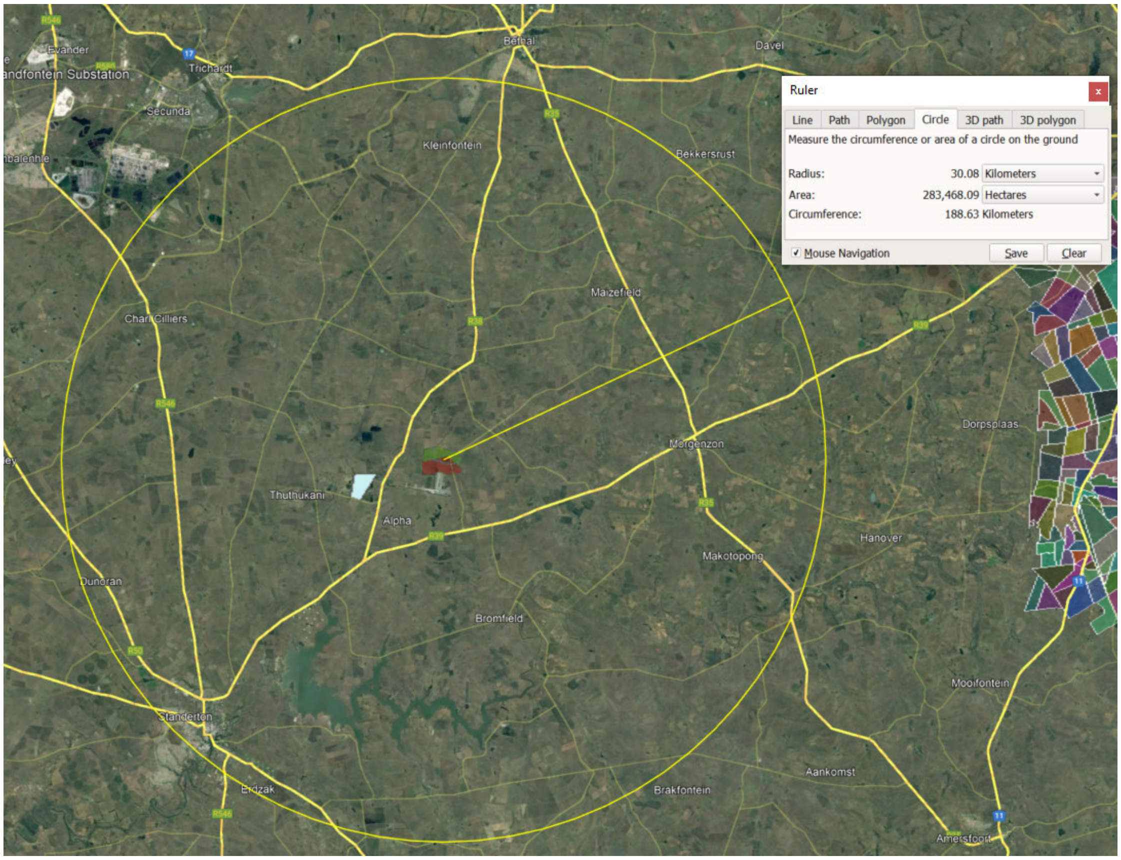

Figure 6-1: Geographic area showing 30 km radius around the proposed Tournée 2 SOLAR PV site

This is a precautionary approach as in reality, these projects would be subject to a highly competitive bidding process and not all the projects may be selected to enter into a Power Purchase Agreement. Even if all the facilities are constructed and/or decommissioned 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.

The construction and decommissioning phases of a renewable energy project are the only significant traffic generators. The duration of these phases is short term, i.e., the potential impact of the traffic generated during the construction and decommissioning phases on the surrounding road network is temporary and solar projects, when operational, do not add any significant traffic to the road network.

At the time of preparing this report, the projects shown in

Table 6-3 were considered.

Table 6-3: Approved and planned projects in a 30 km radius of the proposed Tournée 2 Solar PV site

No.	Site name	Distance from study area	Proposed generating capacity	DFFE reference	EIA process	Project status
1	Tournée 1 Solar PV Facility	0 km	150 MW	tbc	Scoping and EIA	In progress
2	Tutuka Photovoltaic (PV) Energy Facility	5 km	66 MW	DFFE Ref: 14/12/16/3/3/2/754	Scoping and EIA	Approved

It is noted that it is unlikely that all above developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the projects to reduce development trips and consequently the impact on the external road network.

7 IMPACT ASSESSMENT

7.1 Potential Impact during the Construction Phase

The construction phase will generate traffic including transportation of people, construction materials, water, and equipment (abnormal trucks transporting the transformers). The exact number of trips generated will be determined at a later stage. Based on the high-level screening of impacts, a negative low impact rating can be expected during the construction phase with mitigation measures.

Nature of the impact

- Temporary increase in traffic, noise and dust pollution associated with potential traffic.

The impact methodology as attached in **Annexure C** and provided by the Environmental consulting company has been used to determine the rating shown in **Table 7-2**.

7.2 Potential Impact (Operational Phase)

Nature of the impact

- Noise and dust pollution associated potential traffic.

The traffic generated during this phase will have a nominal impact on the surrounding road network. The impact evaluation is shown in **Table 7-2** . The following items need to be clarified:

- The number of permanent employees
- Water source to be clarified – borehole or transported to site
- Size of water tankers if water is to be delivered on site

7.3 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 and associated noise and pollution are expected (see **Table 7-2**).

7.4 Cumulative Impacts during the Construction Phase

For the cumulative impact during the construction phase, the projects as per Table 6-have been considered. However, it is unlikely that these developments and the proposed Tournée 2 Solar PV development will exactly overlap with their construction period but for the purpose of this assessment, please see **Table 7-4**.

7.5 Impact Assessment Summary

The overall impact significance findings, following the implementation of the proposed mitigation measures, are shown in **Table 7-1** below.

Table 7-1: Summary of overall Impact Significance

Tournée 2 Solar PV Facility	Overall Impact Rating
Construction (Pre-mitigation measures)	Negative Moderate
Operational (Pre-mitigation measures)	Negative Low
Construction (Post-mitigation measures)	Negative Low
Operational (Post-mitigation measures)	Negative Very Low

Table 7-2: Impact Table – Construction Phase / Decommissioning Phase

Aspect	Description	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Impact Significance post mitigation	Mitigation possible?	Possible mitigation measures	Impact Significance post mitigation
TRAFFIC IMPACT	Increase in development trips for the duration of the construction Phase Associated noise, dust and exhaust pollution	Medium	Local	Reversible	Short Term	Probable	Negative Moderate	YES	▪ Stagger component delivery to site. ▪ Reduce the construction period where possible. ▪ Stagger the construction Phase. ▪ The use of mobile batch plants and quarries in close proximity to the site would decrease the impact on the surrounding road network ▪ Staff and general trips should occur outside of peak traffic periods as much as possible. ▪ Maintenance of haulage routes. ▪ Design and maintenance of internal roads. ▪ Provide two access points to the site to split construction vehicle trips and reduce the risk of congestion.	Negative Low

Table 7-3: Impact Table – Operational Phase

Aspect	Description	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Impact Significance post mitigation	Mitigation possible?	Possible mitigation measures	Impact Significance post mitigation
TRAFFIC IMPACT	Slight increase in trips due to permanent staff on site. Increase in trips around twice a year for transport of water to site for the cleaning of solar panels (water source to be clarified – borehole or transported to site / size of water tankers if water is to be delivered on site).	Low	On site	Reversible	Immediate	Low Probability	Negative Low	YES	▪ Source on-site water supply if possible. ▪ Utilise cleaning systems for the panels needing less vehicle trips. ▪ Schedule trips for the provision of water for the cleaning of panels outside peak traffic times as much as possible	Negative Very Low

Table 7-4: Impact Table – Cumulative Assessment

Aspect	Description	Impact Magnitude	Impact Extent	Impact Reversibility	Impact Duration	Probability of Occurrence	Impact Significance post mitigation	Mitigation possible?	Possible mitigation measures	Impact Significance post mitigation
TRAFFIC IMPACT	Further increase of development trips during **construction phase** if the developments listed in Table 6.3 will be constructed at the same time as the proposed Tournée 2 Solar PV Facility.	High	Local	Reversible	Short Term	Probable	Negative High	YES	▪ Same mitigation measures as Table 7-1. ▪ It is noted that it is unlikely that all developments will be constructed at the same time. However, for the event that the developments have similar construction periods, it is recommended to agree on a delivery schedule between the respective projects.	Negative Moderate

8 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed Tournée 2 Solar PV Facility as well as the associated infrastructure do not proceed. This would mean that there will be no negative environmental impacts and no traffic impact on the surrounding network during the construction and decommissioning phases. 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 its targets for renewable energy. Hence, the no-go alternative is not a preferred alternative.

9 CONCLUSION AND RECOMMENDATIONS

The potential traffic and transport related impacts for the construction, operation and decommissioning phases of the proposed Tournée 2 Solar PV Facility were identified and assessed.

- The main impact on the external road network will be during the construction phase. This phase is temporary in comparison to the operational period. The number of abnormal loads vehicles was estimated and to be found to be able to be accommodated by the road network.
- During operation, it is expected that maintenance and security staff will periodically visit the facility and water be transported to site possibly twice a year for the cleaning of panels. The generated trips can be accommodated by the external road network and the impacts are rated **negative low** pre-mitigation and **negative very low** post-mitigation.
- The traffic generated during the construction phase, although significant, will be temporary and impacts are considered to be of **negative low impact** after mitigation.
- The traffic generated during the decommissioning phase will be similar to or even less than the construction phase traffic and the impact on the surrounding road network will also be considered to be of **negative low impact** after mitigation.
- For the cumulative impact, it was assumed that all listed developments in a radius of 30 km from the site will be developed at the same time (which will in reality be unlikely). After mitigation, a rating of a **negative medium impact** is given.

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

- Dust suppression of internal gravel roads and the access roads.
- 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 mobile batching plants and quarries near the site would decrease the impact on the surrounding road network, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- A “dry run” of the preferred route. Should the haulage company be familiar with the route, evidence is to be provided to the Client and the Contractor.
- Design and maintenance of the internal gravel roads and maintenance of the access roads.
- If required, 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 be arranged by haulage company) or raised to accommodate the abnormal load vehicles.

The construction and decommissioning phases of a solar power facility are the only significant traffic generators and therefore noise and dust pollution will be higher during these phases. The duration of these phases is of temporary nature, i.e., the impact of the solar power facility on the external traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

From a transport engineering perspective, the proposed development alternatives (i.e., electrical infrastructure compound location alternatives and the technology options for the BESS) are acceptable as they do not have any impact on the traffic on the surrounding road network and as such the project is supported from a transport engineering perspective.

10 REFERENCES

- 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
- Transnetportterminals.net. n.d. *Transnet Port Terminals*. [online] Available at: <https://www.transnetportterminals.net/Ports/Pages/default.aspx>
- 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

SUMMARY OF EXPERIENCE

Iris is a Professional Engineer registered with ECSA (20110156) and obtained her Master of Science degree in Civil Engineering in Germany in 2003. She has more than 20 years of experience in a wide field of traffic and transport engineering projects.

Iris left Germany in 2003 and has gained work experience 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.

Her passions are the renewable energies and road safety, and she is highly experiences in providing traffic and transport engineering advise.

Iris is registered with the International Road Federation as a Global Road Safety Audit Team Leader and is a regular speaker at conferences, seminars and similar.

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

PrEng	Registered with the Engineering Council of South Africa No. 20110156 Registered Mentor with ECSA
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 (Abitur)	Carl Friedrich Gauss Schule, Hemmingen, Germany
1998 - Diploma (Draughtsperson)	Lower Saxonian State Office for Road Engineering
2002 – BSc Eng (Civil)	Leibniz Technical University of Hannover, Germany
2003 - MSc Eng (Civil & Transpt)	Leibniz Technical University of Hanover, Germany

Master Thesis on the 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.*

SUMMARY OF EXPERIENCE

iWink Consulting (Pty) Ltd – Independent Consultant

2022 – present
Position: Independent Consultant – working as an independent Specialist in the field of Traffic & Transport Engineering, Renewable Energies and Road Safety.

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

2016 – 2022
Position: Associate / Division Head: Traffic & Transport Engineering

Jeffares & Green (Pty) Ltd

2012 – 2016
Position: Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2010 - 2012
Position – Senior Traffic & Transport Engineer

Arup (Pty) Ltd

2004 - 2010
Position – Traffic & Transport Engineer

Schmidt Ingenieursbüro, Hannover, Germany

2000
Position – Engineering Assistant

Leibniz University of Hannover, Germany

2000 - 2003
Position – Engineering Researcher - Institute for Road & Railway Engineering

SELECTION OF PROJECTS

Please note: The below lists show only a *selection* of projects that Iris has been involved in over the last 20 years. More information and a complete Schedule of Experience can be made available on request.

RENEWABLE ENERGY PROJECTS

Transport Impact Assessments /Traffic Management Plans for:

- Mayogi Solar PV Project
- AGV Red Sands Solar Project
- Cradock – Kaladokhwe WEFs
- Britstown WEFs
- Highveld Solar Cluster
- Dealsville & Bloemfontein Solar PV
- Great Karroo Wind and Solar Cluster
- Ummbila Emoyeni Solar Project
- Poortjie Wind&Solar
- Hydra B Solar Cluster
- Choje Windfarm, Eastern Cape
- Richards Bay Gas to Power Project
- Oya Black Mountain Solar Project
- De Aar Solar Project
- Euronotus Wind & Solar Cluster
- Pienaarspoort Wind Energy Project
- Karreebosch Wind Energy Project
- Dyasonsklip Solar Project
- Kuruman Windfarm
- Bloemsmond Solar Farms
- Hendrina Wind Energy Project
- Orkney Solar Project
- Bulskop Solar Project
- Hyperion Solar & Thermal Project
- Gromis & Komas Wind Energy Projects
- Kudusberg & Rondekop Wind Energy Projects
- Bayview Windfarm
- Coega West Windfarm
- Suikerbekkie Solar Project
- Poortjie Solar Project

- Northam Solar Project
- Sibanye Solar Project
- Du Plessis Dam Solar Project
- Mercury Solar Project
- Aberdeen Wind Energy Project
- Saldanha Wind and Solar Projects
- Ummbila Emoyeni Wind Energy Project
- Springhaas Solar Project

Clients:

- G7 Energies
- ABO Wind Renewable Energies
- Atlantic Renewable Energy Partners
- Mulilo
- Acciona
- Enel
- Engie
- DNV GL
- Enertrag
- Scatec Solar
- Red Rocket Energies
- Windlab
- Mainstream
- Africoast

FURTHER PROJECTS

Traffic Impact Studies & Site Development Plan Input:

- Nooiensfontein Housing Development, City of Cape Town
- Belhar Housing Development, City of Cape Town
- Baredale Phase 7, City of Cape Town
- Beau Constantia Wine Farm
- Constantia Glen Wine Farm
- Eagles Nest Wine Farm
- Groenvallei Parking Audit, City of Cape Town
- Kosovo Housing Development, Western Cape Government
- Enkanini Housing Development, Stellenbosch
- Delft Housing Development, City of Cape Town
- Secunda Sasol, Free State
- Marula Platinum Mine
- InnerCity Transport Plan, City of Cape Town
- Stellenbosch Road Master Plan
- Nyanga Public Transport Interchange
- Crawford Campus Cape Town

- Durban RoRo Car Terminal, Transnet
- Durban Farewell Container Site
- Msunduzi Waterfront Housing Development
- Transnet Park Site – Traffic Management and Evacuation Plans
- UWC Bellville Medical Campus
- Bloekombos District Hospital
- Malabar Extension 3, Port Elizabeth

Traffic Engineering for Roads Projects:

- Ekhurhuleni Bus Stops and Intersection Safety Assessments
- Namibia Noordoewer to Rosh Pina, Road Agency Namibia
- N2 Section 19 Mthatha – NMT Studies
- R63 Alice to Fort Beaufort – NMT, Road Link and Intersection Studies
- N2 Kangela to Pongola Upgrade
- Cofimvaba Eastern Cape – NMT, Road and Intersection Upgrades
- Stellenbosch R44 Traffic Signals
- Secunda Traffic Signals
- Fezile Dabi District Gravel Roads Upgrade, Free State Province
- Zambia RD Rehabilitation Project
- R61 Eastern Cape – NMT Studies, SANRAL

CONTINUED PROFESSIONAL DEVELOPMENT (CPD)

*Last five years*full CPD list available*

2023 – International Traffic Safety Conference, Doha – Speaker

2022 – 7th Regional Conference for Africa & PIARC International Seminar on Rural Roads and Road Safety - Speaker

2022 – Non-motorised Transport Seminar (SARF) – Co-Organizer / Speaker

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

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

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

2020 – Understanding Road Accidents (SARF)

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

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

2018 – Road Safety in Engineering (SARF) – Presenter

2016 - SATC Road Safety Audit Workshop Pretoria (SARF)

2015 - Non-motorised Transport Planning (SARF

Annexure 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: iWink Consulting (Pty) Ltd

Date: 16-03-2023

Appendix Annexure C: Impact Assessment Methodology

IMPACT ASSESSMENT METHODOLOGY

SCOPING PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of Baseline Environment
- Site Verification Assessment (including sensitivity mapping) (as applicable)
- Identification and high-level screening of impacts
- Plan of Study for EIA

HIGH-LEVEL SCREENING OF IMPACTS AND MITIGATION

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence (**Table 0-3**), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 0-3** and **Table 0-2** respectively.

Table 0-1: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 0-2: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.

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3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

Table 0-3: Significance Screening Tool

CONSEQUENCE SCALE

PROBABILITY SCALE		1	2	3	4
	1	**Very Low**	**Very Low**	**Low**	**Medium**
	2	**Very Low**	**Low**	**Medium**	**Medium**
	3	**Low**	**Medium**	**Medium**	**High**
	4	**Medium**	**Medium**	**High**	**High**

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (**Table 0-4**) has been applied according to the nature and significance of the identified impacts.

Table 0-4: Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	Positive Impacts (+ve)
Negligible	**Negligible**
Very Low	**Very Low**
Low	**Low**
Medium	**Medium**
High	**High**

EIA PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of methodology (as required)
- Update and/or confirmation of Baseline Environment – including update and / or confirmation of sensitivity mapping
- Identification and description of Impacts
- Full impact assessment (including Cumulative)
- Mitigation measures
- Impact Statement

Ensure that all reports fulfil the requirements of the relevant Protocols.

ASSESSMENT OF IMPACTS AND MITIGATION

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

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in **Table 0-5**.

Table 0-5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes

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

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

IMPACT MITIGATION

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

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 1** below.

Avoidance / Prevention	Refers to considering options in project location, nature, scale, layout, technology and phasing to **avoid** environmental and social impacts. Although this is the best option, it will not always be feasible, and then the next steps become critical.
Mitigation / Reduction	Refers to considering alternatives in the project location, scale, layout, technology and phasing that would **minimise** environmental and social impacts. Every effort should be made to minimise impacts where there are environmental and social constraints.
Rehabilitation / Restoration	Refers to the **restoration or rehabilitation** of areas where impacts were unavoidable and measure are taken to return impacted areas to an agreed land use after the activity / project. Restoration, or even rehabilitation, might not be achievable, or the risk of achieving it might be very high. Additionally it might fall short of replicating the diversity and complexity of the natural system. Residual negative impacts will invariably still need to be compensated or offset.
Compensation / Offset	Refers to measures over and above restoration to remedy the residual (remaining and unavoidable) negative environmental and social impacts. When every effort has been made to avoid, minimise, and rehabilitate remaining impacts to a degree of no net loss, **compensation / offsets** provide a mechanism to remedy significant negative impacts.
No-Go	Refers to 'fatal flaw' in the proposed project, or specifically a proposed project in and area that cannot be offset, because the development will impact on strategically important ecosystem services, or jeopardise the ability to meet biodiversity targets. This is a **fatal flaw** and should result in the project being rejected.

Figure 1: Mitigation Sequence/Hierarchy