TRAFFIC AND TRANSPORT MANAGEMENT PLAN:

THE PROPOSED MERCURY CLUSTER SOLAR PV PROJECT: SOUTHERN PV FARMS, FREE STATE PROVINCE

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SYNOPSIS

Preparation of a Traffic and Transport Management Plan for the proposed Mercury Cluster Solar PV Project, Southern PV Farms, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS:

Traffic and Transport Management Plan, Solar PV

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.

Verification	Capacity	Name	Signature	Date
By Author	Senior Technologist	Adrian Johnson		13/09/2022
Checked by:	Associate	Iris Wink		13/09/2022
Authorised by:	Director	Duane Petersen	pp	13/09/2022

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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	19 Years
Years with Firm	9 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 15 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.

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 - SARF Western Region Committee Member
SARF RSC - Road Safety Committee Member
IRF - Global Road Safety Audit Team Leader with the International Road Federation (IRF)

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

JG Afrika (Pty) Ltd (Previously Jeffares & Green (Pty) Ltd)
2016 – Date
Position – Associate

- **Rondekop Windfarm** – Transport study for the proposed Kudusberg Windfarm near Sutherland, Northern Cape – Client: G7 Renewable Energies

- **Kudusberg Windfarm** – Transport study for the proposed Kudusberg Windfarm near Sutherland, Northern Cape – Client: G7 Renewable Energies
- **Multiple Traffic Impact and Route Assessment** for the proposed Solar PV Facilities in the Northern Cape – Client: Private Developer
- **Kuruman Windfarm –** Transport study for the proposed Kuruman Windfarm in Kuruman, Northern Cape – Client: Mulilo Renewable Project Developments
- **Coega West Windfarm** – Transportation and Traffic Management Plan for the proposed Coega Windfarm in Coega, Port Elizabeth – Client: Electrawinds Coega
- **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
- **Sonop Windfarm** – Traffic Impact Assessment for the proposed Sonop Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **Universal Windfarm** - Traffic Impact Assessment for the proposed Universal Windfarm, Coega, Port Elizabeth – Client: Founders Engineering
- **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 Appraisal**s 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

COMPLIANCE WITH THE APPENDIX 6 OF THE 2014 EIA REGULATIONS

Requirements of Appendix 6 – GN R326 EIA Regulations of 7 April 2017	Addressed in the Specialist Report
1. (1) A specialist report prepared in terms of these Regulations must contain- 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;	Yes. See attached CV
b) a declaration that the specialist is independent in a form as may be specified by the competent authority;	Yes. See attached declaration
c) an indication of the scope of, and the purpose for which, the report was prepared;	Yes. See section 1.1
(cA) an indication of the quality and age of base data used for the specialist report;	n/a
(cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Yes. See Chapters 6, 8
d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	n/a
e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Yes. See section 1.3
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;	Yes. Chapters 3 and 6
g) an identification of any areas to be avoided, including buffers;	n/a
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;	n/a
i) a description of any assumptions made and any uncertainties or gaps in knowledge;	Yes. Section 1.4
j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	Yes. Chapters 3, 6, 8
k) any mitigation measures for inclusion in the EMPr;	Yes. Chapter 9
l) any conditions for inclusion in the environmental authorisation;	n/a
m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Yes. Chapter 9
n) a reasoned opinion- i. as to whether the proposed activity, activities or portions thereof should be authorised; (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;	Yes. Chapter 6, 8 and 10
o) a description of any consultation process that was undertaken during the course of preparing the specialist report;	n/a
p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	n/a
q) any other information requested by the competent authority.	n/a
2) Where a government notice *gazetted* by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	n/a

THE PROPOSED MERCURY CLUSTER SOLAR PV PROJECT
SOUTHERN PV FARMS
TRAFFIC AND TRANSPORT MANAGEMENT PLAN

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1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

The Mercury Cluster Solar PV Project will involve the development of Photo Voltaic (PV) solar facilities on privately owned land in the vicinity of Viljoenskroon in the Free State Province, together with associated grid connections (power lines) to connect the solar farms to the existing Mercury Transmission Substation (MTS).

The assessment area for the proposed PV Solar farms and grid connections is situated north and south of the R76, as shown in **Figure 1-1,** close to the town of Viljoenskroon in the Free State Province. It falls within the jurisdiction of the Moqhaka Local Municipality in the Fezile Dabi District Municipality.

The total extent of the assessment area is approximately 3 400ha.

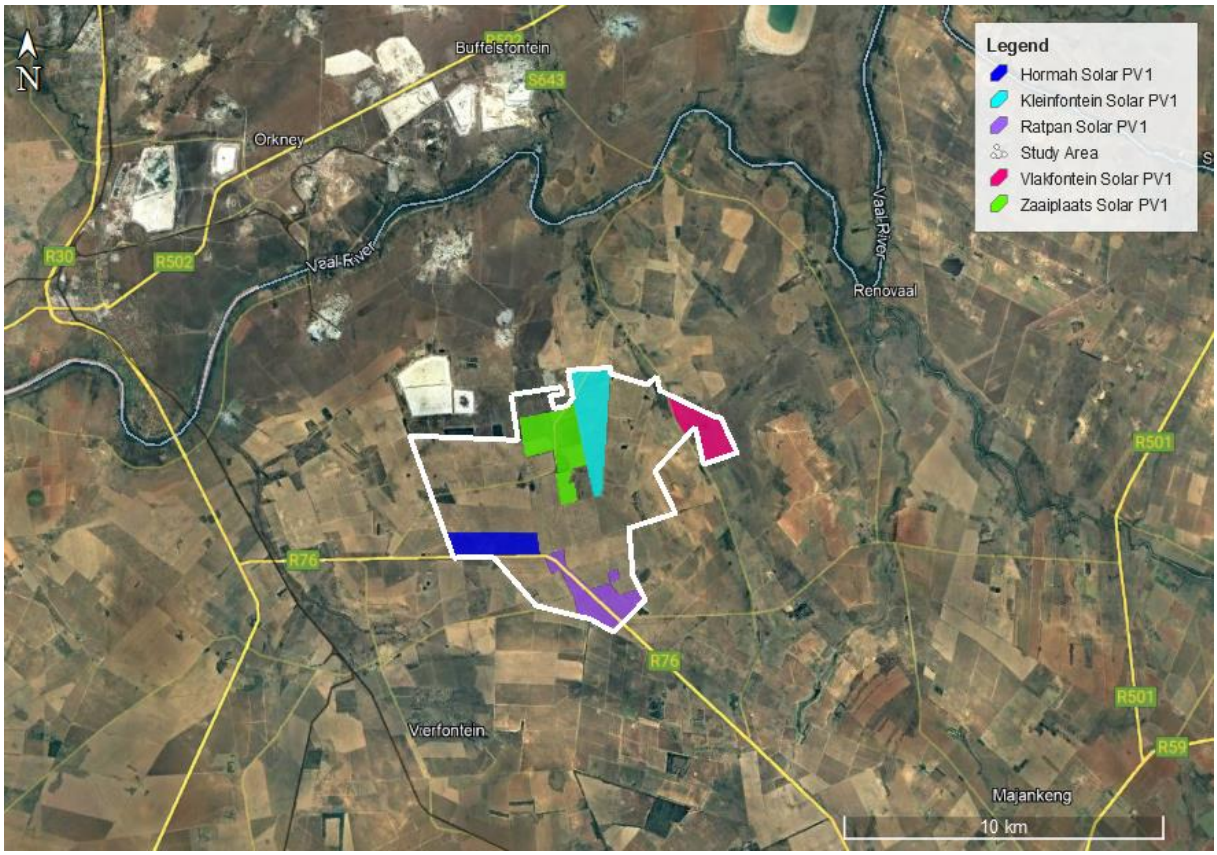

Figure 1-1: Location of the Project

A Basic Screening Assessment resulted in five proposed applications, as well as consideration by Mulilo Renewable Project Developments (Pty) Ltd in terms of financial viability and landowner/farmer recommendations.

The number of these applications can however change and/or the site areas could be redefined within the total assessment area during the course of the EIA process. Changes will be based on findings and

recommendations from the specialists as well as comments received during the public participation process.

This report focuses on the southern PV farms i.e., the two Solar PV facilities located along the R76 (shown in **Figure 1-2**). The two facilities are Hormah Solar PV1 and Ratpan Solar PV1. The northern PV farms viz, Vlakfontein Solar PV1, Kleinfontein Solar PV1 and Zaaiplaats Solar PV1, will be assessed in a separate report.

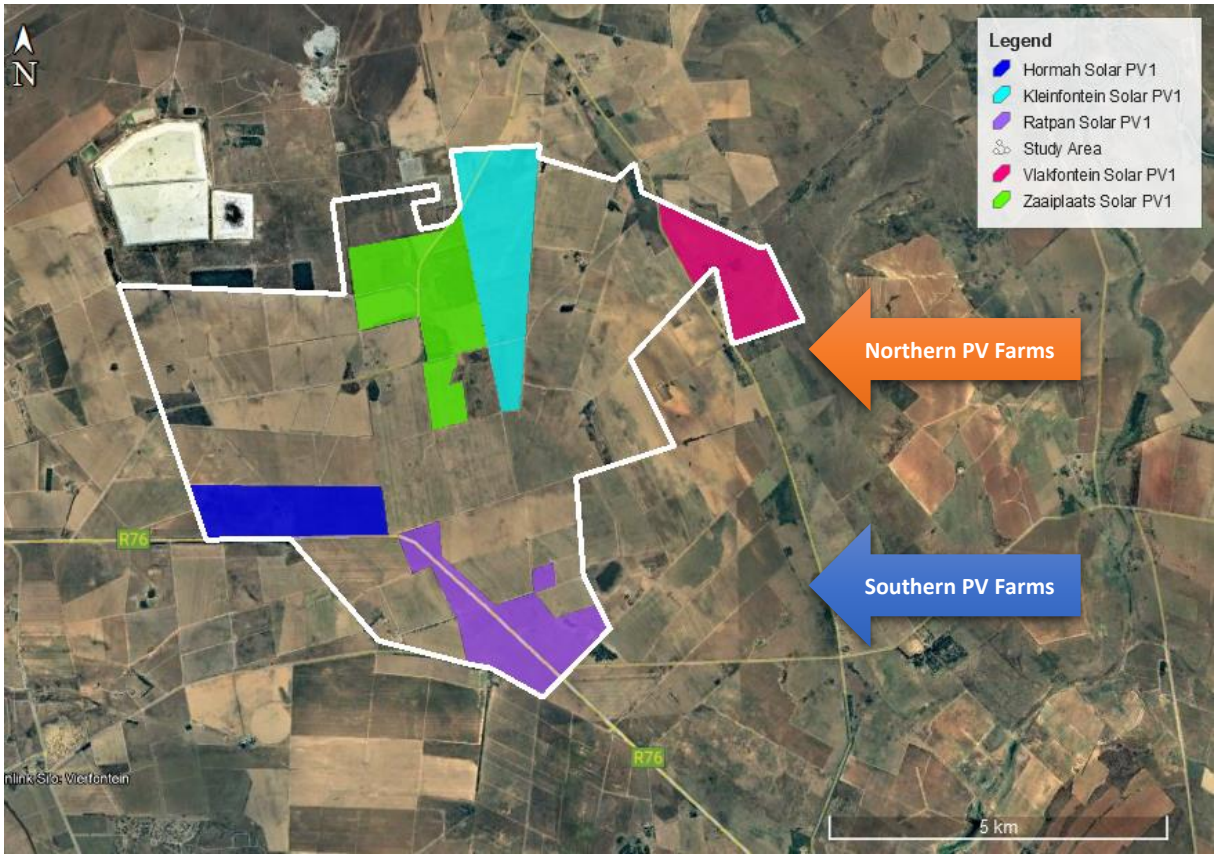

Figure 1-2: Solar PV Farms

As part of the environmental impact processes, the services of a Transportation Specialist are required to conduct a Transport Impact Assessment for the proposed facility.

The following two main transportation activities will be investigated:

- Abnormal load vehicles transporting components to the site; and
- The transportation of construction materials, equipment and people to and from the site/facility.

This report will aim to provide the following objectives:

- Assess activities related to traffic movement for the construction and operation (maintenance) phases of the facility;
- Recommend a preliminary route for the transportation of the components to the proposed site;
- Recommend a preliminary transportation route for the transportation of materials, equipment and people to site; and
- Recommend alternative or secondary routes where possible.

1.2 Terms of Reference

The Terms of Reference for this study include the following:

General:

- A description of the environment that may be affected by the activity and the manner in which the environment may be affected by the proposed project;
- A description and evaluation of environmental issues and potential impacts (including direct, indirect, cumulative impacts and residual risks) that have been identified;
- Direct, indirect, cumulative impacts and residual risks of the identified issues must be evaluated within the EIA Report;
- A statement regarding the potential significance of the identified issues based on the evaluation of the issues/impacts;
- A comparative evaluation of the identified feasible alternatives and nomination of a preferred alternative;
- Any aspects conditional to the findings of the assessment which are to be included as conditions of the Environmental Authorisation;
- This must also include any gaps in knowledge at this point of the study. Consideration of areas that would constitute “acceptable and defendable loss” should be included in this discussion.
- A reasoned opinion as to whether the proposed project should be authorized;
- Summary of the positive and negative impacts and risks of the proposed project and identified alternatives; and
- Mitigation measures and management recommendations to be included in the Environmental Management Programme.

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.

1.3 Approach and Methodology

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

- The construction of the access roads;
- The construction of the facility;
- The operation and maintenance during the operational phase; and
- The decommissioning phase.

This study was informed by the following:

Project Assessment

- Overview of project background information including location maps, component specifications and any possible resulting abnormal loads to be transported; and
- Research of all available documentation and information relevant to the proposed facility.

The study considered and assessed the following:

Traffic and Haulage Route Assessment

- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes; and
- Vehicle trips related to the construction, operational (maintenance) and decommissioning phases of the project.

Site layout, Access Points and Internal Roads Assessment per Site

- Description of the surrounding road network;
- Description of site layout;
- Assessment of the proposed access points; and
- Assessment of the proposed internal roads on site.

The findings of the transport assessment are detailed in this report, prepared as part of the environmental impact assessment process for the proposed facility.

1.4 Assumptions 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 4 300 mm and total maximum length 10 500 mm;
- Maximum vertical height clearances along the haulage route is 5.2 m for abnormal loads;
- Imported elements will be transported from the most feasible port of entry, which is deemed to be Port of Richards Bay;
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centers, which would be either in Cape Town, the greater Johannesburg or Pinetown/Durban;
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads; and
- Material for the construction of internal access roads will be sourced locally as far as possible.

1.5 Source of Information

Information used in a transport study includes:

- Project Information provided by the Client;

- Google Earth.kmz provided by the Client;
- Google Earth Satellite Imagery;
- Information gathered during the site visit; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE STUDY

2.1 Port of Entry

Any components that cannot be manufactured in South Africa are recommended to be imported via the Richards Bay Port, as the proposed site is located within a 720km radius of this Port. A deep-sea water port and boasting 13 berths, the Richards Bay terminal handles dry bulk ores, minerals and break bulk consignments with a draft that easily accommodates Cape size and Panamax vessels. The terminal exports over 30 varied commodities from magnetite to ferrochrome, woodchips to aluminium and steel. A large percentage of dry bulk commodities are handled via a computer-controlled network of conveyor belts extending 40 km to seven harbour bound industries. These belts transport cargo between the quayside and the respective manufacturers. Break bulk cargo, on the other hand, is a skip-loading operation that due to the density of the commodities primarily relies on road motor transport to and from the point of trade. The Richards Bay Port is operated by Transnet Port Terminals.

Alternatively, components can be imported via the Port of Ngqura in the Eastern Cape, which is located approximately 900km from the proposed site. The Port is a world-class deep-water transshipment hub offering an integrated, efficient and competitive port service for containers on transit. The Port forms part of the Coega Industrial Development Zone (CIDZ) and is operated by Transnet National Ports Authority.

2.2 Traffic Management Plan

A traffic management plan (TMP) is required to ensure that the trips generated by the construction and operational activities associated with the facility are mitigated as far as possible. The Traffic Management Plan is a dynamic document that is updated when changes are made to the project that will affect the traffic on the surrounding road network and the transportation requirements of the project. During the construction phase, the Contractor is the custodian of the plan. The requirements of the Traffic Management Plan shall apply to all construction personnel and subcontractors appointed to provide vehicles, machinery or drivers. The Contractor is expected to review the TMP every four months or immediately after an incident, when corrective measures will be incorporated into the Plan.

The Facility Manager becomes the custodian of the plan when the operational phase commences. A designated employee will ensure that the plan is enforced and will make sure that the Plan is available to all relevant personnel and external maintenance/repair teams. The Facility Manager (or equivalent designation) is expected to review the TMP annually or immediately after an incident, when corrective measures will be incorporated into the Plan.

2.3 Abnormal Load Considerations

It is expected that certain components, such as the transformer, will be transported with an abnormal load vehicle. 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 of 22 m for an interlink, 18.5 m for truck and trailer and 13.5 m for a single unit truck;
- Width of 2.6 m;
- Height of 4.3 m measured from the ground;
- Possible height of load being2.7 m;
- Weight of gross vehicle mass of 56 t resulting in a payload of approximately 30t;
- Axle unit limitations are 18 t for dual and 24 t for triple-axle units; and
- Axle load limitations are 7.7 t on the front axle and 9 t on the single or rear axles.

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

2.4 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. Within the guidelines, the detailed procedures to be followed in applying for exemption permits are described and discussed. Legal axle load limits and the restrictions imposed on abnormally heavy loads are discussed in relation to the damaging effect on road pavements, bridges and culverts.

The general conditions, limitations and escort requirements for abnormally dimensioned loads and vehicles are also discussed and reference is made to speed restrictions, power / mass ratio, mass distribution and general operating conditions for abnormal loads and vehicles. Provision is also made for the granting of permits for all other exemptions from the requirements of the Road Traffic Act and the relevant regulations.

2.5 Permitting – General Rules

The limits recommended in TRH 11 are intended to serve as a guide to the Permit Issuing Authorities. It must be noted that each Administration has the right to refuse a permit application or to modify the conditions under which a permit is granted. It is understood that:

a) A permit is issued at the sole discretion of the Issuing Authority. The permit may be refused because of the condition of the road, the culverts and bridges, the nature of other traffic on the road, abnormally heavy traffic during certain periods or for any other reason.
b) A permit can be withdrawn if the vehicle upon inspection is found in any way not fit to be operated.
c) During certain periods, such as school holidays or long weekends an embargo may be placed on the issuing or permits. Embargo lists are compiled annually and are obtainable from the Issuing Authorities.

2.6 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.

2.7 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.

2.8 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 and substation transformers, will also be transported to site during construction. The transport of these items will generally be conducted with normal heavy loads vehicles, except for the transformers which require an abnormal load vehicle.

3 DESCRIPTION OF THE AFFECTED ENVIRONMENT

3.1 Description of the Site

The proposed southern PV farms of the Mercury Cluster Solar PV Project are located 18km southeast of Orkney in the Free State. The two sites are located along the R76 and are bounded by the R30 to the west, the R501 to the east and the Vaal River to the north, as shown in **Figure 3-1**. Access to the southern PV farms will be via R76, a 2-lane single carriageway with no shoulders.

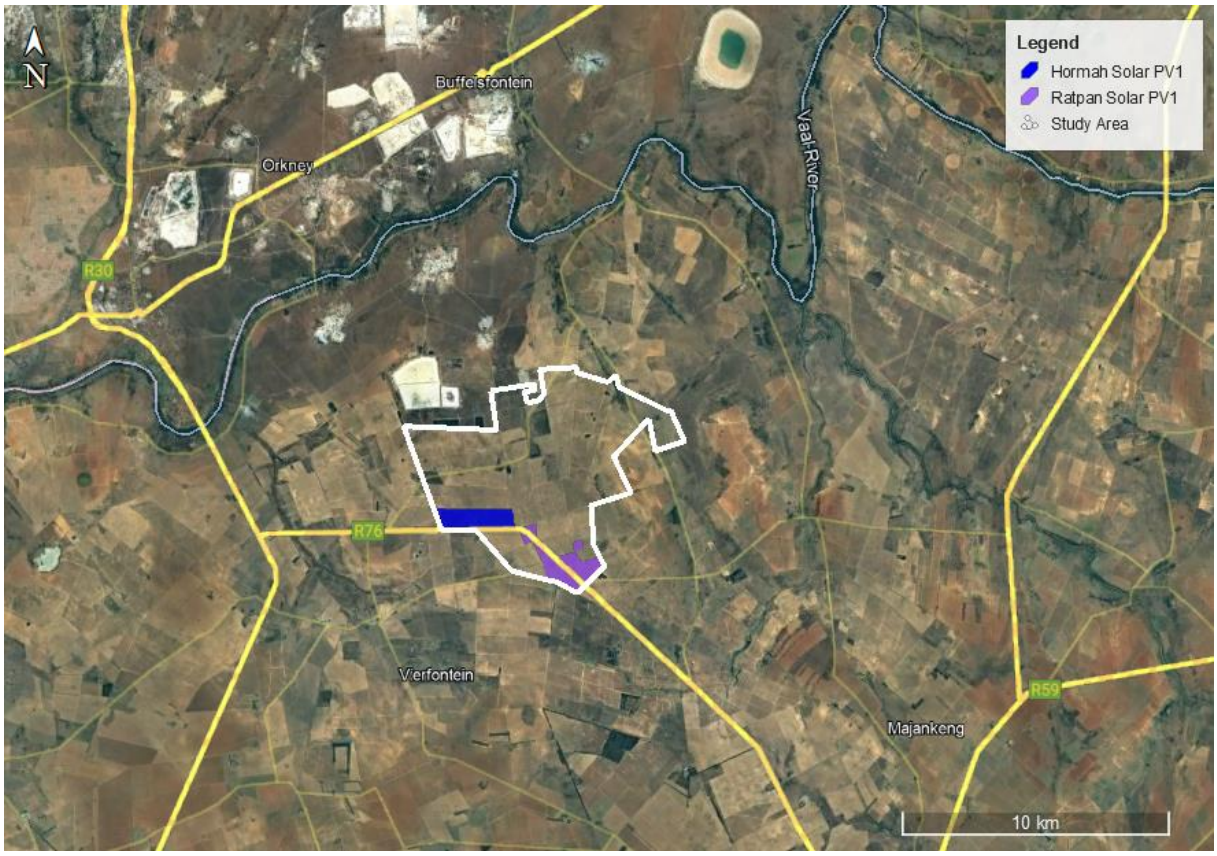

Figure 3-1: Locality Plan

Available details of the two southern solar farms are shown in **Table 3-1** below

Table 3-1: Southern PV Farms Available Details

Solar Farm	Affected properties	Capacity	Size	Applicant name
Hormah Solar PV1	Portion 2 of the Farm Hormah No 276	Up to 120MW	227ha	Hormah Solar PV1 (Pty) Ltd
Ratpan Solar PV1	The Farm Ratpan No 441	Up to 80MW	291ha	Ratpan Solar PV1 (Pty) Ltd

Project components to be confirmed for each individual facility could include the following:

- Solar PV Farm;
- 132kV Grid Connections with switching station/substations for each PV facility;
- Battery Energy Storage Systems (BESS);
- Laydown area for the construction period;
- Diesel storage facility of less than 500m^3;
- Operational & Maintenance Buildings;
- Auxiliary Generator Set (GENSET); and
- Additional infrastructure (Access Roads - new and/or upgrade; stormwater; water pipelines, etc.)

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

- Conventional trucks within the freight limitations to transport building material to the site;
- 40ft container trucks transporting solar panels, frames and the inverter, which are within freight limitations;

- Flatbed trucks (Superlinks) transporting the solar panels and frames, which are within the freight limitations;
- LDV (Light Differential Vehicle)-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 transformer and possibly the containers/tanks for the BESS will be transported as abnormal loads.

3.2 National Route to Site for Imported Components

Any components imported to South Africa are recommended to be shipped via the Port of Richards Bay, being the closest feasible port to the site. The distance from the Port of Richards Bay to the site (shown in cyan in **Figure 3-2)** is approximately 720km.

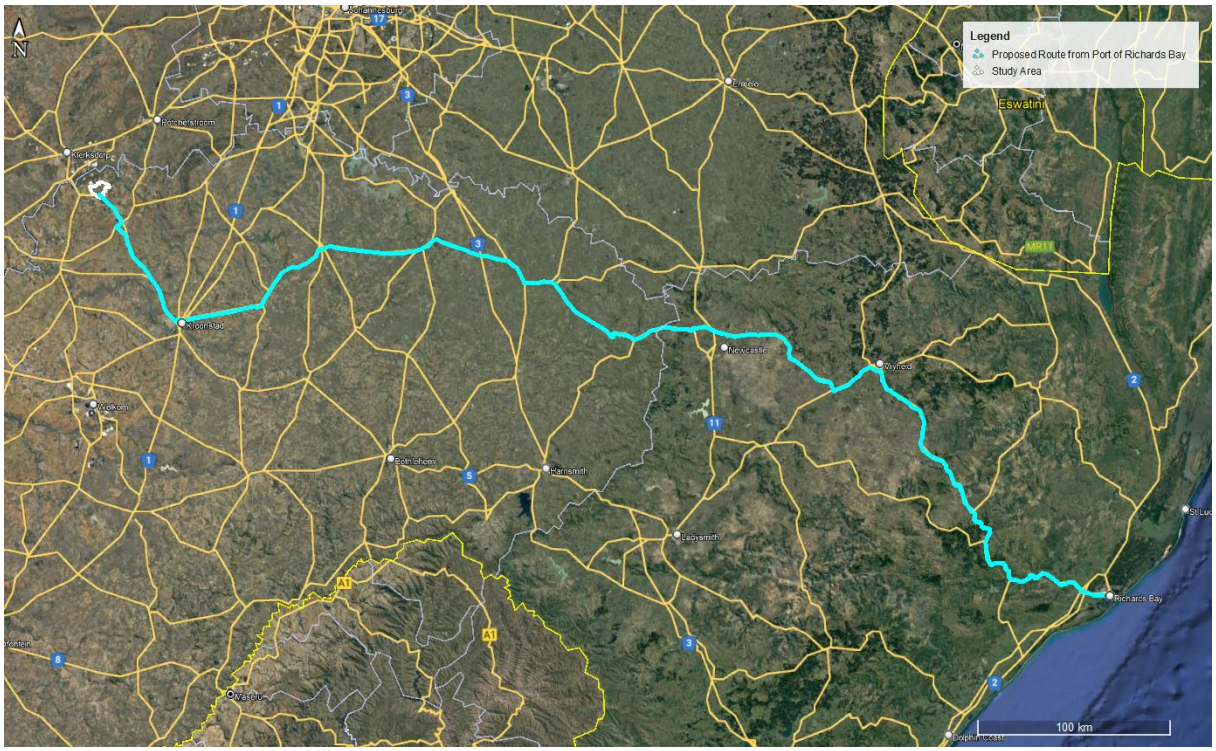

Figure 3-2: National haulage route from Port to the proposed site

3.3 Proposed Access Road to the Site

The main access road to the southern PV farms will be the R76, as shown in **Figure 3-3**.

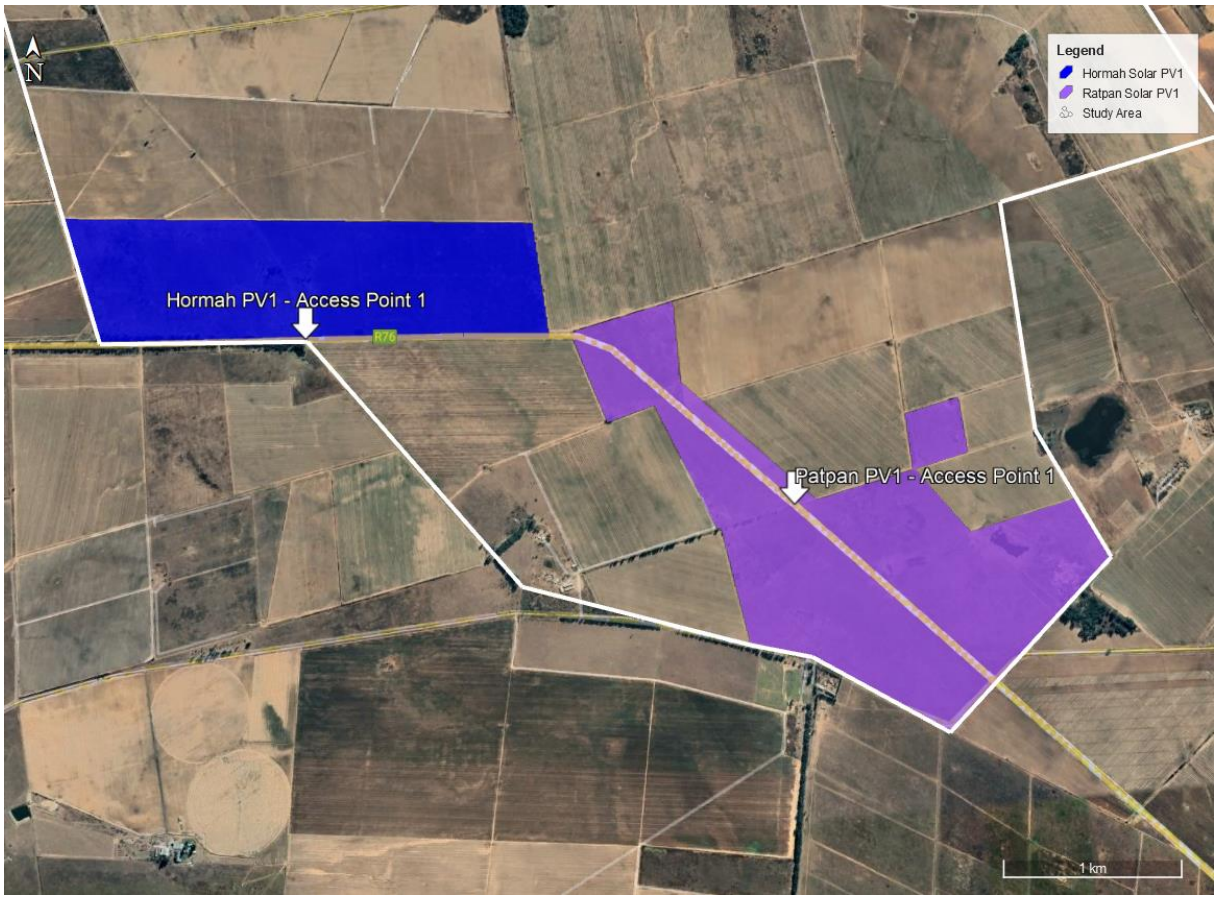

Figure 3-3: Access Road and Access Point

The proposed access points to the Hormah Solar PV1 and Ratpan Solar PV1 facilities will be located on the R76, shown in **Figure 3-3**. The access points have been assessed in accordance with TRH17, with all access points exceeding the minimum shoulder site distance of 380m (assuming a 100km/hr speed limit).

All access point options are deemed acceptable from a traffic and transport engineering perspective.

The proposed access road and access point to the site will need to be able to accommodate the construction and abnormal load vehicles. Generally, the road width at the access point needs to be a minimum of 8m and the access roads a minimum of 5m. The radius at the access points and intersection leading to the site needs to be large enough to allow for all construction vehicles to turn safely. It is recommended that the access point be surfaced and the internal access roads on site remain gravel.

3.4 Internal Roads

The Directorate Road Asset Management (Department of Police, Roads & Transport, Free State Province) supports the Mercury Cluster Solar PV Project (and the use of the provincial gravel roads) subject to certain conditions shown in **Annexure B**.

The internal road geometric design and layout 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 any 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 gravel roads will require grading with a grader to obtain a flat even surface.

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred routes. 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, 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, prior to the transportation of any components, to ensure that the delivery will occur without disruptions. It needs to be ensured that the gravel sections 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. It should be noted that any low hanging overhead lines (lower than 5.1m), e.g., Eskom and Telkom lines, would have to be moved temporarily or raised to accommodate the abnormal load vehicles.

3.5 Route for Components manufactured within South Africa

It is anticipated that elements manufactured within South Africa will be transported to the site from the Cape Town, Johannesburg and/or Pinetown/Durban areas. It is furthermore assumed that the transformer, which will be transported with an abnormal load vehicle, will be transported from the Johannesburg area and therefore it needs to be ensured that the route from the manufacturer to the site doesn't have load limitations for abnormal vehicles. At this stage, only a high-level assessment can be conducted as no information of the exact location of the manufacturer is known and all road structures (such as bridges and culverts) need to be confirmed for their load bearing by SANRAL or the respective Roads Authority.

PV panels are manufactured in South Africa in the Pinetown (Durban), Johannesburg and Cape Town areas. As the distance from Pinetown is deemed very far taking the number of panels that are planned for the site into account, only the Johannesburg and Cape Town areas have been considered.

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

Route from Pinetown (Durban) to Site

Solar PV components could possibly be manufactured in Durban and transported to site via road, as shown in **Figure 3-4**. Normal loads will transport elements via various national highways from Durban and Pinetown to the site**.** No road limitations are envisaged along the route for normal load freight. The distance from Durban to the site is approximately 613km.

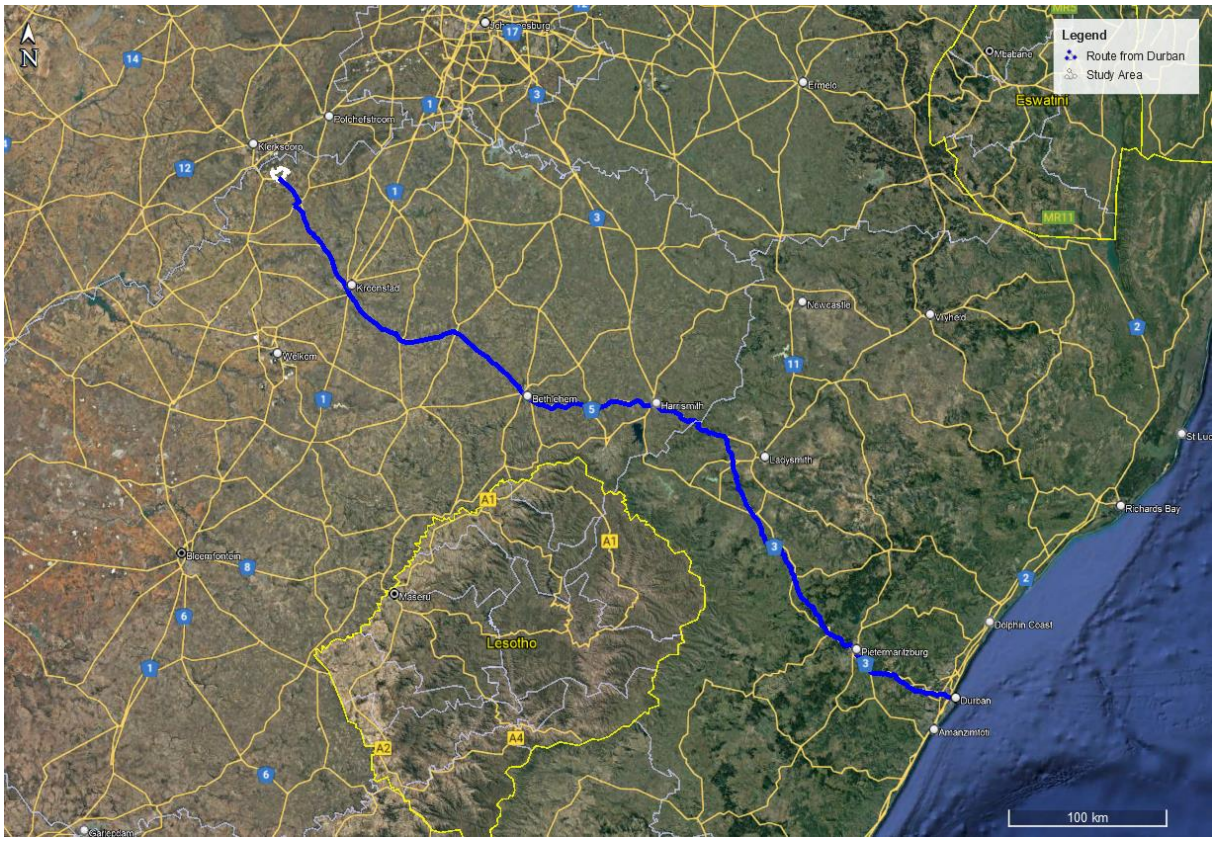

Figure 3-4: Route from Durban to the Site

Route from Johannesburg Area to Site – Normal Loads

Normal loads will transport elements via the N1 highway from Johannesburg to the site, as shown in **Figure 3-5** below. The distance from Johannesburg to the site is 192km and no road limitations are envisaged along the route for normal load freight as it will mainly follow national and provincial roads.

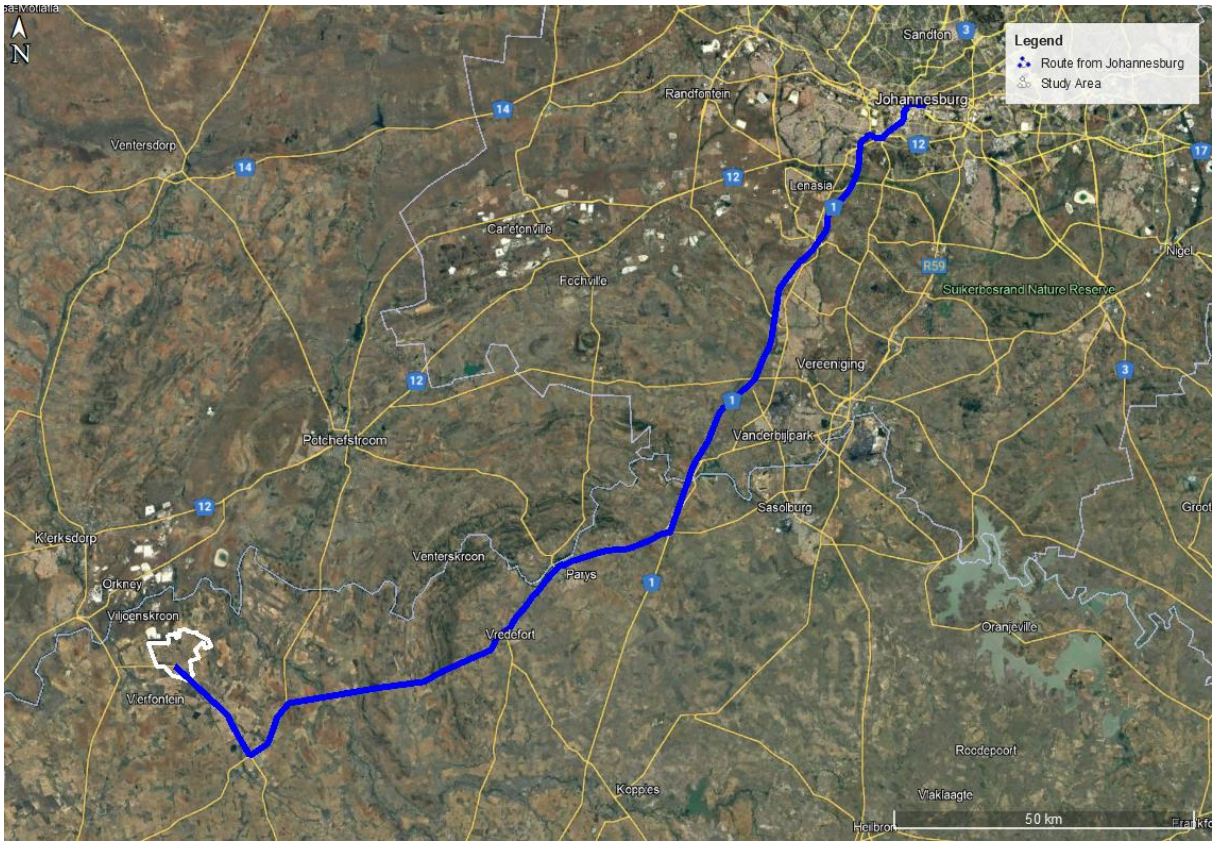

Figure 3-5: Route from Johannesburg to the Site

Route from Johannesburg Area to Site – Abnormal Load

It is assumed that the transformer will be manufactured locally and be transported from the Johannesburg area to site. As the transformer will be transported with an abnormal load vehicle, the route planning needs a more detailed investigation of the feasible routes taking into account any limitations due to existing road structures. Furthermore, a load of abnormal dimensions may cause an obstruction and danger to other traffic and therefore the transformer needs to be transported as far as possible on roads that are wide enough for general traffic to pass. It is expected that the transformer can be transported to site via the same route used for normal loads.

There are several bridges and culverts along this route, which need to be confirmed for load bearing and height clearances. There will be several turns along the way and small towns to pass through. According to the desktop study, all turning movements along the route are manageable for the abnormal vehicle.

Route from Cape Town Area to Site – Normal Loads

The PV panels might be manufactured in the Cape Town area and transported to site. Normal loads will transport elements via the N1 highway from Cape Town to the site, as shown in **Figure 3-6** below. The distance from Cape Town to the site is 1 270km and no road limitations are envisaged along the route for normal load freight.

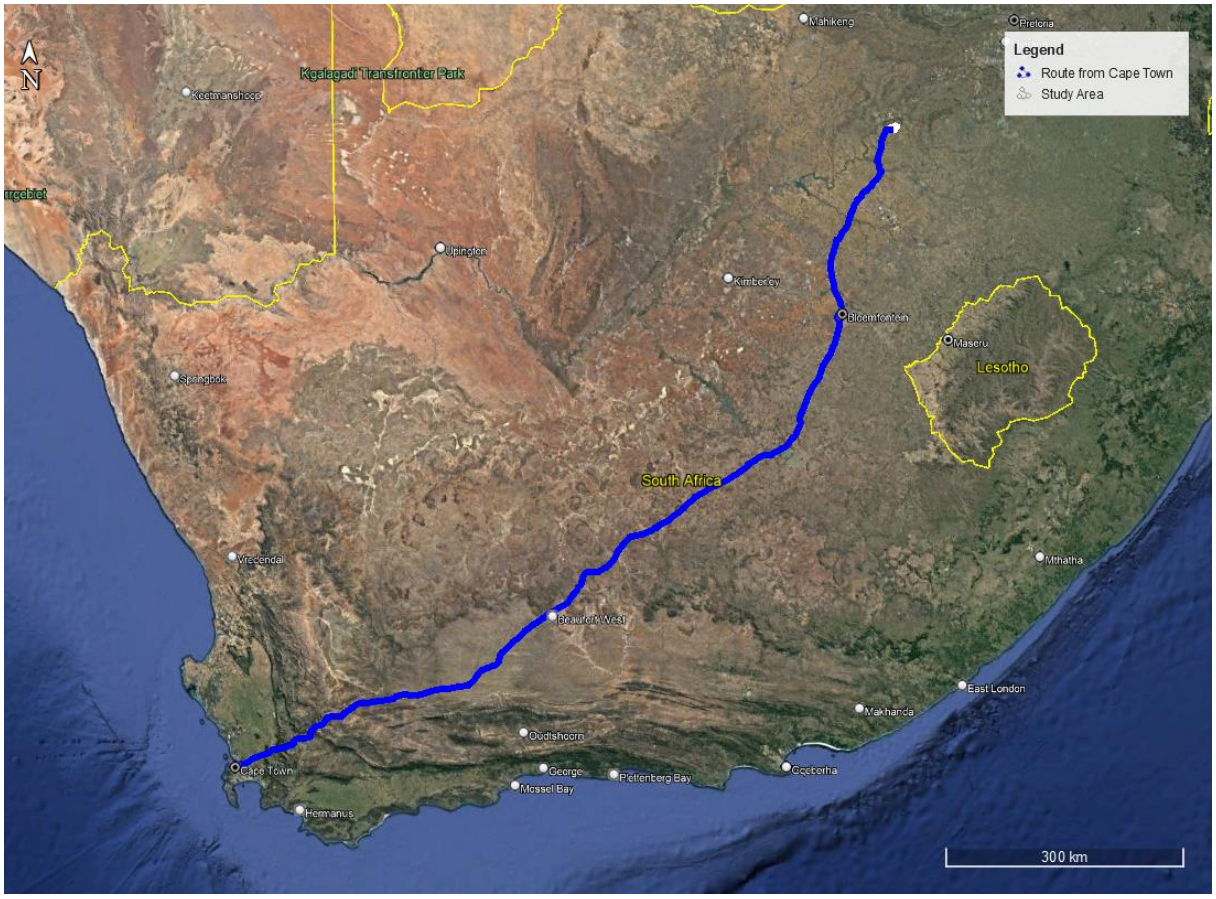

Figure 3-6:Route from Cape Town to the Site

3.6 Main Route for the Transportation of Materials, Plant and People to the proposed site

It is envisaged that the majority of materials, plant and labour will be sourced from towns within a 50km radius of the proposed site and transported to the site via the R76 (during off peak hours only).

Should concrete batch plants (if required) or quarries not be available in the surrounding areas, 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.

4 APPLICABLE LEGISLATION 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, 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.

5 IDENTIFICATION OF KEY ISSUES

5.1 Hormah Solar PV1

5.1.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.1.1.1 Construction Phase

Potential impact

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

5.1.1.2 Operational Phase

Potential impact

- During operation, it is expected that staff and security will visit the facility.
- Maintenance vehicles are expected on site at times.
- Should municipal water not be available, water will have to be transported to the site.

5.1.1.3 Decommissioning Phase

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

5.1.1.4 Cumulative Impacts

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

5.2 Ratpan Solar PV1

5.2.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.2.1.1 Construction Phase

Potential impact

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

5.2.1.2 Operation Phase

Potential impact

- During operation, it is expected that staff and security will visit the facility.
- Maintenance vehicles are expected on site at times.
- Should municipal water not be available, water will have to be transported to the site.

5.2.1.3 Decommissioning Phase

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

5.2.1.4 Cumulative Impacts

- Traffic congestion/delays on the surrounding road network.
- Noise and dust pollution

6 ASSESSMENT OF IMPACTS AND IDENTIFICATION OF MANAGEMENT ACTIONS

6.1 Hormah Solar PV1

6.1.1 Potential Impact (Construction Phase)

Nature of the impact

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

Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

Estimate trips generated during the Construction Phase

From experience on other projects of similar nature, the number of heavy vehicles per 7 MW installation is estimated to range between 200 and 300 trips depending on the site conditions and requirements. For the 120 MW, the total trips can therefore be estimated to be between 3 429 and 5 143 heavy vehicle trips, which will generally be made over a 12-month construction period. Choosing the worst-case scenario of 5 143 heavy vehicles over a 12-month period travelling on an average of 22 working days per month, the resulting daily number of vehicle trips is 20. In a rural environment, traffic during the peak hour accounts for roughly 20-40% of the average daily traffic i.e., 20-40% of the daily 20 vehicle trips generated by the facility will travel during the peak hour. This amounts to between 4 and 8 trips. The impact on general traffic on the R76 is therefore deemed nominal.

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 2MW packages and 40ft containers). These can then be stored at the port and repacked onto flatbed trucks.

It is assumed that during the peak of the construction period, 200 employees will be active on site.

Staff trips are assumed to be:

Table 6-1: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Number of Employees
Car	10	15 (assuming 1.5 occupants)
Bakkie	20	30 (assuming 1.5 occupants)
Taxi – 15 seats	5	75
Bus – 80 seats	1	80
Total	**36**	**200**

It is difficult to accurately estimate the construction traffic for the transportation of materials as it depends on the type of vehicles, tempo of the construction, source/location of construction material etc. However, it is assumed that at the peak of construction, approximately 150 construction vehicle trips will access the site per day.

The total estimated daily site trips are shown in the table below.

Table 6-2: Estimation of daily site trips

Activity	Number of trips
Staff trips	36
Component delivery	20
Construction trips	150
Total	**206**

The impact on general traffic on the R76 is therefore deemed nominal as the 206 trips will be distributed across a 9 hr working day. The majority of the trips will occur outside the peak hours.

As components and other elements will be stored on site and on the laydown areas, many internal trips will occur on site during construction, i.e., dumpers will bring small equipment from laydown / storage area to site, cranes will lift structures / equipment to final locations, flat-bed trucks will be used to transfer equipment from laydown area to the construction site and telehandlers and cherry pickers will be used to support the work at heights. These trips are internal to the construction site and will not have an impact on the traffic on the surrounding road network.

The significance of the transport impact without mitigation measures during the construction phase can be rated as medium. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level.

6.1.2 Potential Impact (Operational Phase)

Nature of the impact

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

Significance of impact without mitigation measures

- Traffic during the operation phase will include occasional maintenance requirements and staff trips.

- The number of water tanks needed for cleaning the panels will be significant and therefore every effort needs to be made to reduce these trips. However, water related trips are expected to not occur more than four times a year.

Estimate trips generated during the Operational Phase

Water is required to clean the solar panels. Should municipal water not be available, water will have to be transported to the site. The following assumptions have been made to estimate the resulting trips generated:

- 5 000 litre bowsers to be used for transporting the water
- Approximately 5 litres of water needed per panel

As no exact number was provided by the client at the time of preparing this study, the total number of panels was estimated to be approximately 375 000. The total number of trips would be 375 for the 375 000 panels. Given the high number of vehicle trips, boreholes and on-site water storage tanks should be investigated to reduce this number of trips. Panels are generally cleaned up to four times a year. To further limit the impact of water related trips on the external roads, it is recommended to schedule these trips outside of peak traffic periods and to spread the cleaning of the panels over a week.

Traffic during the operational phase will be low (less than 10 trips) as trips will only be for occasional maintenance requirements and staff trips (assumed at 30 permanent staff).

The operational trips generated will be acceptable and will have a low to medium impact on the external road network.

6.2 Ratpan Solar PV1

6.2.1 Potential Impact (Construction Phase)

Nature of the impact

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

Significance of impact without mitigation measures

- Traffic generated by the construction of the facility will have a significant impact on the surrounding road network. The exact number of trips generated during construction will be determined by the contractor and the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

Estimate trips generated during the Construction Phase

From experience on other projects of similar nature, the number of heavy vehicles per 7 MW installation is estimated to range between 200 and 300 trips depending on the site conditions and requirements. For the 80 MW, the total trips can therefore be estimated to be between 2 286 and 3 429 heavy vehicle trips, which will generally be made over a 12-month construction period. Choosing the worst-case scenario of 3 429 heavy vehicles over a 12-month period travelling on an average of 22 working days per month, the resulting daily number of vehicle trips is 13. In a rural environment, traffic during the peak hour accounts for roughly 20-40% of the average daily traffic i.e., 20-40% of the daily

13 vehicle trips generated by the facility will travel during the peak hour. This amounts to between 3 and 6 trips. The impact on general traffic on the R76 is therefore deemed nominal.

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 2MW packages and 40ft containers). These can then be stored at the port and repacked onto flatbed trucks.

It is assumed that during the peak of the construction period, 200 employees will be active on site.

Staff trips are assumed to be:

Table 6-3: Estimation of daily staff trips

Vehicle Type	Number of vehicles	Number of Employees
Car	10	15 (assuming 1.5 occupants)
Bakkie	20	30 (assuming 1.5 occupants)
Taxi – 15 seats	5	75
Bus – 80 seats	1	80
Total	**36**	**200**

It is difficult to accurately estimate the construction traffic for the transportation of materials as it depends on the type of vehicles, tempo of the construction, source/location of construction material etc. However, it is assumed that at the peak of construction, approximately 150 construction vehicle trips will access the site per day.

The total estimated daily site trips are shown in the table below.

Table 6-4: Estimation of daily site trips

Activity	Number of trips
Staff trips	36
Component delivery	13
Construction trips	150
Total	**199**

The impact on general traffic on the R76 is therefore deemed nominal as the 199 trips will be distributed across a 9 hr working day. The majority of the trips will occur outside the peak hours.

As components and other elements will be stored on site and on the laydown areas, many internal trips will occur on site during construction, i.e., dumpers will bring small equipment from laydown / storage area to site, cranes will lift structures / equipment to final locations, flat-bed trucks will be used to transfer equipment from laydown area to the construction site and telehandlers and cherry pickers will be used to support the work at heights. These trips are internal to the construction site and will not have an impact on the traffic on the surrounding road network.

The significance of the transport impact without mitigation measures during the construction phase can be rated as medium. However, considering that this is temporary and short term in nature, the impact can be mitigated to an acceptable level.

6.2.2 Potential Impact (Operational Phase)

Nature of the impact

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

Significance of impact without mitigation measures

- Traffic during the operation phase will include occasional maintenance requirements and staff trips.
- The number of water tanks needed for cleaning the panels will be significant and therefore every effort needs to be made to reduce these trips. However, water related trips are expected to not occur more than four times a year.

Estimate trips generated during the Operational Phase

Water is required to clean the solar panels. Should municipal water not be available, water will have to be transported to the site. The following assumptions have been made to estimate the resulting trips generated:

- 5 000 litre bowsers to be used for transporting the water
- Approximately 5 litres of water needed per panel

As no exact number was provided by the client at the time of preparing this study, the total number of panels was estimated to be approximately 375 000. The total number of trips would be 375 for the 375 000 panels. Given the high number of vehicle trips, boreholes and on-site water storage tanks should be investigated to reduce this number of trips. Panels are generally cleaned up to four times a year. To further limit the impact of water related trips on the external roads, it is recommended to schedule these trips outside of peak traffic periods and to spread the cleaning of the panels over a week.

Traffic during the operational phase will be low (less than 10 trips) as trips will only be for occasional maintenance requirements and staff trips (assumed at 30 permanent staff).

The operational trips generated will be acceptable and will have a low to medium impact on the external road network.

6.3 Mitigation measures

6.3.1 Construction Phase

The following mitigation measures are proposed for the construction phase of the solar PV facilities:

- *Traffic Management Plan*
  - The TMP should be updated when changes are made to the project that will affect the traffic on the surrounding road network and the transportation requirements of the project.

- A designated personnel member of the Contractor's team must be the custodian of the plan and the custodian must ensure that all personnel and subcontractors are trained to ensure compliance.
- The requirements of the TMP shall apply to all construction personnel and subcontractors appointed to provide vehicles, machinery or drivers.
- The Contractor is expected to review the TMP every four months or immediately after an incident, when corrective measures will be incorporated into the Plan.

- *Accommodation of Traffic*
  - The Contractor is to submit a detailed Traffic Accommodation Plan to the Project Engineer for approval, for the R76 and access road sections.
  - Specifications must be strictly in accordance with the South African Road Traffic Signs Manual and in accordance with the relevant specifications of the project documents.
  - The Contractor must ensure that provision is made for access by emergency vehicles, where required.

- *Emergency Preparedness and Incident Management*
  - Local emergency services shall be consulted prior to the start of the project to ascertain the availability and capacity of emergency services to attend to road and construction accidents associated with the Project.
  - All hazards shall immediately be reported to the Site Manager who shall take the appropriate measures to avoid the occurrence of an incident or accident.
  - Relevant staff shall be required to undertake first aid training and all project vehicles shall carry first aid supplies which should be adequate to cater for the number of passengers carried on the vehicle in question.
  - An on-site emergency procedure shall be made available and implemented when an incident occurs.
  - If an accident occurs off-site, it shall immediately be reported to the relevant emergency services.
  - Records of all accidents, incidents and near misses shall be kept on site and mitigation measures shall be investigated.

- *Transport Coordinator*
  - It is recommended that a transport coordinator (or similar designation) be appointed to ensure compliance of the TMP. The coordinator shall make all the necessary arrangements to maintain the required traffic measures for the duration of the construction period.

- *Licensing*
  - All construction vehicles shall have the necessary licences, a valid roadworthy certificate and shall comply with the relevant traffic and transport licencing requirements (such as abnormal loads or hazardous materials).
  - All drivers of vehicles shall have the requisite licences to operate any vehicle (or machinery) operated by them on site or on any public roads. Drivers' licenses must be applicable to the specific vehicle/machinery that is being used.

- *Construction Staff*
  - Staff and general trips should occur outside of peak traffic periods as far as possible.
  - Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.
  - All staff shall be transported safely to site in appropriate vehicles. Staff shall not be allowed to be transported to site on the back of open trucks. Passenger vehicles shall not exceed the carrying capacity of the vehicle.
  - Collections/Drop-off points for staff shall be located at a safe distance from traffic and construction activities. Roads and areas used by construction vehicles shall, as far as possible be avoided by all personnel. Designated pedestrian pathways shall be demarcated where appropriate.
  - All staff shall receive the appropriate site safety induction training. Drivers shall be adequately trained in the identification and avoidance of road hazards, vehicle maintenance and care and safety requirements. All staff shall be informed of the construction site risks and training shall include appropriate precautionary measures required to be undertaken to facilitate safe and efficient traffic management (e.g., understanding signage, crossing roadways and utilising designated pedestrian pathways, reporting incidents).

- *Inspection of all Routes*
  - A "dry-run" of all routes is to be undertaken to identify any areas to avoid or obstacles that might disrupt the movement of the construction vehicles. All issues affecting the movement of vehicles are to be addressed immediately by the Contractor and relevant stakeholders e.g., law enforcement, relevant roads department and authorities.

- *Component Delivery*
  - The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.

- *Maintenance of vehicles*
  - All vehicles and construction plant shall be regularly maintained, repaired when necessary and inspected on a regular basis to ensure that the vehicles are in good working order. Construction and passenger vehicles shall be monitored to ensure that vehicles are not overloaded.

- *Maintenance of roads*
  - The Contractor shall maintain the road used by construction vehicles, repairing any damage caused by construction traffic to the surrounding road network.
  - Dust suppression of gravel roads during the construction phase, as required.
  - Road verges at the site shall be regularly maintained to ensure that vegetation remains short and that the roads serve as an effective firebreak.
  - 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.

- *Signage*
  - Signage, in accordance with the South African Road Traffic Signs Manual (SARTSM), will be required to be conspicuously placed at appropriate locations along all access roads, the internal roads to the site and public roads used by construction vehicles (in consultation with the relevant traffic authorities) to indicate the following:
    - all road and pedestrian hazards;
    - site access
    - site offices
    - wayfinding signs on internal roads e.g. parking, toilets, emergency assembly point
    - crossing points;
    - speed limits;
    - turning traffic;
    - dedicated routes for construction vehicles and staff;
    - no-go areas; and
    - any traffic control information which may be relevant to the construction activity at the time.
  - It is recommended that flagmen be implemented when high volumes of construction traffic are expected to help direct the traffic, thus ensuring the safe movement of the vehicles and reducing the potential conflicts.

- *Speed limit*
  - All drivers operating vehicles shall comply with the posted speed limits (or the maximum allowable speed as per the permit for abnormal load vehicles) on public roads as well as a proposed 30km/h speed limit within the construction site and access roads.
  - The failure to adhere to the prescribed speed limits is an offence and disciplinary action may be taken by the Contractor.

- *Abnormal Loads*
  - Abnormal permits are required for vehicles exceeding the permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996).
  - Abnormal Loads may be required which 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.

- *Preferred Abnormal load route*
  - 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 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, prior to the transportation of any

components, to ensure that the 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. 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.

- 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.

6.3.1.1 Significance of impact with mitigation measures

The proposed mitigation measures for the construction traffic will result in a reduction of the impact on the surrounding road network, but the impact on the local traffic will remain moderate as long as daily trips don't exceed the assumptions made above. The dust suppression, however, will result in significantly reducing the impact.

6.3.2 Operational Phase

The following mitigation measures are proposed for the operational phase of the solar PV facilities:

- *Traffic Management Plan*
  - A copy of the TMP must be kept at the facility and a designated employee will ensure that the plan is enforced and will make sure that the Plan is available to all relevant personnel and external maintenance/repair teams.
  - The Facility Manager (or equivalent designation) is expected to review the TMP annually or immediately after an incident, when corrective measures will be incorporated into the Plan.

- *Cleaning of panels*
  - Staff and general (maintenance) trips should occur outside of peak traffic periods as far as possible.
  - Should municipal water not be available, water will have to be transported to the site.
    - The provision of water tanks.
    - Water bowsers trips should occur outside of peak traffic periods as far as possible.
    - Using a larger water bowser.

- *Maintenance of roads*
  - Any gravel roads used by vehicles visiting the facility during the operational phase will be maintained and repaired when damaged, if required.
  - Dust suppression of any gravel roads during the operational phase, if required.

7 NO-GO ALTERNATIVE

The no-go alternative implies that the proposed southern PV farms do 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 the government in meeting energy demands. **Hence, the no-go alternative is not a preferred alternative.**

8 IMPACT ASSESSMENT SUMMARY

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

8.1 Hormah Solar PV1

8.1.1 Construction Phase

Table 8-1: Impact Rating - Construction Phase

Impact Description

Traffic congestion due to an increase in traffic caused by the transportation of components, equipment, material and staff to site

Cumulative impact description

The increase in construction traffic on roads will cause congestion which leads to an increase in dust and noise pollution.

Mitigation

- Stagger component delivery to site.
- Reduce the construction period.
- The use of mobile batch plants and quarries in close proximity to the site, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods
- Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.
- Dust Suppression of gravel roads during the construction phase, as required.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Traffic Congestion	Local	Short Term	Probable	High	Moderate	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	**NO**

Cumulative impact rating (*after* mitigation) If high, please explain	**Low**	Medium	High

8.1.2 Operational Phase

Table 8-2: Impact Rating - Operation Phase

Impact Description

Traffic congestion due to an increase in traffic caused by staff trips, water deliveries and trips for maintenance requirements.

Cumulative impact description

The increase in traffic on roads will cause congestion which leads to an increase in e dust and noise pollution.

Mitigation

- Water deliveries, staff trips and trips for maintenance requirements could be staggered or scheduled to occur outside of peak traffic periods.
- Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.
- The provision of water tanks and/or use of boreholes.
- Spread the cleaning of the panels over a week.
- Using a larger water bowser.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Traffic Congestion	Local	Short Term	Probable	High	Moderate	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	**NO**

Cumulative impact rating (*after* mitigation) If high, please explain	**Low**	Medium	High

8.1.3 Decommissioning Phase

Table 8-3: Impact Rating - Decommissioning Phase

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

8.2 Ratpan Solar PV1

8.2.1 Construction Phase

Table 8-4: Impact Rating - Construction Phase

Impact Description

Traffic congestion due to an increase in traffic caused by the transportation of components, equipment, material and staff to site

Cumulative impact description

The increase in construction traffic on roads will cause congestion which leads to an increase in dust and noise pollution.

Mitigation

- Stagger component delivery to site.
- Reduce the construction period.
- The use of mobile batch plants and quarries in close proximity to the site, if available and feasible.
- Staff and general trips should occur outside of peak traffic periods.
- Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods
- Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase.
- Dust Suppression of gravel roads during the construction phase, as required.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Traffic Congestion	Local	Short Term	Probable	High	Moderate	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	**NO**

Cumulative impact rating (*after* mitigation) If high, please explain	**Low**	Medium	High

8.2.2 Operational Phase

Table 8-5: Impact Rating - Operation Phase

Impact Description
Traffic congestion due to an increase in traffic caused by staff trips, water deliveries and trips for maintenance requirements.

Cumulative impact description
The increase in traffic on roads will cause congestion which leads to an increase in e dust and noise pollution.

Mitigation

- Water deliveries, staff trips and trips for maintenance requirements could be staggered or scheduled to occur outside of peak traffic periods.
- Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.
- The provision of water tanks and/or use of boreholes.
- Spread the cleaning of the panels over a week.
- Using a larger water bowser.

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation
Traffic Congestion	Local	Short Term	Probable	High	Moderate	Low

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	**NO**

Cumulative impact rating (*after* mitigation) If high, please explain	**Low**	Medium	High

8.2.3 Decommissioning Phase

Table 8-6: Impact Rating - Decommissioning Phase

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

9 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

It is recommended that dust suppression and maintenance of gravel roads form part of the EMPr. This would be required during the Construction Phase where an increase in vehicle trips can be expected. The EMPr will be the same for the individual southern PV farms.

Table 9-1: EMPr Input – Construction Phase

Impact	**Mitigation/Management Objectives**	**Mitigation/Management Actions**	**Monitoring**	
			Frequency	***Responsibility***
A. CONSTRUCTION PHASE				
A.1. TRAFFIC IMPACTS				
Dust and noise pollution due to construction traffic.	Minimize impacts on road network and surrounding area.	• *Traffic Management Plan* ○ The TMP should be updated when changes are made to the project that will affect the traffic on the surrounding road network and the transportation requirements of the project. ○ A designated personnel member of the Contractor's team must be the custodian of the plan and the custodian must ensure that all personnel and subcontractors are trained to ensure compliance. ○ The requirements of the TMP shall apply to all construction personnel and subcontractors appointed to provide vehicles, machinery or drivers. ○ The Contractor is expected to review the TMP every four months or immediately after an incident, when corrective measures will be incorporated into the Plan.	▪ Before construction commences and regularly and as required during construction phase.	▪ Holder of the EA and Contractor

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		• *Accommodation of Traffic* o The Contractor is to submit a detailed Traffic Accommodation Plan to the Project Engineer for approval, for the R76 and access road sections. o Specifications must be strictly in accordance with the South African Road Traffic Signs Manual and in accordance with the relevant specifications of the project documents. o The Contractor must ensure that provision is made for access by emergency vehicles, where required. • *Emergency Preparedness and Incident Management* o Local emergency services shall be consulted prior to the start of the project to ascertain the availability and capacity of emergency services to attend to road and construction accidents associated with the Project. o All hazards shall immediately be reported to the Site Manager who shall take the appropriate measures to avoid the occurrence of an incident or accident. o Relevant staff shall be required to undertake first aid training and all project vehicles shall carry first aid supplies which should be adequate to cater for the number of passengers carried on the vehicle in question. o An on-site emergency procedure shall be made available and implemented when an incident occurs. o If an accident occurs off-site, it shall immediately be reported to the relevant emergency services.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		○ Records of all accidents, incidents and near misses shall be kept on site and mitigation measures shall be investigated. • *Transport Coordinator* ○ It is recommended that a transport coordinator (or similar designation) be appointed to ensure compliance of the TMP. The coordinator shall make all the necessary arrangements to maintain the required traffic measures for the duration of the construction period. • *Licensing* ○ All construction vehicles shall have the necessary licences, a valid roadworthy certificate and shall comply with the relevant traffic and transport licencing requirements (such as abnormal loads or hazardous materials). ○ All drivers of vehicles shall have the requisite licences to operate any vehicle (or machinery) operated by them on site or on any public roads. Drivers' licenses must be applicable to the specific vehicle/machinery that is being used. • *Construction Staff* ○ Staff and general trips should occur outside of peak traffic periods as far as possible. ○ Consider scheduling shift changes to occur outside peak hours to concentrate staff trips in off peak periods.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		○ All staff shall be transported safely to site in appropriate vehicles. Staff shall not be allowed to be transported to site on the back of open trucks. Passenger vehicles shall not exceed the carrying capacity of the vehicle. ○ Collections/Drop-off points for staff shall be located at a safe distance from traffic and construction activities. Roads and areas used by construction vehicles shall, as far as possible be avoided by all personnel. Designated pedestrian pathways shall be demarcated where appropriate. ○ All staff shall receive the appropriate site safety induction training. Drivers shall be adequately trained in the identification and avoidance of road hazards, vehicle maintenance and care and safety requirements. All staff shall be informed of the construction site risks and training shall include appropriate precautionary measures required to be undertaken to facilitate safe and efficient traffic management (e.g., understanding signage, crossing roadways and utilising designated pedestrian pathways, reporting incidents). • *Inspection of all Routes* ○ A "dry-run" of all routes is to be undertaken to identify any areas to avoid or obstacles that might disrupt the movement of the construction vehicles. All issues affecting the movement of vehicles are to be addressed		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***

		immediately by the Contractor and relevant stakeholders e.g., law enforcement, relevant roads department and authorities.
		
		• *Component Delivery*
		  ○ The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
		
		• *Maintenance of vehicles*
		  ○ All vehicles and construction plant shall be regularly maintained, repaired when necessary and inspected on a regular basis to ensure that the vehicles are in good working order. Construction and passenger vehicles shall be monitored to ensure that vehicles are not overloaded.
		
		• *Maintenance of roads*
		  ○ The Contractor shall maintain the road used by construction vehicles, repairing any damage caused by construction traffic to the surrounding road network.
		  ○ Dust suppression of gravel roads during the construction phase, as required.
		  ○ Road verges at the site shall be regularly maintained to ensure that vegetation remains short and that the roads serve as an effective firebreak.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		○ 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. • *Signage* ○ Signage, in accordance with the South African Road Traffic Signs Manual (SARTSM), will be required to be conspicuously placed at appropriate locations along all access roads, the internal roads to the site and public roads used by construction vehicles (in consultation with the relevant traffic authorities) to indicate the following: ○ all road and pedestrian hazards; - site access - site offices - wayfinding signs on internal roads e.g. parking, toilets, emergency assembly point - crossing points; - speed limits; - turning traffic; - dedicated routes for construction vehicles and staff; - no-go areas; and - any traffic control information which may be relevant to the construction activity at the time.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		○ It is recommended that flagmen be implemented when high volumes of construction traffic are expected to help direct the traffic, thus ensuring the safe movement of the vehicles and reducing the potential conflicts. • *Speed limit* ○ All drivers operating vehicles shall comply with the posted speed limits (or the maximum allowable speed as per the permit for abnormal load vehicles) on public roads as well as a proposed 30km/h speed limit within the construction site and access roads. ○ The failure to adhere to the prescribed speed limits is an offence and disciplinary action may be taken by the Contractor. • *Abnormal Loads* ○ Abnormal permits are required for vehicles exceeding the permissible maximum dimensions on road freight transport in terms of the Road Traffic Act (Act No. 93 of 1996). ○ Abnormal Loads may be required which 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.		

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		• *Preferred Abnormal load route* ○ 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 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, prior to the transportation of any components, to ensure that the 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. 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. ○ 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.		

Table 9-2: EMPr Input – Operational Phase

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
B. OPERATIONAL PHASE				
B.1. TRAFFIC IMPACTS				
Dust and noise pollution due to operational traffic.	Minimize impacts on road network and surrounding area.	• *Traffic Management Plan* ○ A copy of the TMP must be kept at the facility and a designated employee will ensure that the plan is enforced and will make sure that the Plan is available to all relevant personnel and external maintenance/repair teams. ○ The Facility Manager (or equivalent designation) is expected to review the TMP annually or immediately after an incident, when corrective measures will be incorporated into the Plan. • *Cleaning of panels* ○ Staff and general (maintenance) trips should occur outside of peak traffic periods as far as possible. ○ Should municipal water not be available, water will have to be transported to the site. ○ The provision of water tanks. ○ Water bowsers trips should occur outside of peak traffic periods as far as possible. ○ Using a larger water bowser.	▪ Regularly and as required during operational phase.	▪ Client/Facility Manager

Impact	Mitigation/Management Objectives	Mitigation/Management Actions	Monitoring	
			Frequency	***Responsibility***
		• *Maintenance of roads* ○ Any gravel roads used by vehicles visiting the facility during the operational phase will be maintained and repaired when damaged, if required. ○ Dust suppression of any gravel roads during the operational phase, if required.		

10 CONCLUSION AND RECOMMENDATIONS

This report focuses on the southern PV farms of the Mercury Cluster Solar PV Project comprising Hormah Solar PV1 and Ratpan Solar PV1. The potential transport related impacts for the construction and operation phases for the proposed southern PV farms were assessed.

Hormah Solar PV1

- The construction phase traffic, although significant, will be temporary and impacts are considered to have a medium significance without mitigation measures and low with mitigation measures.
- During operation, it is expected that staff trips and trips for maintenance requirements to the facility will occur. Approximately 30 full-time workers will be stationed on site.
- The number of water delivery vehicles transporting water could be reduced by providing boreholes and/or water storage tanks on site and staggering deliveries outside peak hours. However, it is estimated that water will only be delivered to site a maximum of four times a year.

The potential mitigation measures mentioned in the construction phase are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batch 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.
- Design and maintenance of internal 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 accommodate the abnormal load vehicles.

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

The main access road to the facility will be the R76 and the proposed access point to the Hormah Solar PV1 facility will also be located on the R76. The access road and proposed access point are deemed feasible from a traffic and transportation engineering perspective.

The Directorate Road Asset Management (Department of Police, Roads & Transport, Free State Province) supports the Mercury Cluster Solar PV Project (and the use of the provincial gravel roads) subject to certain conditions shown in **Annexure B**.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

The impacts associated with the Hormah Solar PV1 facility are acceptable with the implementation of the recommended mitigation measures and can therefore be authorised.

Ratpan Solar PV1

- The construction phase traffic, although significant, will be temporary and impacts are considered to have a medium significance without mitigation measures and low with mitigation measures.
- During operation, it is expected that staff trips and trips for maintenance requirements to the facility will occur. Approximately 30 full-time workers will be stationed on site.
- The number of water delivery vehicles transporting water could be reduced by providing boreholes and/or water storage tanks on site and staggering deliveries outside peak hours. However, it is estimated that water will only be delivered to site a maximum of four times a year.

The potential mitigation measures mentioned in the construction phase are:

- Dust suppression
- Component delivery to/ removal from the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- The use of mobile batch 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.
- Design and maintenance of internal 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 accommodate the abnormal load vehicles.

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

The main access road to the facility will be the R76 and the proposed access point to the Ratpan Solar PV1 facility will also be located on the R76. The access road and proposed access point are deemed feasible from a traffic and transportation engineering perspective.

The Directorate Road Asset Management (Department of Police, Roads & Transport, Free State Province) supports the Mercury Cluster Solar PV Project (and the use of the provincial gravel roads) subject to certain conditions shown in **Annexure B**.

The development is supported from a transport perspective provided that the recommendations and mitigations contained in this report are adhered to.

The impacts associated with the Ratpan Solar PV1 facility are acceptable with the implementation of the recommended mitigation measures and can therefore be authorised.

11 REFERENCES

- Google Earth Pro
- National Road Traffic Act (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
- The Technical Recommendations for Highways (TRH 17): Geometric Design of Rural Roads

Annexure A - Assessment Methodology

Impact Assessment Tables

Impacts are evaluated and assessed in terms of the following criteria:

Extent of impact	***Explanation of extent***
Site	*Impacts limited to construction site and direct surrounding area*
Local	*Impacts affecting environmental elements within the local area / district*
Regional	*Impacts affecting environmental elements within the province*
National	*Impacts affecting environmental elements on a national level*

Duration of impact	***Explanation of duration***
Short term	*0 - 5 years. The impact is reversible in less than 5 years.*
Medium term	*5 - 15 years. The impact is reversible in less than 15 years.*
Long term	*>15 years, but where the impacts will cease if the project is decommissioned*
Permanent	*The impact will continue indefinitely and is irreversible.*

Probability of impact	***Explanation of Probability***
Unlikely	*The chance of the impact occurring is extremely low*
Possible	*The impact may occur*
Probable	*The impact will very likely occur*
Definite	*Impact will certainly occur*

Reversibility of impact	***Explanation of Reversibility Ratings***
Low	*The affected environment will not be able to recover from the impact - permanently modified*
Medium	*The affected environment will only recover from the impact with significant intervention*
High	*The affected environmental will be able to recover from the impact*

Significance of impact	***Explanation of Significance***
None	*There is no impact at all*
Low	*Impact is negligible or is of a low order and is likely to have little real effect*
Moderate	*Impact is real but not substantial*
High	*Impact is substantial*
Very high	*Impact is very high and can therefore influence the viability of the project*

DESIGN AND PRE-CONSTRUCTION PHASE

Each impact will have the following table:

Impact Description
Cumulative impact description
Mitigation

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	Medium	High

CONSTRUCTION PHASE

Each impact will have the following table:

Impact Description

Cumulative impact description

Mitigation

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	Medium	High

POST-CONSTRUCTION AND OPERATIONAL PHASE

Each impact will have the following table:

Impact Description

Cumulative impact description

Mitigation

Impact Assessment

Name of Impact	Extent	Duration	Probability	Reversibility of impact	Significance without mitigation	Significance after mitigation

Impact on Irreplaceable Resources (*after* mitigation) If yes, please explain	YES	NO

Cumulative impact rating (*after* mitigation) If high, please explain	Low	Medium	High

Annexure B – Letter from Free State Province
REF: P29/4/201/P15/2