



EIA REPORT:

PIXLEY PARK SOLAR CLUSTER, NORTHERN CAPE PROVINCE

TRANSPORT STUDY

July 2022
First Issue

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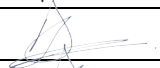

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SYNOPSIS Preparation of a Transport Study for the EIA Stage of the proposed Pixley Park Solar Cluster near De Aar in the Northern Cape Province, pertaining to all relevant traffic and transportation engineering aspects.

KEY WORDS: EIA Report, Solar Energy, Transport Study, Photovoltaic, PV
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QUALITY VERIFICATION This report has been prepared under the controls established by a quality management system that meets the requirements of ISO 9001: 2015 which has been independently certified by DEKRA Certification.	
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PROPOSED PIXLEY PARK SOLAR CLUSTER, NORTHERN CAPE PROVINCE

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PROPOSED PIXLEY PARK SOLAR CLUSTER, NORTHERN CAPE PROVINCE

1 INTRODUCTION AND METHODOLOGY

1.1 Scope and Objectives

The project is planned as part of a cluster of renewable energy facilities known as Pixley Park, which includes four Solar PV Facilities (see Figure 1-1):

- Carolus Solar PV1 – 120MW,
- Fountain Solar PV1 – 120MW,
- Wagt Solar PV1 – 200MW; and
- Riet Fountain Solar PV1 – 120MW.

The projects will all connect to the new Vetlaagte Main Transmission Substation (MTS) via the Wag 'n Bietjie MTS.

It is the developer's intention to bid the proposed project under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme (or similar programme), with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with each of the four facilities set to inject respectively the above listed generation capacity into the national grid.

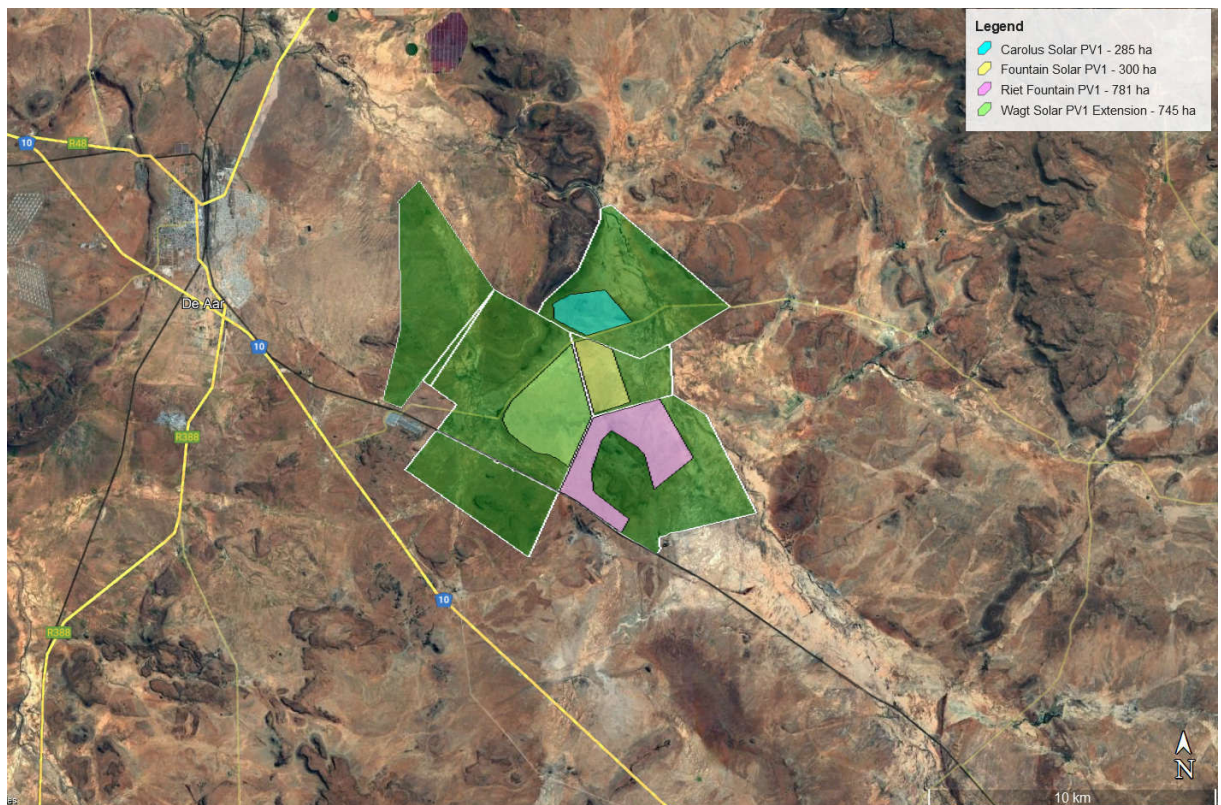


Figure 1-1: Proposed Pixley Park Solar Cluster

As part of the Environmental Impact Assessment (EIA) process undertaken, the services of a Transportation Specialist are required to conduct a Transport Study and JG Afrika (Pty) Ltd was consequently appointed to conduct the Traffic Impact Assessments.

The following two main transportation activities will be investigated:

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

The transport study will aim to provide the following objectives:

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

1.2 Terms of Reference

General:

A specialist report prepared in terms of the Regulations must 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 accesses;
- 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 proposed sites:

- during the construction of the access roads;
- construction of the facilities; and
- operation and maintenance during the operational phase.

This transport study was informed by the following:

Site Visit and Project Assessment

- Overview of project background information including location maps, component specs and any possible resulting abnormal loads to be transported.
- Research of all available documentation and information relevant to the proposed facilities; and
- Site visit to gain sound understanding of the project.

The transport study considered and assessed the following:

Traffic and Haul Route Assessment

- Estimation of trip generation;
- Discussion on potential traffic impacts;
- Assessment of possible haul routes; and
- Construction and operational (maintenance) vehicle trips.

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.

1.4 Assumptions and Limitations

The following assumptions and limitations apply:

- This study is based on the project information provided by Savannah Environmental (Pty) Ltd.
- According to the Eskom Specifications for Power Transformers (Eskom Power Series, Volume 5: Theory, Design, Maintenance and Life Management of Power Transformers), the following dimensional limitations need to be kept when transporting the transformer – total maximum height 5 000mm, total maximum width 4 300mm and total maximum length 10 500mm.
- Maximum vertical height clearances along the haulage route is 5.2m for abnormal loads.
- Imported elements will be transported from the most feasible port of entry, which is deemed to be Port of Ngqura.
- If any elements are manufactured within South Africa, these will be transported from their respective manufacturing centres, which would be either in the greater Johannesburg area for the transformer, inverter and the support structures and in Pinetown/Durban, Cape Town or Johannesburg for the PV modules.
- All haulage trips will occur on either surfaced national and provincial roads or existing gravel roads.
- Construction materials will be sourced locally as far as possible.
- Approximately 30 full-time employees will be stationed at each of the four sites during the operational phase.

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;
- 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
- Information gathered during the site visit; and
- Project research of all available information.

2 DESCRIPTION OF PROJECT ASPECTS RELEVANT TO THE TRANSPORT STUDY

2.1 Port of Entry

It is assumed that if components are imported to South Africa, it will be via the Port of Ngqura, which is located in the Eastern Cape. The Port is located approximately 480km from the proposed site. The Port of Ngqura 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.

Alternatively, components can be imported via the Port of Saldanha in the Western Cape. The Port of Saldanha, located 825km from the proposed site, is the largest and deepest natural port in the Southern Hemisphere able to accommodate vessels with a draft of up to 21.5m.

2.2 Transportation requirements

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

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

2.3 Abnormal Load Considerations

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

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

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

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

2.5 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 of 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, pylons 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 Pixley Park Solar Cluster will be located approximately 10km east of De Aar, as shown in Figure 3-1. The proposed site is bounded by the R389 to the east and the N10 to the west and south.

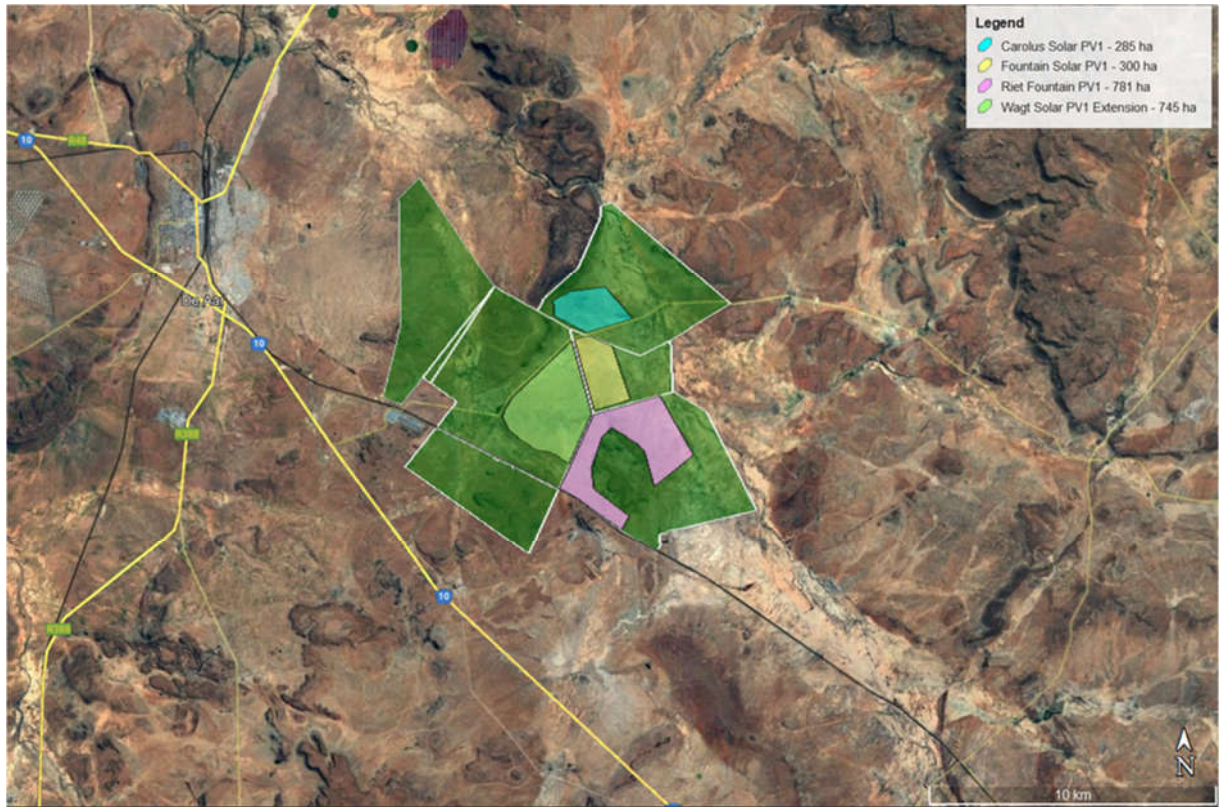


Figure 3-1: Aerial View of the Proposed Pixley Park Solar Cluster

The Pixley Park Solar Cluster is proposed to include four (4) solar PV facilities, e.g. Carolus Solar PV1, Fountain Solar PV1, Wagt Solar PV1, and Riet Fountain Solar PV1.

3.1.1 Carolus Solar PV 1

Carolus Solar PV1 (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on Portion 3 of the Farm Carolus Poort No.3, located approximately 10km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, as shown in blue in Figure 3-1.

The facility will have a contracted capacity of up to 120MW and will be known as Carolus Solar PV1.

A development footprint of approximately 285ha has been identified within the broader project site (approximately 8 200ha in extent) by the developer for the development of the Carolus Solar PV1 Facility, which is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes.

3.1.2 Fountain Solar PV1

Fountain Solar PV1 (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on Portion 1 of the Farm Riet Fountain No.6, located approximately 10km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, as shown in yellow in Figure 3-1.

The facility will have a contracted capacity of up to 120MW and will be known as Fountain Solar PV1.

A development footprint of approximately 300ha has been identified within the broader project site (approximately 8 200ha in extent), by the developer for the development of the Fountain Solar PV1 Facility, which is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes.

3.1.3 Wagt Solar PV1

Wagt Solar PV1 (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on Farm Wag 'n Bietjie Annex C 137 and Farm Wag 'n Bietjie No. 5 located approximately 10km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, as shown in green in Figure 3-1.

The facility will have a contracted capacity of up to 200MW and will be known as Wagt Solar PV1.

A development footprint of approximately 745ha has been identified within the broader project site (approximately 8 200ha in extent), by the developer for the development of the Wagt Solar PV1 Facility, which is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes.

3.1.4 Riet Fountain Solar PV1

Riet Fountain Solar PV1 (Pty) Ltd is proposing the development of a Photovoltaic (PV) Solar Energy Facility and associated infrastructure on Portion 4 of the Farm Riet Fountain No.6, located approximately 10km east of De Aar within the Emthanjeni Local Municipality in the Northern Cape Province, as shown in red in Figure 3-1.

The facility will have a contracted capacity of up to 120MW and will be known as Riet Fountain Solar PV1.

A development footprint of approximately 781ha has been identified within the broader project site (approximately 8 200ha in extent), by the developer for the development of the Rietfontein Solar PV1 Facility, which is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes.

Each of the four project sites is proposed to accommodate the following infrastructure, which will enable these facilities to supply the respective contracted capacities:

- Solar PV array comprising bifacial PV modules and mounting structures, using single axis tracking technology
- Inverters and transformers
- Cabling between the panels
- Battery Energy Storage System (BESS)
- Laydown areas, construction camps, site offices
- 12m wide Access Road and entrance gate to the project site and switching station
- 6m wide internal distribution roads
- Operations and Maintenance Building, Site Offices, Ablutions with conservancy tanks, Storage Warehouse, workshop, Guard House
- Onsite 132kV IPP Substation, including the HV Step-up transformer, and MV Interconnection building
- 132kV Overhead Power Line (OHPL) – 30m height from the switching station to the Main Transmission Substation (MTS) located on farms Vetlaagte and Wagt, which is to be handed back to Eskom (a separate EA is being applied for in this regard)
- Extension of the 132kV Busbar at the MTS
- 132kV Feeder Bay at the MTS
- Extension of the 400kV Busbar at the MTS
- Installation of a new 400/132kV Transformer and bay at the MTS

The solar PV facility is proposed in response to the identified objectives of the national and provincial government and local and district municipalities to develop renewable energy facilities for power generation purposes. It is the developer's intention to bid the proposed project under the Department of Mineral Resources and Energy's (DMRE's) Renewable Energy Independent Power Producer Procurement (REIPPP) Programme (or similar programme), with the aim of evacuating the generated power into the national grid. This will aid in the diversification and stabilisation of the country's electricity supply, in line with the objectives of the Integrated Resource Plan (IRP), with each of the four solar PV facilities set to inject the respective MWs into the national grid.

3.2 National Route to Site for Imported Components

There are two viable options for the port of entry for imported components - the Port of Ngqura in the Eastern Cape and the Port of Saldanha in the Western Cape.

The Port of Ngqura is located approximately 480km travel distance from the proposed site whilst the Port of Saldanha is located approximately 825km travel distance from the proposed site. The Port of Ngqura is the preferred port of entry, however, the Port of Saldanha can be used as an alternative should the Port of Ngqura not be available.

The preferred route from the Port of Ngqura is shown in green in Figure 3-2 below. The route is approximately 480km and follows the N10 north, passing Cradock and Middelburg before turning off on Hydra Road that leads to the proposed site.

The alternative route from the Port of Saldanha, shown in orange in Figure 3-2, will follow the R45 east to Moorreesburg before taking the R46 east to Ceres. Vehicles will head east on the N1, passing Laingsburg, Beaufort West and Richmond before turning off onto the N10 at Hanover. Vehicles will follow the N10 in a north-westerly direction before turning off onto Hydra Road that leads to the proposed site.



Figure 3-2: Preferred and Alternative Routes

It is critical to ensure that the abnormal load vehicle will be able to move safely and without obstruction along the preferred route. The preferred route should be surveyed prior to construction to identify any problem areas, e.g. intersections with limited turning radii and sections of the road with sharp horizontal curves or steep gradients, that may require modification. After the road modifications have been implemented, it is recommended to undertake a “dry-run” with the largest abnormal load vehicle, 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.

3.3 Route for Components manufactured locally

As mentioned in Section 1.4 (Assumptions and Limitations), it is anticipated that elements manufactured within South Africa will be transported to the site from the Cape Town, Johannesburg and Pinetown/Durban areas. It is also assumed that the transformers, which will be transported with an abnormal load vehicle, will be transported from the Johannesburg area and therefore it needs to be verified that the route from the

manufacturer to the site does not have any load limitations for abnormal vehicles. At this stage, only a high-level assessment can be undertaken 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.

3.4 Route from Cape Town to Proposed Site

Components, such as PV modules, manufactured in Cape Town will be transported to site via road as shown in Figure 3-3. Haulage vehicles will travel from Cape Town on N1 to the proposed site, passing Laingsburg and Beaufort West before turning onto the N10 at Hanover.

Haulage vehicles will mainly travel on the national highway and the total distance to the proposed site is approximately 765km.



Figure 3-3: Route from Cape Town to Proposed Site

3.5 Route from Johannesburg to Proposed Site

It is assumed that the inverters and support structure will be manufactured in the Johannesburg area and transported to site via the N1. The travel distance is around 760km, and no road limitations are expected on this route for normal loads vehicles as it will mainly follow national and provincial roads. The route is shown in Figure 3-4.



Figure 3-4: Route from Johannesburg to Proposed Site

3.6 Route from Pinetown / Durban to Proposed Site

If the PV modules are manufactured in South Africa, they could possibly be manufactured in the Pinetown area, close to Durban and transported to site via road. These elements are normal loads, and no road limitations are expected along the routes, which is shown in Figure 3-5. Haulage vehicles will mainly travel on national and provincial roads and the total distance to the proposed site is approximately 1 000km.



Figure 3-5: Route from Durban / Pinetown to Proposed Site

3.7 Route from Johannesburg Area to Site – Abnormal Load

It is assumed that the transformer will be manufactured locally in South Africa 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 considering any limitations due to existing road features. Furthermore, a load of abnormal dimensions may cause an obstruction and danger to other traffic and therefore the transformers need to be transported as far as possible on roads that are wide enough for general traffic to pass. It is expected that the transformers 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. The road is fairly straight and will pass through towns such as Bloemfontein and Hanover en route to the site. According to the desktop study, all turning movements along the route are manageable for the abnormal vehicle.

However, there are a number of alternative routes which can be investigated if the above route or sections of the route should not be feasible.

3.8 Proposed main access road and access points to the Proposed Development

The proposed main access road to the sites is an existing gravel road, known as Hydra Road, with an east-west orientation, located between the R389 in the east and the N10 in the west, as shown in green in Figure 3-6. The proposed main access road will link to individual site access roads, as shown in Error! Reference source not found., Error! Reference source not found. and Error! Reference source not found..

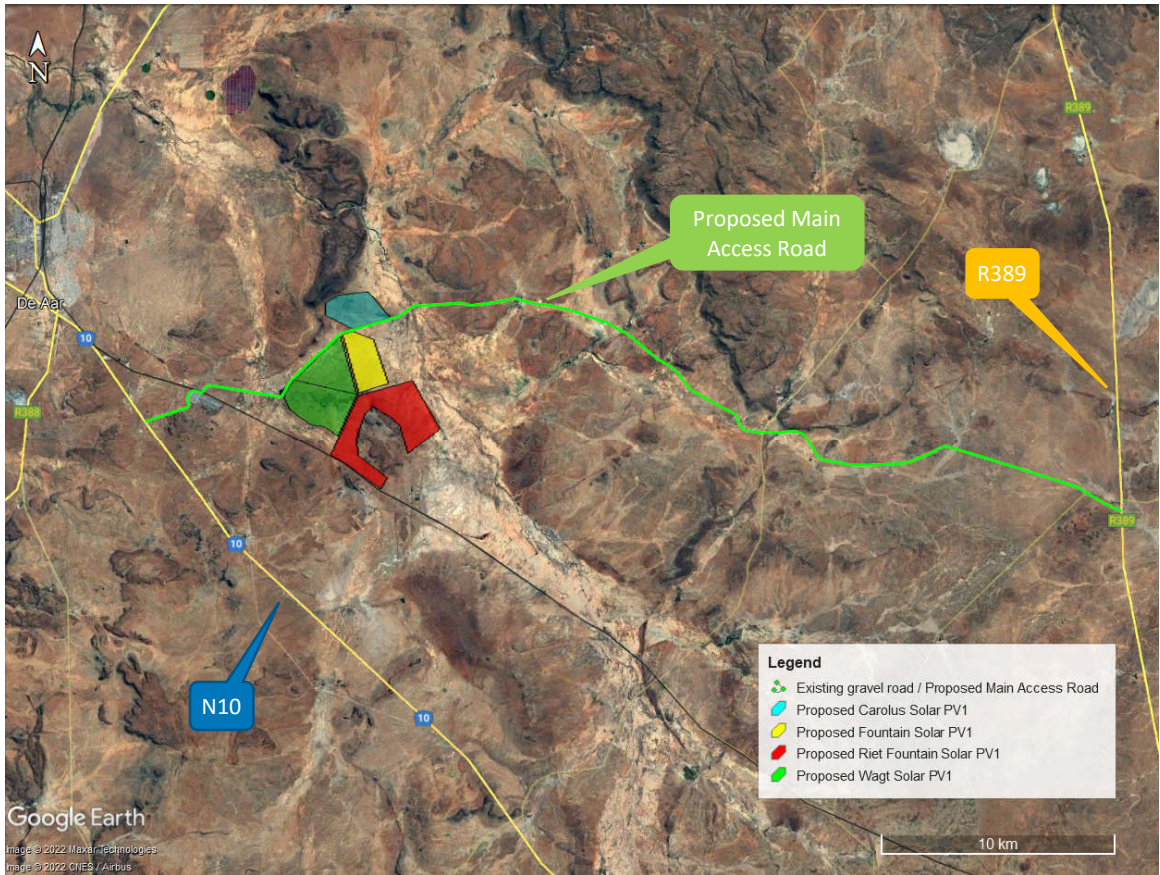


Figure 3-6: Proposed Main Access Road

The **proposed main access road to the development is deemed suitable** as it is an existing road. The existing road is surfaced between the turn-off at the N10 up to the Hydra Substation. The road crosses the railway line via an at-grade level crossing from where it continues east as a gravel road.



Photo 3-1: Existing level crossing near Hydra Substation, on the proposed main access road

The Client should note that application for wayleaves and permits should be made to the railway authority (Transnet) well in advance of construction commencing. Special safety measures e.g., access booms might be required to protect drivers of vehicles from oncoming railway traffic, especially in instances of poor visibility and increased traffic flow. All vertical clearances appear to be sufficient, but the height clearances need to be physically verified, especially in the vicinity of overhead power supply at the railway crossing. Should the railway authority not grant permission for the level crossing to be used during construction and operational phases, accessing the sites from the east via the R389 can be considered as an alternative access road. However, the condition of the road is unknown, and it is recommended that a site visit be conducted to determine the suitability thereof. This appears to be the only access road that does not cross the railway lines and no other safe alternative routes could be identified to gain access to the sites.

Site Access Point Carolus PV1

The proposed site access road for Carolus Solar PV1 is shown in blue in Figure 3-7 and is suitable as it has sufficient shoulder sight distance to either side.

Site Access Point Fountain Solar PV1

The proposed site access road for Fountain Solar PV1 is shown in yellow in Figure 3-8, but it is located on the inside of a horizontal curve and might cause reduction in visibility of oncoming vehicles on either side. A recommended site access is indicated in dark yellow and has sufficient shoulder sight distances to either side of the access point.

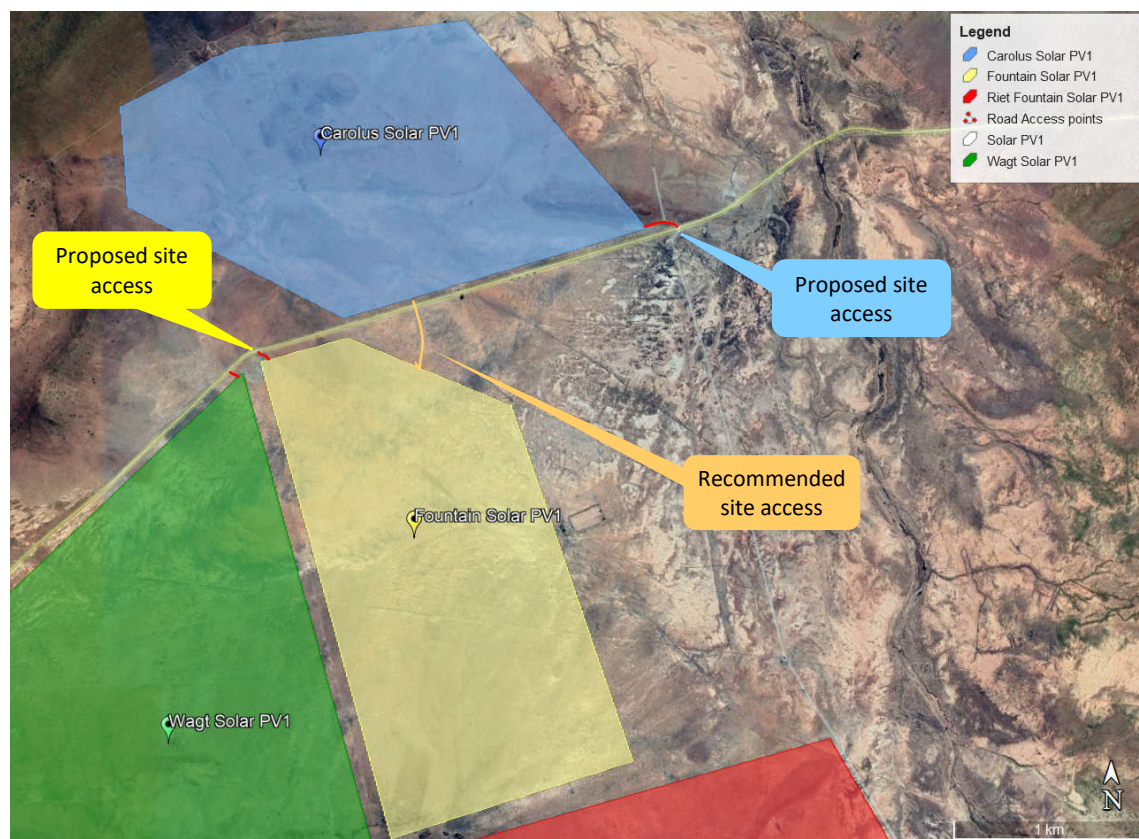


Figure 3-7: Proposed site access roads and access points: Carolus and Fountain Solar PV1

Site Access Point Riet Fountain Solar PV1

The proposed site access road for Riet Fountain Solar PV1 is shown in red in Figure 3-8. As this proposed access will be located on the outside of a bend, shoulder sight distances are acceptable.

Site Access Point Wagt Solar PV1

The proposed site access road for Wagt Solar PV1 is shown in green in Figure 3-8. This existing gravel road is narrow and will require regraveling and widening at certain locations along the route. The access point is also located on a horizontal curve and shoulder sight distances are not sufficient. It is therefore proposed that the location indicated in dark green be considered as a site access point. This new proposed access point would meet the requirements in terms of shoulder sight distance.

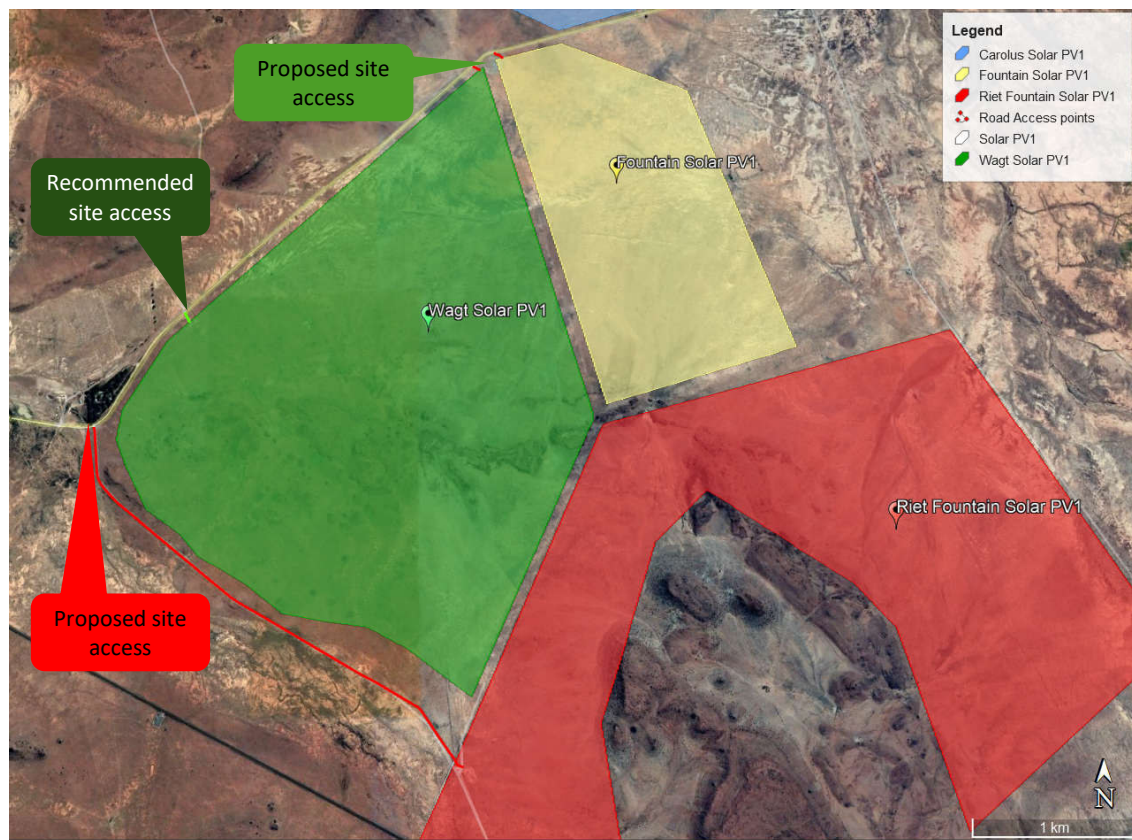


Figure 3-8: Proposed site access roads and access points: Wagt Solar and Riet Fountain PV1



Photo 3-2: Proposed access to Riet Fountain Solar PV1



Photo 3-3: Insufficient shoulder sight distance to the East on proposed access to Riet Fountain Solar PV1

A minimum required road width of 4 m needs to be maintained and all turning radii must conform with the specifications needed for the abnormal load vehicles and haulage vehicles. It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence 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 and the geometric design of these gravel roads needs to be confirmed at detailed design stage.

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

The nearest towns in relation to the proposed development sites are De Aar, Richmond, Britstown and Hanover. It is envisaged that most materials, water, plant, services and people will be procured within an 80km radius of the proposed facility. However, this would be informed by the REIPPPP requirements. The nearest major town, Beaufort West, is located approximately 305km from the proposed development site.

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

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)
- 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.
- SANS 3000-2-2-1: Technical Requirements for Engineering and Operational Standards – Track, Civil and Electrical Infrastructure – Level Crossings
- Transnet Freight Rail Technical requirements for new level crossing application

5 IDENTIFICATION OF KEY ISSUES

5.1 Identification of Potential Impacts

The potential transport related impacts are described below.

5.1.1 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 for electrical cables and other ancillary construction works that will temporarily generate the most traffic.

5.1.2 Operational Phase

During operation, it is expected that staff and security will periodically visit the facilities. It is assumed that approximately 30 full-time employees will be stationed on each of the four sites. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.

5.1.3 Decommissioning Phase

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

5.1.4 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 Potential Impact (Construction Phase)

6.1.1 Nature of the impact

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

6.1.2 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, the haulage company transporting the components to site, the staff requirements and where equipment is sourced from.

6.1.3 Trip generation - Construction Phase

From experience on other projects of similar nature, the number of heavy vehicles per 7MW installation is estimated to range between 200 and 300 trips depending on the site conditions and requirements.

For Carolus Solar PV1, Fountain Solar PV1 and Riet Fountain Solar PV1 (each 120MW), the respective 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. Considering that the number of vehicle trips during peak hour traffic in a rural environment can roughly be estimated at around 20-40% of the average daily traffic, the resulting vehicle trips for the construction phase are approximately 4-8 trips.

For Wagt Solar PV1 with 200 MW, the total trips can be estimated to be between 5 714 and 8 572. Choosing the worst-case scenario of 8 572 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 33. Considering that the number of vehicle trips during peak hour traffic in a rural environment can roughly be estimated at around 20-40% of the average daily traffic, the resulting vehicle trips for the construction phase are approximately 7-13 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 2MW packages and 40ft containers). These can then be stored at the port and repacked onto flatbed trucks.

As no specific information was available at the time of preparing this report, it was assumed that during the peak of the construction period, 200 employees will be active on site.

Staff trips are assumed to be per sites mentioned above:

Table 6-1: Estimation of daily staff trips per site

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 for each of the three sites are shown in the table below.

Table 6-2: Estimation of daily trips per site

Activity	Number of trips
Staff trips	36
Component delivery	17
Construction trips	150
Total	203

The impact on general traffic is therefore deemed nominal as the 203 trips will be distributed across a 9hr working day. The majority of the trips will occur outside the peak hours.

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. Further mitigation measure due to more than one site being developed are discussed in the cumulative impact section of this report.

6.1.4 Significance of impact with mitigation measures

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

- The delivery of components to the site can be staggered and trips can be scheduled to occur outside of peak traffic periods.
- Dust suppression of gravel roads during the construction phase, as required.
- Regular maintenance of gravel roads by the Contractor during the construction phase and by the Owner/Facility Manager during the operation phase.
- The use of mobile batch plants and quarries near the site would decrease the traffic impact on the surrounding road network.
- Staff and general trips should occur outside of peak traffic periods as far as possible.

- 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 accommodate the abnormal load vehicles.
- 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 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 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.
- Design and maintenance of internal roads. The 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.

6.2 Potential Impact (Operational Phase)

6.2.1 Nature of the impact

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

6.2.2 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 can be significant. However, water related trips are expected to not occur more than four times a year.

6.2.3 Trip Generation – Operational Phase

During operation, it is assumed that approximately 30 full-time employees will be stationed on site and hence vehicle trips generated are low and will have a negligible impact on the external road network. 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).

▪ **Trips generated by material delivery:**

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

- On a commercial scale, Solar panels are typically cleaned using special cleaning agents or treated water such as distilled, deionized (DI) or reverse osmosis (RO) water. The treated water can be trucked in via water tankers or alternatively an onsite water treatment system can be installed to generate treated water.

- Using manpower to clean solar panels can be physically tasking resulting in long hours and high staff demands for large volumes of panels (e.g., A 32 panel system on average takes 2 hours to clean (Sunpower, n.d.)).
- Manpower/manual cleaning has a disadvantage of uneven and inconsistent pressure which can result in damaged solar panels.
- Commercial and large solar facilities often employ mechanical cleaning systems because they have high power and efficiency, and the cleaning work has good consistency of pressure on solar panels drastically limiting solar panel damage. Mechanical systems can also work faster than manual cleaning. See Figure 6-1 and Figure 6-2 for examples of mechanical cleaning systems (Bluesun Solar Group, n.d.)



Figure 6-1: Mechanical Solar panel cleaning system



Figure 6-2: Cleaning robot

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

Assumption	Resulting volumes
Assume all panels are scheduled to be cleaned in 10 days	17 273 panels are cleaned per day
32 panels can be cleaned in 2 hours	64 panels/person/day
Number of staff required to meet assumed target	270 cleaning personnel
Staff trips assuming passenger capacities of 60 for a bus, 15 for a taxi, and 5 for a passenger vehicle.	5 trips staff + 1 trip for managers/coordinators

Assume as a worst-case scenario a weekly supply of cleaning water is delivered at once and stored on site. Limits down time. (5L per panel and 5000L delivery truck)	431.8kL total volume required 87 trucks for delivery Assumed peak hour trips are around 20-40% of the average daily traffic. 35 peak hour trips generated for water delivery
Total estimated peak hour trips	41

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

During the operational phase, the maximum estimated peak hour traffic is an average 8 trips and a periodic 49 peak hour trips when solar cleaning is scheduled. With less than 50 peak hour trips the traffic impact during the operational phase is considered negligible.

6.2.4 Significance of impact with mitigation measures

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

- Staff and general (maintenance) trips should occur outside of peak traffic periods as far as possible.
- The provision of water storage tanks and/or boreholes.
- Water bowsers trips should occur outside of peak traffic periods as far as possible.
- Spread the cleaning of the panels over a week.
- Using a larger water bowser.

7 NO-GO ALTERNATIVE

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

8 POTENTIAL IMPACT ASSESSMENT SUMMARY

The assessment of potential impacts discussed above are collated in the tables below for each of the four sites.

8.1 Construction Phase

8.1.1 Construction Phase – Carolus Solar PV1

Table 8-1: Impact Rating - Construction Phase: Carolus Solar PV1 – Traffic Congestion

Nature:			
Traffic congestion during the construction phase			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (40)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> Stagger component delivery to site Reduce the construction period Source mobile batch plants and quarries in close proximity to the site Staff and general trips should occur outside of peak traffic periods as much as possible Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. Lodge wayleave application with Transnet as soon as possible. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed.			

Table 8-2: Impact Rating - Construction Phase: Carolus Solar PV1 – Air Quality

Nature: Air quality will be affected by dust pollution			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation: <ul style="list-style-type: none"> Dust suppression of gravel roads during the construction phase, as required. Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts: The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks: Traffic will return to normal levels after construction is completed. Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.			

Table 8-3: Impact Rating - Construction Phase: Carolus Solar PV1 – Noise Pollution

Nature:			
Noise pollution due to the increase in traffic			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period as far as possible • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed. Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.			

8.1.2 Construction Phase – Fountain Solar PV1

Table 8-4: Impact Rating - Construction Phase: Fountain Solar PV1 – Traffic Congestion

Nature:			
Traffic congestion during the construction phase			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (40)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period • Source mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods as much as possible • Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. • Lodge wayleave application with Transnet as soon as possible. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed.			

Table 8-5: Impact Rating - Construction Phase: Fountain Solar PV1 – Air Quality

Nature: Air quality will be affected by dust pollution			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation: <ul style="list-style-type: none"> Dust suppression of gravel roads during the construction phase, as required. Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts: The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks: Traffic will return to normal levels after construction is completed. Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.			

Table 8-6: Impact Rating - Construction Phase: Fountain Solar PV1 – Noise Pollution

Nature:			
Noise pollution due to the increase in traffic			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period as far as possible • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
<p>The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.</p>			
Residual Risks:			
<p>Traffic will return to normal levels after construction is completed. Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.</p>			

8.1.3 Construction Phase – Wagt Solar PV1

Table 8-7: Impact Rating - Construction Phase: Wagt Solar PV1 – Traffic Congestion

Nature:			
Traffic congestion during the construction phase			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (40)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period • Source mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods as much as possible • Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. • Lodge wayleave application with Transnet as soon as possible. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed.			

Table 8-8: Impact Rating - Construction Phase: Wagt Solar PV1 – Air Quality

Nature: Air quality will be affected by dust pollution			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation: <ul style="list-style-type: none"> • Dust suppression of gravel roads during the construction phase, as required. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts: The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks: Traffic will return to normal levels after construction is completed. Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.			

Table 8-9: Impact Rating - Construction Phase: Wagt Solar PV1 – Noise Pollution

Nature:			
Noise pollution due to the increase in traffic			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period as far as possible • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
<p>The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.</p>			
Residual Risks:			
<p>Traffic will return to normal levels after construction is completed. Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.</p>			

8.1.4 Construction Phase – Riet Fountain Solar PV1

Table 8-10: Impact Rating - Construction Phase: Riet Fountain Solar PV1 – Traffic Congestion

Nature:			
Traffic congestion during the construction phase			
Impact description: The impact will occur due to added pressure on the road network due to the increase in traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (40)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (6)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period • Source mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods as much as possible • Conduct regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. • Lodge wayleave application with Transnet as soon as possible. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed.			

Table 8-11: Impact Rating - Construction Phase: Riet Fountain Solar PV1 – Air Quality

Nature:			
Air quality will be affected by dust pollution			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Dust suppression of gravel roads during the construction phase, as required. • Regular maintenance of gravel roads by the Contractor during the construction phase and by Client/Facility Manager during operation phase. 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period is expected to last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.			
Residual Risks:			
Traffic will return to normal levels after construction is completed.			
Dust pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Dust pollution is limited to the construction period.			

Table 8-12: Impact Rating - Construction Phase: Riet Fountain Solar PV1 – Noise Pollution

Nature:			
Noise pollution due to the increase in traffic			
Impact description: The impact will occur due to the increase in construction traffic associated with the transport of equipment, material and staff to site during the construction phase.			
	Rating	Motivation	Significance
Prior to Mitigation			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Medium Negative (36)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Moderate (5)	The increase in traffic will have a moderate impact on traffic operations.	
Probability	Highly Probable (4)	The possibility of the impact on the traffic operations is highly probable.	
Mitigation/Enhancement Measures			
Mitigation:			
<ul style="list-style-type: none"> • Stagger component delivery to site • Reduce the construction period as far as possible • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 			
Post Mitigation/Enhancement Measures			
Duration	Short-term (2)	The construction period will last between 1 – 2 years.	Low Negative (15)
Extent	Local (2)	Pressure will only be added on the local road network.	
Magnitude	Low (2)	The increase in traffic will have a low impact on traffic operations.	
Probability	Probable (3)	The possibility of the impact on the traffic operations is probable.	
Cumulative impacts:			
<p>The duration of the construction phase is short term (i.e., the impact of the generated traffic on the surrounding road network is temporary and renewable energy facilities, when operational, do not add any significant traffic to the road network). Even if all renewable energy projects within the area are constructed at the same time, the roads authority will consider all applications for abnormal loads and work with all project companies to ensure that loads on the public roads are staggered and staged to ensure that the impact will be acceptable.</p>			
Residual Risks:			
<p>Traffic will return to normal levels after construction is completed. Noise pollution during the construction phase cannot be completely mitigated but mitigation measures will significantly reduce the impact. Noise pollution is limited to the construction period.</p>			

8.2 Operational Phase

8.2.1 Operational Phase – Carolus Solar PV1

Table 8-13: Impact Rating – Operational Phase: Carolus Solar PV1

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will not have any impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimize/mitigate dust pollution.

8.2.2 Operational Phase – Fountain Solar PV1

Table 8-14: Impact Rating – Operational Phase: Fountain Solar PV1

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will not have any impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimize/mitigate dust pollution.

8.2.3 Operational Phase – Wagt Solar PV1

Table 8-15: Impact Rating – Operational Phase: Wagt Solar PV1

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will not have any impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimize/mitigate dust pollution.

8.2.4 Operational Phase – Riet Fountain Solar PV1

Table 8-16: Impact Rating – Operational Phase: Riet Fountain Solar PV1

IMPACT TABLE – OPERATIONAL PHASE
The traffic generated during this phase will be minimal and will not have any impact on the surrounding road network. However, the Client/Facility Manager is to ensure that regular maintenance of gravel roads occurs during operation phase to minimize/mitigate dust pollution.

8.3 Decommissioning Phase

8.3.1 Decommissioning Phase – Carolus Solar PV1

Table 8-17: Potential Impact - Decommissioning Phase: Carolus Solar PV1

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

8.3.2 Decommissioning Phase – Fountain Solar PV1

Table 8-18: Potential Impact - Decommissioning Phase: Fountain Solar PV1

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

8.3.3 Decommissioning Phase – Wagt Solar PV1

Table 8-19: Potential Impact - Decommissioning Phase: Wagt Solar PV1

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

8.3.4 Decommissioning Phase – Riet Fountain Solar PV1

Table 8-20: Potential Impact - Decommissioning Phase: Riet Fountain Solar PV1

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

9 CUMULATIVE IMPACTS

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

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

The assessments of cumulative impacts are collated in the tables below for the four sites.

9.1.1 Cumulative Impact – Carolus Solar PV1

Table 9-1: Cumulative Impact rating – Carolus Solar PV1

Nature: Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation (post mitigation)	Cumulative impact of the project and other projects in the area
Extent	Local (2)	High (5)
Duration	Short (1)	Medium-term (3)
Magnitude	Low (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	Low (15)	Medium (32)
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		
<ul style="list-style-type: none"> • Stagger component delivery to site • Dust suppression • Reduce the construction period • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 		

9.1.2 Cumulative Impact – Fountain Solar PV1

Table 9-2: Cumulative Impact rating – Fountain Solar PV1

Nature: Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation (post mitigation)	Cumulative impact of the project and other projects in the area
Extent	Local (2)	High (5)
Duration	Short (1)	Medium-term (3)
Magnitude	Low (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	Low (15)	Medium (32)
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		
<ul style="list-style-type: none"> • Stagger component delivery to site • Dust suppression • Reduce the construction period • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 		

9.1.3 Cumulative Impact - Wagt Solar PV1

Table 9-3: Cumulative Impact rating – Wagt Solar PV1

Nature: Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation (post mitigation)	Cumulative impact of the project and other projects in the area
Extent	Local (2)	High (5)
Duration	Short (1)	Medium-term (3)
Magnitude	Low (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	Low (15)	Medium (32)
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		
<ul style="list-style-type: none"> • Stagger component delivery to site • Dust suppression • Reduce the construction period • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 		

9.1.4 Riet Fountain Solar PV1

Table 9-4: Cumulative Impact rating – Riet Fountain Solar PV1

Nature: Traffic generated by the proposed development and the associated noise and dust pollution.		
	Overall impact of the proposed project considered in isolation (post mitigation)	Cumulative impact of the project and other projects in the area
Extent	Local (2)	High (5)
Duration	Short (1)	Medium-term (3)
Magnitude	Low (2)	High (8)
Probability	Probable (3)	Improbable (2)
Significance	Low (15)	Medium (32)
Status (positive/negative)	Negative	Negative
Reversibility	High	High
Loss of resources?	No	No
Can impacts be mitigated?	Yes	Yes
Confidence in findings: High.		
Mitigation:		
<ul style="list-style-type: none"> • Stagger component delivery to site • Dust suppression • Reduce the construction period • The use of mobile batch plants and quarries in close proximity to the site • Staff and general trips should occur outside of peak traffic periods 		

10 ENVIRONMENTAL MANAGEMENT PROGRAM INPUTS

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

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

Mitigation: Action/control	Responsibility	Timeframe
<ul style="list-style-type: none"> Stagger component delivery to site The use of mobile batch plants and quarries near the site would decrease the impact on the surrounding road network Dust suppression Reduce the construction period as far as possible Maintenance of gravel roads Apply for abnormal load permits prior to commencement of delivery via abnormal loads Assess the preferred route and undertake a 'dry run' to test Staff and general trips should occur outside of peak traffic periods as far as possible. Any low hanging overhead lines (lower than 5.1m) e.g., Eskom and Telkom lines, along the proposed routes will have to be moved to accommodate the abnormal load vehicles, if required 	<ul style="list-style-type: none"> Holder of the EA 	<ul style="list-style-type: none"> Before construction commences and regularly during construction phase

Performance Indicator	Staggering or reducing the construction trips will reduce the impact of dust and noise pollution.
Monitoring	<ul style="list-style-type: none"> Regular monitoring of road surface quality. Monitoring congestion levels (increase in vehicle trips) Apply for required permits prior to commencement of construction

12 CONCLUSION AND RECOMMENDATIONS

This report for the EIA stage addressed key issues and alternatives to be considered for the proposed Pixley Park Solar Cluster:

- The preferred Port of Entry for imported components is the Port of Ngqura.
- The proposed access road located off the N10 is deemed a suitable access road as it is an existing gravel road i.e. less expensive to upgrade and/or maintain. However, the Client should note that application for wayleaves and permits should be made to the railway authority (Transnet) well in advance of construction commencing, with specific reference to the railway crossing at the Hydra Substation. The rail authority (Transnet) might also withhold approval.
- The current condition and suitability of the main access road from the R389 should be determined as an alternative route should wayleave approval not be granted by the rail authority.
- It needs to be ensured that the gravel sections of the haulage routes remain in good condition and will hence 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 and the geometric design of these gravel roads needs to be confirmed at detailed design stage.
- The construction phase traffic, although significant, will be temporary and can be mitigated to an acceptable level.
- During operation, it is expected that staff and security will periodically visit each of the facilities. It is assumed that approximately 30 full-time employees will be stationed on each of the four sites. The traffic generated during this phase will be minimal and will not have an impact on the surrounding road network.
- The construction and decommissioning phases of the development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e. the impact of the traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network and impacts are considered to have low significance.

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.
- 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 potential mitigation measures mentioned in the operational phase are:

- Staff and general (maintenance) trips should occur outside of peak traffic periods as far as possible.
- The provision of water storage tanks and/or boreholes.
- Water bowsers trips should occur outside of peak traffic periods as far as possible.
- Spread the cleaning of the panels over a week.
- Using a larger water bowser.

The construction and decommissioning phases of a development is the only significant traffic generator and therefore noise and dust pollution will be higher during this phase. The duration of this phase is short term i.e., the impact of the traffic on the surrounding road network is temporary and solar facilities, when operational, do not add any significant traffic to the road network.

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 Pixley Solar PV Cluster are acceptable with the implementation of the recommended mitigation measures and can therefore be authorised.

13 REFERENCES

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

IRIS SIGRID WINK

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

SUMMARY OF EXPERIENCE

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

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

PROFESSIONAL REGISTRATIONS & INSTITUTE MEMBERSHIPS

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

EDUCATION

1996 - Matric – Matric (Abitur) – Carl Friedrich Gauss Schule, Hemmingen, Germany

1998 - Diploma as Draughtsperson – Lower Saxonian State Office for Road and Bridge Engineering

2003 - MSc Eng (Civil and Transportation) – Leibniz Technical University of Hanover, Germany

SPECIFIC EXPERIENCE (Selection)

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

2016 – Date

Position – Associate

- **Transport Impact Assessments and Management Plan** - Euronotus Wind&Solar Energy Cluster in the Western Cape, Client: WSP on behalf of G7 Energies
- **Transport Impact Assessment for De Aar Solarfarm** - Client: Mulilo
- **Transport Impact Assessments for the Mpumalanga Windfarms** - Client: Enertrag
- **Transport Impact Assessment for the Hyperion Thermal Plant** - Client: Red Rocket
- **Transport Impact Assessment for the Richards Bay Gas to Power Facility** - Client: Savannah
- **Transport Impact Assessment for the Pienaarspoort Wind Energy Facility** - Client: Savannah
- **Transport Impact Assessment for Oya Black Mountain Solar Farm** - Client: G7 Energies
- **Traffic Impact Assessment for the Nooiensfontein Housing Development** - Client: City of Cape Town
- **Kudusberg Windfarm** – Transport study for the proposed Kudusberg Windfarm near Sutherland, Northern Cape – Client: G7 Renewable Energies
- **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 Appraisals** for Northern Region of Cape Town – Client: Aurecon on behalf of City of Cape Town (TCT)
- **Traffic Engineering Services** for the Enkanini Informal Settlement, Kayamandi - Client: Stellenbosch Municipality
- **Lead Traffic Engineer** for the Upgrade of a 150km Section of the National Route N2 from Kangelana 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

Annexure B – ASSESSMENT METHODOLOGY

Assessment of Impacts

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

- » The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- » The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- » The **duration**, wherein it will be indicated whether:
 - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
 - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
 - medium-term (5–15 years) – assigned a score of 3;
 - long term (> 15 years) - assigned a score of 4; or
 - permanent - assigned a score of 5;
- » The **magnitude**, quantified on a scale from 0-10, where a score is assigned:
 - 0 is small and will have no effect on the environment
 - 2 is minor and will not result in an impact on processes
 - 4 is low and will cause a slight impact on processes
 - 6 is moderate and will result in processes continuing but in a modified way
 - 8 is high (processes are altered to the extent that they temporarily cease)
 - 10 is very high and results in complete destruction of patterns and permanent cessation of processes
- » The **probability of occurrence**, which shall describe the likelihood of the impact actually occurring.
Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- » The **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- » The **status**, which will be described as either positive, negative or neutral.
- » The degree to which the impact can be reversed.
- » The degree to which the impact may cause irreplaceable loss of resources.
- » The *degree* to which the impact can be *mitigated*.

The **significance** is calculated by combining the criteria in the following formula:

$$S=(E+D+M)P$$

S = Significance weighting

E = Extent

D = Duration

M = Magnitude

P = Probability

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

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